February 2012

Environmental and Social Impact Assessment Railway Corridor VIII - Eastern section

Contract No:
C21196/EBSF-2010-07-101

Macedonian Railways:
Feasibility Study for Corridor VIII Eastern section and ESIA

SUBMITTED BY:
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Republic of Macedonia
MINISTRY OF TRANSPORT AND COMMUNICATIONS

European Bank
for Reconstruction and Development

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ABBREVIATIONS

AEWA	African-Eurasian Migratory Waterbirds
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AGTC	European Agreement on International Combined Transport Lines
AGTC	European Agreement on International Combined Transport Lines
ARS	Automatic Route Setting
ATP	Automatic Train Protection
BC	Bern Convention
BDZ	Bulgarian railways
CAPEX	Capital Expenses
CBI	Computer-based Interlocking
CEN	Comitée Européen de Normalization - EuropeanCommittee for Standardization
CENELEC	Comité Européen de NormalizationEléctrotéchnique - European Committee for Electro technical Standardization
CITES	Convention of International Trading of Endangered Species
COP	Corporate Operational Plan
CR TSI INS	Conventional Rail 'Infrastructure' Technical specification for interoperability relating to the subsystem infrastructure
CTC	Centralized Traffic Control
CWR	Continuous Welded Rail
DMU	Diesel Multiple Unit
DTM	Digital terrain model
EBRD	European Bank for Reconstruction and Development
ECNC	European Centre for Nature Conservation
EEC	European Union Commision
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMEP	European Monmitoring and Evaluation Programme
EMER	the Program for monitoring the air in Europe
EMU	Electric Multiple Unit Trains
ERTMS	European Rail Traffic Management System
ESIA	Environmental Social Impact Assessment
ETS	European Threat Status
ETS	Bird Life International European Threat Status
ETSI	European Telecommunications Standards Institute
EU	European Union
FTA	Federal Transit Administration
GDP	Gross Domestic Product
GFC	Gross Fixed Capital
GFCF	Gross Fixed Capital Formation
GHG	National greenhouse gas
GIS	Geographic Information Systems
GoM	Government of Macedonia
H&S Plan	Health & Safety Plan

HD	Habitats Directive
HPI-2	Human poverty index
IBAs	Important Bird Areas
IFC	International Finance Corporation
ILO	International Labour Organization
IM	Infrastructure Railway Manager
IPAs	Important Plant Areas
IPPC	Integrated Pollution Prevention and Control
IUCN	International Union for Conservation of Nature
K.P.	Kilometer point
LEAP	Local Environmental Action Plan
LER	Local Economic Development
LEU	Line-side Encoder Unit
LRF	Livelihood restoration framework
MES	Macedonian Ecological Society
MKD	Macedonian
MoEPP	Ministry of Environment and Physical Planning – Environmental Administration
MoTC	Macedonian Ministry of Transport and Communication
MoU	Memorandum of Understanding for the Development of the Core Regional Transport Network
MZ-T	Macedonian Railways - Transport
NARDS	NATIONAL AGRICULTURAL AND RURAL DEVELOPMENT STRATEGY
NEAP	National Environmental Action Plan
NGOs	Non-Government Organizations
NHMS	National Hydrological Metrological Services
NMVOCs	Non – methane volatile organic compounds
NPAA	National Programme for Adoption of the Acquis Communautaire
NSEA	National Strategy for Environmental Approximation
NTS	Non-Technical Summary
NUTS 3	Eurostat - Nomenclature of Territorial Units for Statistics
OH&S	Occupational Health and Safety
OJT	On-the-job training
OPEX	Operational Expenses
PAH	Polycyclic Aromatic Hydrocarbons
PCA	People Centered Analysis
PCBs	Polychlorinated biphenyles
PCE	Public Communal Enterprise
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
PEEN	Pan-European Ecological Network
PERI	Macedonian Railways - Infrastructure
PERI	Public Enterprise for Railway Infrastructure
POP	Persistent organic pollutants
PR	Performance Requirement
RCC	Remote Control Centre
RCF	Resettlement Action Plan (RAP)
RCF	Resettlement Compensation Framework
RIC	Regolamento Internazionaledelle Carrozze-International Coach Regulations
RIMSYS	River Monitoring System

RIV	Regolamento Internazionaledei Veicol-International Wagon Regulations
RMS	Root mean square
SEA	Strategic Environmental Assessment
SEE	South East Europe
SEP	Stakeholder Engagement Plan
SFRY	Social Federal Republic of Yugoslavia
SIA	Strategic Impact Assessment
SMEs,	Small Medium Enterprises
SNAP	Selected Nomenclature on Air Pollutants
SPEC	Species of European Conservation Concern
TEN	Trans-European Network
TRACECA	Transport Corridor Europe-Caucasus-Asia
TSI	Technical Specification for Interoperability
TSI SRT	Safety in Railway Tunnels
UIC	Union Internationale des Chemins de fer-International Union of Railways
UPS	Uninterruptible power supply
WEEE	Waste Electronics and Electrical Equipment
WFD	Water Framework Directive
WHO	World Health Organization
WS	Water Strategy of Republic of Macedonia

Chapter 1 Introduction

Provides general information about the Project, the legal & policy basis of the ESIA, the Project proponent and ESIA assessment team, and the purpose and content of the ESIA.

1 INTRODUCTION

1.1 INTRODUCTION

As part of the governments national transport strategy the Macedonian Ministry of Transport and Communication (MoTC) intends to improve transport capacities of the Country by reconstructing and constructing the Railway Corridor VIII - Eastern Section *(the 'Project')* between Kumanovo and Kriva Palanka at the border with Bulgaria. The Eastern Section comprises of 88.1 km of rail running across the North-East region of Macedonia *(see Figure 1-1)*. The Macedonian Ministry of Transport and Communication has approached the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) to finance the rehabilitation and construction works on the Railway Corridor VIII - Eastern Section.

As part of the application for funds and in order to meet regulatory requirements the Ministry of Transport and Communication with EBRD funds have procured the preparation of a Feasibility Study and the Environmental Social Impact Assessment (ESIA) for the Project. This draft ESIA is being published and disclosed for comment as part of the process for finalising and gaining regulatory approval and financing of the Project. Following the comment period the ESIA will be updated to reflect comments made by stakeholders and information will be provided regarding how comments have been addressed. The final decision and version of the ESIA will be made publically available.

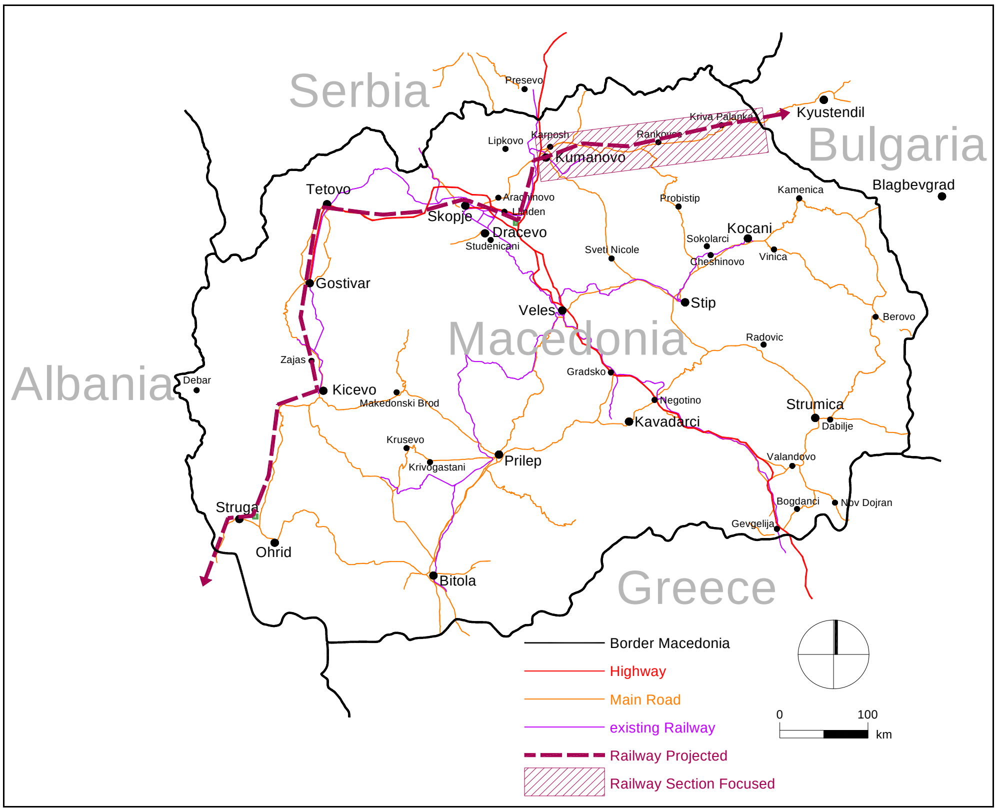


Figure 1-1 The Project (Railway Corridor VIII - Eastern section)

1.2 LEGAL AND POLICY REQUIREMENTS FOR THE ESIA

According to the Macedonian Law on Environment[1] within which the requirements of the EU EIA Directive (85/337/EEC amended[2]) have been transposed, the potential environmental impacts of the Project must be evaluated by an Environmental Impact Assessment (EIA) process and documented in an environmental impact statement.

Screening of the Project under the Law on Environment in relation to determining the need for the EIA was undertaken. Under Annex I of the *"Decree on determining projects for which the full EIA procedure should be carried out"* (Official Gazette[3] No. 74/05), the Project falls under sub-category 7(a): Construction of lines for long-distance railway traffic and airports with a basic runway length of 2,100 m or more. Consequently, the Railway Project has been subject to the full EIA procedure, according to the Macedonian environmental legislation (*listed in Chapter 2*).

As part of their decision-making process, EBRD and EIB require an evaluation of the proposed Project through an Environmental and Social Impact Assessment (ESIA) that meets EBRD, EIB and other applicable international guidelines and requirements. According to the EBRD categorization of the financed projects based on environmental and social criteria reflecting the level of potential impacts and nature and level of assessments, information disclosure and stakeholder engagement, the Project falls within Appendix 1: Category A projects, sub-category 7: Construction of motorways, express roads and lines for long-distance railway traffic. Therefore a participatory assessment process was carried out following the EBRD Performance Requirements given in their Environmental and Social Policy (2008[4]), as well as the EIB's environmental and social requirements outlined in their Environmental and Social Practices Handbook (Version 2: 24/02/2010). The development of the Macedonian EIA and EBRD's ESIA has been consolidated into one process and documented in this single report.

In line with Macedonian law on public participation in the EIA process (contained within the Law of Environment), the EU Public Participation Directive (2003/4/EC), the Aarhus Convention[5], EBRD Environmental and Social Policy[6] and EIB requirements[7] there must be public involvement in the ESIA procedure. Therefore the draft ESIA is being published for comment as part of the process for finalising and regulatory gaining of approval and financing of the Project.

1.3 THE PROJECT

1.3.1 CORRIDOR VIII

Corridor VIII is a multi-modal transport network comprising of sea and river ports, airports, roads and railways running along the east-west axis starting in the southern Italian ports of Bari and Brindisi and before crossing through Albania, Macedonia and Bulgaria to the Black Sea ports of Varna and Burgas.

In 1995, the Government of Macedonia started the preparation of a new Spatial Plan for the country as a result of the political, economic and strategic changes in the state. The Spatial Plan addressed the spatial arrangement of transport and other infrastructures, and included Corridor VIII as a very important transport corridor for the country. The Spatial Plan was finally adopted in 2004 with an expiring horizon in 2020. It was established by the Parliament of the Republic of Macedonia, following an expert consultation

[1] Macedonian Law on Environment 1(Official Gazette of RM No. 53/05, 81/05, 24/07, 159/08, 83/09, 124/10, 51/11)
[2] EIA Directive (85/337/EEC) amended with Directives 97/11/EC, 2003/35/EC and 2009/31/EC.
[3] Official Gazette: Official Gazette of Republic of Macedonia
[4] Environmental & Social Policy (May 2008); European Bank for Reconstruction and Development http://www.ebrd.com/downloads/about/sustainability/2008policy.pdf
[5] Convention on Access to Information, Public Participation in Decision making and Access to Justice in Environmental Matters (Aarhus Convention) which was ratified by FYR Macedonia in 1999 (Law on Ratifications (Official Gazette of RM No. 40/99)
[6] Environmental & Social Policy (May 2008); European Bank for Reconstruction and Development http://www.ebrd.com/downloads/about/sustainability/2008policy.pdf
[7] Including the EIB Corporate Operational Plan 2011-2013, the EIB Statement of Environmental & Social Principles & Standards; 2009 and the EIB Environmental & Social Practices Handbook (Version 2 of 24/02/2010).

process with participation of public expertise, representatives from departments of the State government, representatives of local self-governments, institutions responsible for the preservation of cultural heritage, scientific institutions, communal enterprises, and Non-Government Organizations (NGOs). However, because the Spatial Plan was passed before the enactment in 2005 of the Law on Environment, it was not subject to a Strategic Impact Assessment (SEA).

The National Strategy of Transport from 2009 for the Republic of Macedonia (Macedonia) confirmed the high governmental priority for Corridor VIII for the country. The railway Corridor VIII through Macedonia is partly finished with 2 incomplete sections; the first Western section towards Albania and the Eastern section towards Bulgaria.

Corridor VIII starts in the west from the southern Italian ports of Bari and Brindisi and crossing to the Albanian ports of Durres and Vlora then overland through Albania, Macedonia and Bulgaria to the Bulgarian ports on the Black Sea of Burgas and Varna. The railway corridor East-West, otherwise known as Corridor VIII, was defined in its present form at the Pan-European Conference, held in Helsinki (1997), and was included as part of one of five new European Transnational Axes in 2005[8]. Along its route Corridor VIII connects with Pan-European Corridors IV, IX and X, as shown in *Figure 1-2*.

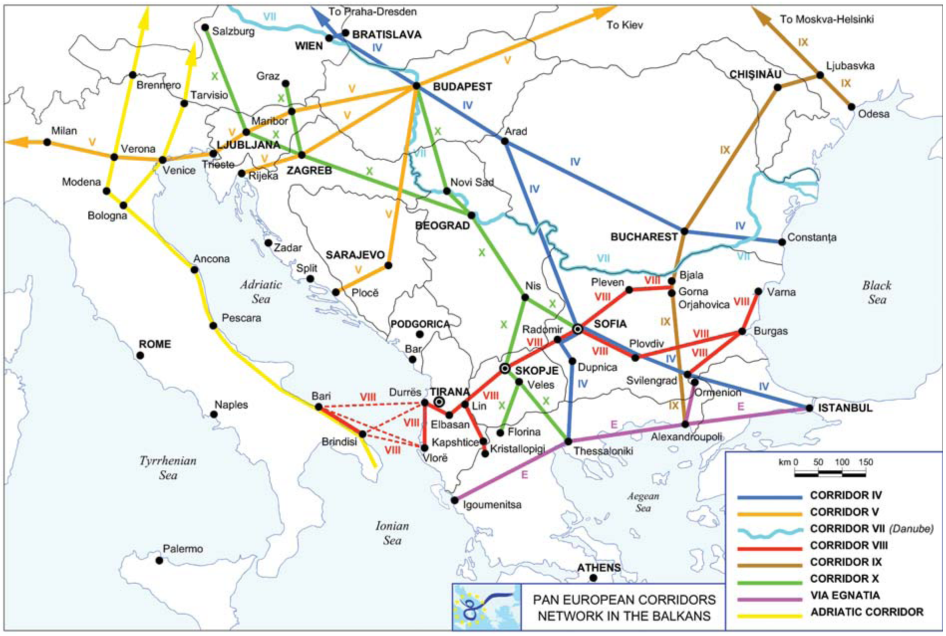


Figure 1-2 Pan-European Corridors in the Balkan Region

[8] The Pan-European Transport Corridors and Areas were established during three Pan-European Transport conferences. The overall concept was developed at the first conference in Prague in 1991. Nine long-distance transport corridors as priorities for infrastructure development were defined at the second conference in Crete in 1994, including Corridor VIII. A tenth corridor and the Pan-European Transport Areas for maritime basins were added at the third conference in Helsinki in 1997, where the Corridors were defined in their present form. Therefore, these corridors are sometimes referred to as the "Crete corridors" or "Helsinki corridors", regardless of their geographical locations. The Pan European Corridor VIII Memorandum of Understanding (MoU), signed in Bari on September 9, 2002, by Albania, Bulgaria, Macedonia, Italy and Turkey, gave new impulse to the accomplishment of the Corridor.

The EU enlargement, with the accessions of 10 new Member States on May 1, 2004 and of Romania and Bulgaria on January 1, 2007, made the external borders of the Union move further towards East and South, bringing several new neighbouring Countries to the EU.

In this new situation, EU transport policy to connect neighbouring countries needed to be redefined, as most of Pan European Transport Corridors were now included in the EU and became part of the Trans European Network. In this general framework of the EU enlargement to new Member States, the process of definition of a new European Transport Planning Strategy was completed in December 2005 with the publication of the report “Networks for Peace and Development – Extension of the major trans-European transport axes to the neighbouring countries and regions” (November 2005), where Corridor VIII was confirmed as integral part of one of the five new European Transnational Axes, namely the South Eastern Axis. The task of coordinating and promoting the initiatives for the realization of Corridor VIII are carried out by the Steering Committee (SC), comprised of Member States’ representatives and chaired by Italy.

1.3.2 MACEDONIAN RAIL CORRIDOR VIII - EASTERN SECTION

The Project comprises of the rehabilitation and construction of the eastern section of rail Corridor VIII within the Republic of Macedonia. *Figure 1-3* shows the planned alignment of rail Corridor VIII and other rail corridors in the Republic of Macedonia.

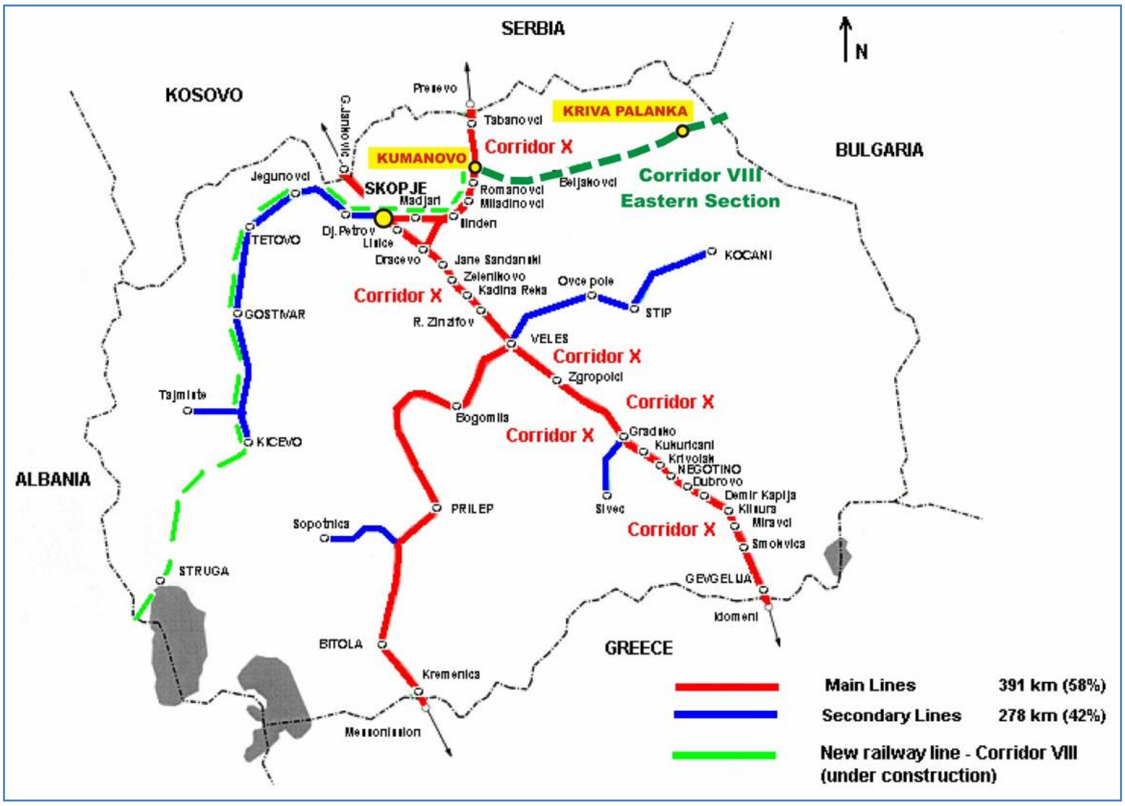


Figure 1-3 Railway Corridors in the Republic of Macedonia

Plans and activities for construction and operation of the eastern part of rail line from Kumanovo to the Bulgarian border began as early as the XIX century and, albeit with interruptions, were continuous until 2004, when works started in 1994 stopped due to the lack of funds. The Project has been divided into three sections:

- **Section 1: Kumanovo to Beljakovce (31km)**: the first 31km of the railway line was previously operational (until 1994) however, rehabilitation of this section is required in order for it to become operational again;
- **Section 2: Beljakovce to Kriva Palanka (34km):** the middle section of the alignment runs from K.P. 31 to K.P. 65 just before the town of Kriva Palanka. In this section many of the structures are partially completed. It can be estimated that approximately one third of all construction works has been completed. Construction is required of the missing railway structures and rehabilitation is also necessary to the railway structures previously constructed; and
- **Section 3: Kriva Palanka to the Bulgarian Border (23.5 km):** The last section of the railway line runs from Kriva Palanka at K.P. 65 up to Deve Bair at the Bulgarian border located at K.P. 88.5. There have been no previous railway works undertaken within this section and therefore construction of the railway line and structures is required along entire route.

These sections are represented in *Figure 1-4*.

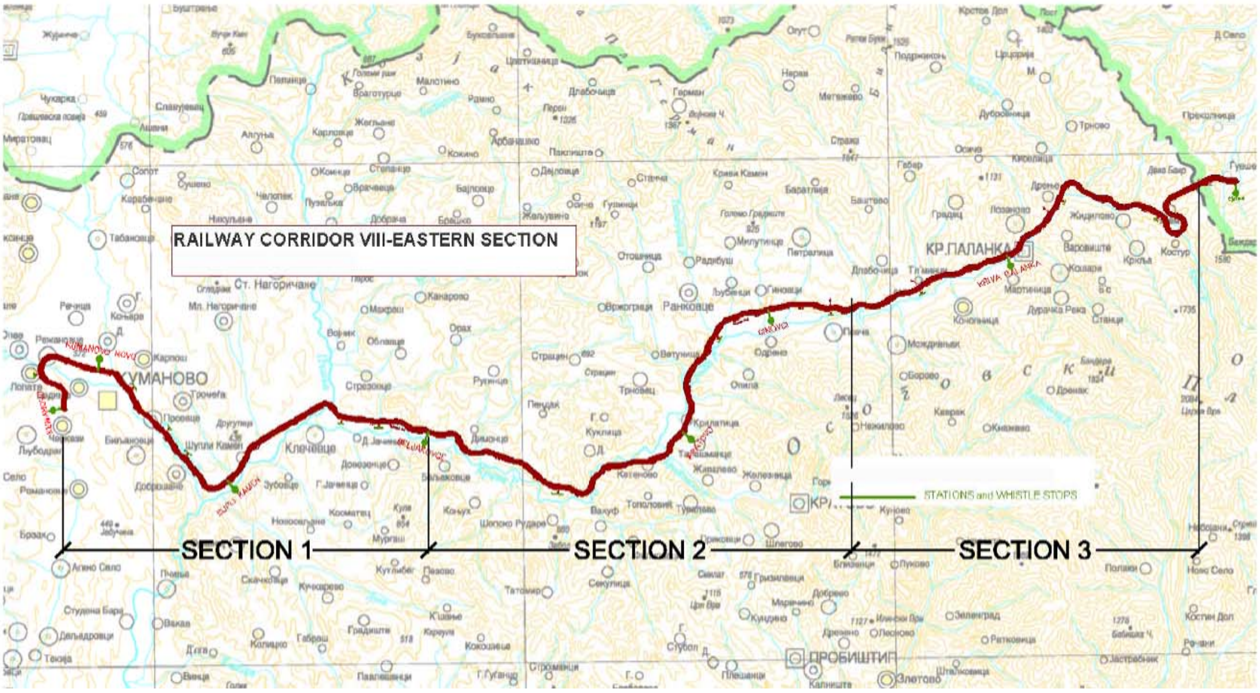


Figure 1-4 Sections of Project "Railway Corridor VIII - Eastern Section"

The ESIA assesses within its scope the 3 sections of the Project. These sections are common to both the ESIA and the Feasibility Study.

1.3.3 INVESTMENT DELIVERY PHASES

The Project is to be delivered in two main phases of investment, which are referred to within the ESIA as Stage 1 and Stage 2[9]:

Stage 1: Comprises the rehabilitation of Section 1 between Kumanovo to Beljakovce for diesel traction and without electrification. The envisaged construction period is from 2013 to the end of 2014. The operational period is expected to be from the end of 2014 to 2018 for diesel traction and local passenger services but no freight services; and

Stage 2: Rehabilitation and construction of the Beljakovce to Deve Bair section (comprising of both Sections 2 and 3) and the electrification of the whole route from Kumanovo to Deve Bair (including Sections,1 ,2 and 3). The envisaged construction period is from 2015 to 2018 with the commencement of railway operations by the end of 2018. Electric traction will be delivered during this phase from Kumanovo up to Deve Bair on the Macedonian side of the Bulgarian border, and will link with electric traction up to Guyeshevo, just after the Bulgarian border. It is understood though currently that diesel traction from Guyeshevo through Bulgaria, which is not included in the scope of this ESIA, is envisaged until 2024 with the change of tractive stock to electric envisaged from 2025 on the Bulgarian side.

1.4 PURPOSE OF THE ESIA

The purpose of the ESIA is to identify and assess the potential positive and adverse impacts that may arise from the Railway Corridor VIII - Eastern Section railway Project *(Figure 1-5*) on the physical and natural

[9] Stage 2 now covers the previous Project preparation Stages 2 and 3.

environment, on the socio-economic wellbeing and conditions of the population (community and workforce) at the local (municipalities), regional (North Eastern region), national (Macedonia) and transboundary levels, including an assessment of railway accidents and identification of railway safety provisions.

The Project activities that have been considered as part of the ESIA include those to be undertaken during the design, rehabilitation/construction and operation of the railway, including the interim operation of Section 1 using diesel traction and operation of the whole eastern section (Sections 1 to 3) using electric traction. Decommissioning of construction sites and temporary facilities is also considered within the scope of the assessment. However, decommissioning of the railway line has not been considered within the ESIA at this stage due to both limited information being available at this stage with regard to the ceasing of operation of the railway and given the intention that with maintenance the railway line will continue to operate beyond its design life. In the event that the railway line ceases operation and needs to be decommissioned relevant approvals will be sought and if required an ESIA will be prepared.

Identified impacts have been assessed taking into account the environmental and social baseline conditions analyzed for the study area, and, where necessary and appropriate, mitigation measures to avoid, prevent, mitigate or compensate significantly adverse impacts and enhance beneficial impacts have been proposed. In this regard, a mitigation and monitoring plan to both monitor and evaluate the implementation of mitigation measures and the Project performance on environmental and social baseline conditions has been included as an integral part of the ESIA. Furthermore, the assessment determines the significance of residual effects remaining on the environment and community as a result of the Project following implementation of the mitigation measures.

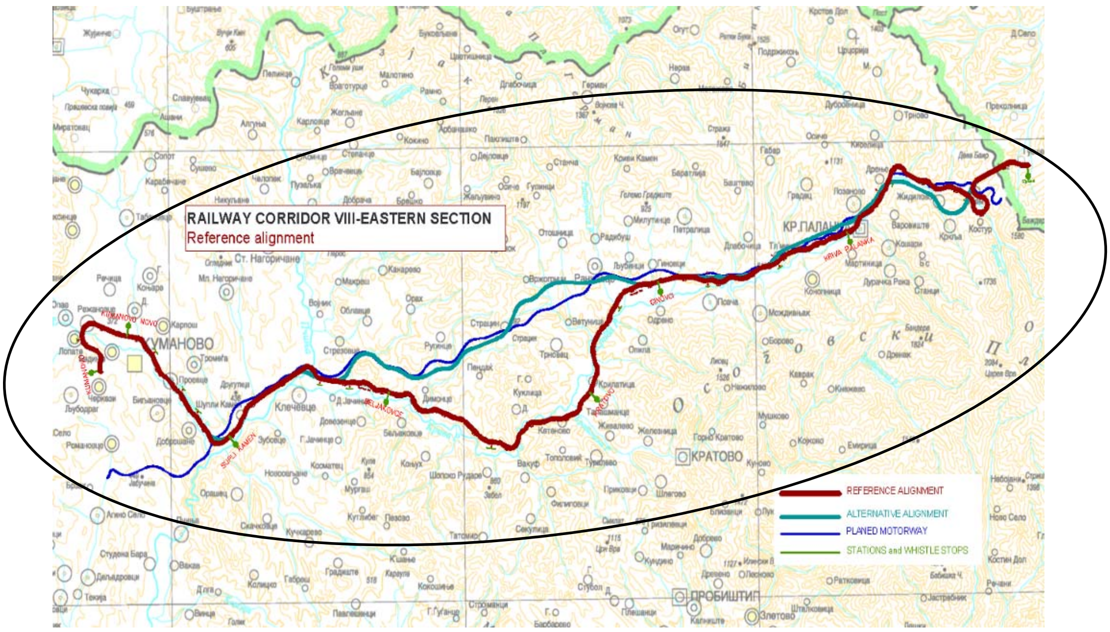


Figure 1-5 Area potentially affected by the Project within the North – East region of Macedonia

The ESIA has been prepared in line with the national EIA requirements within Macedonia, and with reference to EBRD and EIB requirements and other international applicable standards, such as the International Finance Corporation (IFC) Environmental, Health & Safety (EHS) Guidelines for Railways (April 2007). The scoping assessment and methodology for the ESIA is presented in Chapter 4 Assessment Methodology & Scoping.

The draft ESIA will be disclosed to the public. The comment period will be 120 days, ensuring that all stakeholders have an opportunity to express their views. A Stakeholder Engagement Plan (SEP) has been developed as a communication tool for the Project and using this the stakeholders were identified and have been involved during the development of the draft ESIA. Upon completion of the comment period, the ESIA Study will be updated to reflect the comments made by stakeholders and information will be provided about how comments have been addressed. In addition, these comments will be fed into the future work on the detailed design and construction of the Project. The final decision and version of the ESIA will be made publically available.

1.5 PROJECT PROPONENT AND ESIA TEAM

The Railway Corridor VIII – Eastern Section Project proponent is the Ministry of Transport and Communication, Government of the Republic of Macedonia. Eptisa with DB International have been selected by the Macedonian Ministry of Transport and Communication as the Consultant for the preparation of the Feasibility Study and the ESIA for the Project. This draft ESIA has been prepared on behalf of the Macedonian Ministry of Transport & Communication by Eptisa consulting firm with DB International. As part of Consultant's team, the following technical environmental and social experts have participated in the preparation of the ESIA.

Consultant's team of experts		
Name	**Organization**	**Role /Tasks**
Mrs María Carlota Arquiaga	Eptisa	ESIA expert acting as associated environmental consultant/ ESIA review
Mr Bertold Weitz	DB International	Environmental specialist /Topography, landscape, geomorphology, Geology, soils baseline and assessment, mitigation measures
Mrs Gitte Andersen	Eptisa	Social Impact Specialist / socio-economic baseline, assessment of social impacts, mitigation measures, resettlement compensation framework, Stakeholder engagement plan
Mrs Slavjanka Pejcinovska Andonova	Eptisa	Local Environmental Specialist / Surface water & Groundwater, air quality, noise & vibrations, waste management, cultural heritage& Archeology, baseline and assessments of impacts, mitigation measures, Stakeholder engagement plan
Dr Jovan Pejkovski –	Eptisa	Local Social Impact Specialist / socio-economic baseline, assessment of social impacts, mitigation measures, resettlement compensation framework,
Mrs Svetlana Kirevska	Eptisa	Local Social Impact Specialist / socio-economic baseline
Ms Tatjana Todoroska	Eptisa	Project assistant / Coordination of ESIA works, assistance for: socio-economic baseline, assessment of social impacts, mitigation measures, Resettlement compensation framework, Stakeholder engagement plan, Project leaflet
Mr Vasil Anastasovski	Eptisa	Consultant / Geology, hydrology
Dr Mitko Karadelev	Eptisa	Coordinator of works on natural environment / Natural environment, fungi, co-ordination and synthesis
Dr Ljupco Melovski	Eptisa	Assistant to Dr Karadelev / Habitat and flora description, related impact assessment and mitigation measures
Dr Slavco Hristovski	Eptisa	Assistant to Dr Karadelev / Fauna (invertebrate) description, related impact assessment and mitigation measures, and synthesis
Mr Bogoljub Sterjovski	Eptisa	Assistant to Dr Karadelev / Fauna (fishes, amphibians and reptiles) description, related impact assessment and

Consultant's team of experts		
Name	**Organization**	**Role /Tasks**
		mitigation measures
Mr Metodija Velevski	Eptisa	Assistant to Dr Karadelev / Fauna (birds) description, related impact assessment and mitigation measures
Mr. Dimce Melovski	Eptisa	Assistant to Dr Karadelev / Fauna (mammals and butterflies) description, related impact assessment and mitigation measures
Mr Ljubomir Stefanov	Eptisa	Assistant to Dr Karadelev / Fauna (grasshoppers) description, related impact assessment and mitigation measures
Ms Daniela Jovanovska	Eptisa	Drafter / GIS, cartography

1.6 CONTENT OF THE ESIA

The ESIA has been structured to follow a commonly accepted impact assessment format and is reflective of the stages within the Macedonian EIA procedure. The ESIA is organized into 15 chapters with the following content:

Chapter 1 Introduction: provides general information about the Project, the legal & policy basis of the ESIA, the Project proponent and ESIA assessment team, and the purpose and content of the ESIA.

Chapter 2 Legal & Policy Requirements: describes environmental and social policy, legislation and standards relevant to the Project, at both national and EU levels, as well as multilateral agreements and conventions signed/ratified by the Republic of Macedonia.

Chapter 3 Project Description & Consideration of Alternatives: describes the technical specification of the Project and its background, need and objectives along with outlining the expected benefits from the Project, the land use and land take, the Project phases and programme, and the proposed labour and workforce arrangements and facilities. The Chapter also describes the route alternatives considered and the selection of the final route.

Chapter 4 Assessment Methodology & Scoping Assessment: defines the scope of the assessment based on the issues which have the potential to cause significant effects on the receiving environment and communities, the scoping opinion of the relevant authority (Ministry of Environment and Physical Planning – Environmental Administration) and the opinions of stakeholders. Describes the methodology applied for the assessment of potential environmental and social impacts and the determination of the significance of residual effects.

Chapter 5 Baseline Environmental & Social Conditions: describes baseline environmental and social conditions, focusing on sensitive issues and vulnerable groups.

Chapter 6 Potential Environmental & Social Impacts: describes the potential environmental and social impacts resulting from the railway project activities, including cumulative, synergy and transboundary impacts.

Chapter 7 Environmental & Social Mitigation Measures and Residual Environmental & Social Effects: presents the environmental and social mitigation measures proposed to avoid, prevent, mitigate and/or compensate the adverse impacts and enhance the beneficial impacts of the railway Project. Describes the potential residual environmental and social effects remaining from the Project following the implementation of mitigation measures and presents the likely significance of these residual effects along with a summary of the likely significant residual environmental and social effects.

Chapter 8 Environmental & Social Management & Monitoring: presents the proposed environmental and social management and monitoring program designed to evaluate the implementation and performance of the mitigation measures and the overall environmental and social performance of the Project.

Chapter 9 Analysis of Technical Insufficiency & Need for Update of the ESIA Study: describes the various technical insufficiencies encountered during the ESIA development in terms of data availability (lack of data) and collection.

Chapter 10 Conclusion: summarizes the key findings and conclusions of the assessment including the potential significant residual environmental and social effects.

Chapter 11 Non-Technical Summary (NTS): presents the Non-Technical Summary of the ESIA of the proposed Project.

Chapter 12 Stakeholder Engagement Plan (SEP): describes the Stakeholder Engagement Plan, showing the communication channels with stakeholders, and the active public participation during the entire ESIA process.

Chapter 13 Resettlement Compensation Framework: describes the principles to be applied in the event of land acquisition leading to physical and/or economic displacement (resettlement), involuntary resettlement and land acquisition issues and measures.

Chapter 14 Comments on Draft ESIA Study & List of Introduced Changes: will include the comments received on the draft ESIA during the public disclosure/comment period, and a list of the changes introduced in the final version of the ESIA Study.

Chapter 15 References: presents a list of the references used during the preparation of the ESIA Study.

Annexes to the ESIA

Annex 1 - Part from Future Traffic Scheme

Annex 2 - Decision from the Government of the Republic of Macedonia for the selected alignment

Annex 3 - Site inspection

Annex 4 – Decision of MoEP for scope of the ESIA

Annex 5 - Habitats maps

Annex 6 - Plant species

Annex 7 - Fungi & Lichens

Annex 8.1 - Vertebrates (Amphibians, Reptiles, Birds, Mammals)

Annex 8.2 - Invertebrates (Dragonflies, Ground beetles, Daily butterflies, Grasshoppers

Annex 9 - Land use types

Chapter 2
Legal & Policy Requirements

Describes environmental and social policy, legislation and standards relevant to the Project, at national and EU levels, as well as multilateral agreements and conventions signed/ratified by the Republic of Macedonia.

2 LEGAL AND POLICY REQUIREMENTS

2.1 NATIONAL LEGISLATION (& RELATED EU DIRECTIVES)

2.1.1 NATIONAL ENVIRONMENTAL & SOCIAL LEGISLATION AND EU DIRECTIVES

Recognizing the damaging effects of environmental pollution on human beings and the quality of life, the Republic of Macedonia has developed constitutional provisions that guarantee the right to a healthy environment. Article 43 of the Constitution of the Republic of Macedonia (Official Gazette No. 52/91) prescribes *"everyone is obliged to promote and protect the environment; the State provides conditions to apply the right of citizens to a healthy environment"*. Macedonia has become a Party to the main multilateral conventions and protocols explicitly recognising the link between environmental protection and the human rights norms covering many environmental issues like EIA, Strategic Environmental Assessment (SEA) in the national and transboundary context, climate change, biodiversity, public information, public participation in the decision-making process and access to justice, transboundary air pollution and air monitoring, ozone layer, chemicals like persistent organic pollutants (POP), nature protection, etc. Key relevant legislation is listed in *Table 2-1*.

At the same time the Republic of Macedonia has confirmed its commitment towards EU accession through the development of the relationship with the EU since October 1992, and has posed the EU Membership on its political agenda as a national goal of highest priority from the very beginning of independence, obtained in 1991. In 2005 the Republic of Macedonia was granted by the EU the candidate status for full EU membership.

In order to fulfil the criteria for full membership, the Republic of Macedonia adopted the National Programme for Adoption of the Acquis Communautaire (NPAA) in 2007[10]. The NPAA, which is periodically revised, comprises the plans for harmonization of the national legislation with the EU legislation, the necessary institutional strengthening for implementation of the legislation, as well as the necessary resources for realization. Chapter 3.27 of the NPAA addresses the achievements and the remaining obligations in the field of Environment. In early 2008, the Republic of Macedonia adopted the National Strategy for Environmental Approximation (NSEA) in order to respond to the complex obligations of the EU environmental acquis and at the same time contribute to the sustainable development of the country. The NSEA provides a "roadmap" for a full and effective approximation process, including a sustainable, comprehensive framework of actions with associated costs needed for legal transposition and technical implementation in all ten environmental sectors. The transposition of the main obligations of the environmental EU Directives, EU standards and international organisation's standards (e.g. World Health Organization (WHO)) into the national primary legislation started in 2003/2004 with the Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08, 83/2009, 124/2010, 51/2011). The Law on Environment contains the basic principles of environmental protection with both precautionary and "polluter pays" principles and provides the legal basis for issuing of necessary secondary legislation.

During 2004 to 2008, other primary legal acts related to air quality and air management, water management and water quality, waste management, nature protection, industrial pollution control, noise, have been prepared and adopted by the Macedonian Parliament in the form of the legal acts given in *Table 2-1*.

The EU environmental legislation has been transposed into the national legislation and, almost for all environmental sectors, the prescribed standards and emission limits, or waste management principles are the same (chemicals, waste, IPPC, EIA, SEA, noise, air quality). In some sectors there is still a lack of secondary legislation prescribing where the applicable standards will be prescribed (e.g. water quality,

[10] National Programme for Adoption of the Acquis Communautaire – Revision 2009, Government of the Republic of Macedonia, Skopje, 29 May 2009.
http://www.sobranie.mk/en/WBStorage/Files/00%20NATIONAL%20PROGRAMME%202009%20%2029.05.2009. pdf

emissions to water and ground waters, emissions to soil and soil quality); some of this secondary legislation is in the process of preparation.

The key relevant national legislation, EU Directives and international standards are summarized in *Table 2-1*, with specific standards being referenced in the relevant environmental and social chapters.

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
ESIA procedure	Law on Environment (Official Gazette No.53/05,81/05,24/07,159/08, 83/2009, 124/2010, 51/2011); Rulebook on the content of the requirements that need to be fulfilled by the study on EIA (Official Gazette No.33/06); Rulebook on the form, content procedure and manner of developing the report on the adequacy of the study on EIA of the project and the procedure for authorization of persons from the List of Experts for EIA responsible for the preparation of the report (Official Gazette No.33/06); Decree on determining projects for which and criteria on the basis of which the screening for EIA should be carry out (Official Gazette No.74 / 05); Rulebook on the content of announcement of the notification of the intention to implement a project, on the necessity of an EIA, on the study on project EIA, of the report on the adequacy of the study on EIA (Official Gazette No. 33/06); Rulebook on the information contained in notification of intent to implement a project and the procedure for determining the need for EIA of a project (Official Gazette No.33/06);	EIA Directive (85/337/EEC) amended with EU Directive 97/11/EC, EU Directive2003/35/EC, EU Directive 2009/31/EC; EU Guidelines: Guidance on EIA Screening / Scoping / EIS Review, June 2001 Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, May 1999 EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: IFC's Policy on Social & Environmental Sustainability, April 30, 2006;
Access to environmental information and public participation in environmental decision making process	Law on Environment (Chapter on EIA procedure and transboundary context and information dissemination, public participation and access to justice requirements) - (Official Gazette No. 53/05, 81/05, 24/07, 159/08, 83/09, 124/10, 51/11); Espoo Convention was ratified by Macedonia (Official Gazette No. 44/99); The Aarhus Convention was ratified by Macedonia (Official Gazette No.40/99);	Directive on Access to Environmental Information (2003/4/EC); Directive for public participation in respect of the drawing up of certain plans and programs relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC (2003/35/EC); Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, February 1991); Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus Convention, June 1998); EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirement 10);

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
Water	Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08, 48/10, 124/10, 51/11); Law on Waters (Official Gazette No. 87/08, 6 / 09, 161/09, 83/10, 51/11); Law on Water Management (Official Gazette No. 85/03, 95/05, 103/08); Law on Aquatic Communities (Official Gazette No. 51/03, 95/05 113/07); Decree on classification of waters (Official Gazette No. 18/99); Regulation on categorization of water streams, lakes, accumulations and groundwater (Official Gazette No. 18/99, 71/99) ; Rulebook on monitoring of sediment in reservoirs (Official Gazette No. 4 / 99); Rules for reporting on the state level and quantity of water accumulated in reservoirs, and the amount of water released by them (Official Gazette No. 8 / 99) ; Rulebook on the content and method of preparing management plans for river basins (Official Gazette No. 148/09) ; Regulation on methodology for assessment of river basins (Official Gazette No. 148/09); Rulebook on the content and method of preparing the program of measures (Official Gazette No. 148/09); Rules for special security requirements for natural mineral water (Official Gazette No. 32/06) ; Rulebook on determination and maintenance of protective zones around sources of drinking water (SFRY Official Gazette No. 17/83); Rules Amending the Rules of the manner of determination and maintenance of protective zones around sources of drinking water (SFRY Official Gazette No. 15/89); Rules for water safety (Official Gazette No. 46/08) ; Law on ratification of the convention for assessing environmental impacts in a transboundary context (Official Gazette No. 44/99);	EU Directive 2001/60/EC – Water Framework Directive and Decision 2455/2001/EC establishing the list of priority substances in the field of water policy; EU Directive 2008/105/EC on environmental quality standards in the field of water policy; EU Directive 2006/11/EC on pollution caused by certain dangerous substances discharged into the aquatic environment ; Urban Wastewater Treatment Directive (91/271/EEC); Nitrates Directive (91/676/EEC); Dangerous Substances to Water Discharges Directive (76/464/EEC) as emission control oriented legislation; Directive 98/83/EEC on the quality of water intended for human consumption; Directive 1991/271/EEC concerning urban waste water treatment; Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances;
Waste Management	Law on Waste (Official Gazette No. 68/04, 71/04, 107/07, 102/08, 134/08, 124/10 and 51/11); List of Waste Types (Official Gazette No. 100/05); Law on Packaging and Packaging Waste (Official Gazette No. 161/1009); The Law on the Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette No. 48/97) Decree for determining the activities of installations (landfills operation) requiring an integral	Waste Framework Directive 2006/12/EC amended with EU Directive 2008/98/EC on waste management; Commission Decision 2000/532/EC of 3 May 2000, replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste; Decisions 2001/118/EU, 2001/119/EU and 2001/573/EU;

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
	environmental permit (Official Gazette No. 89/05) Rulebook on the manner and the conditions for waste storage, as well as on the conditions to be met by the sites on which waste storage is performed (Official Gazette No. 29/07); Rulebook on the minimum technical requirements with regard to environmental protection to be met by waste transfer stations, requirements to be met by the sites where waste transfer stations are built or placed, as well as on the terms for the waste storage in waste transfer stations depending on the types of waste (Official Gazette No. 39/07); Rulebook on the landfill operation, monitoring and controlling in the operational and closing phase as well as on the closure and after-care procedures (Official Gazette No. 156/07); Rulebook for criteria for acceptance of waste to landfill in each landfill class, preparation procedure for acceptance of waste, basic testing procedures, sampling procedure and acceptance of waste (Official Gazette No. 8/08) ; Rulebook on the manner and the conditions for handling PCBs, the conditions to be met by installations and facilities for PCBs disposal and decontamination, on used PCBs and on the manner of labeling the equipment that contains PCBs (Official Gazette No. 48/07) ; Rulebook on the procedures and manner of collection, transport, processing, storage, treatment and disposal of waste oils, and the manner of keeping records and submission of data (Official Gazette No. 156/07); Rulebook of detailed conditions on the handling of hazardous waste, and on the manner of packaging and labeling (Official Gazette No. 15/08); Rulebook on the form and content of the request for issuing a permit for the landfill operator as well as the form for and content of the permit (Official Gazette No. 140/07);	Disposal of Waste Oils Directive (75/439/EEC) as amended by Directives 87/101/EEC, 91/692/EEC and partially repealed by Directive 2000/76/EC; EU Landfill Directive 99/31/EC; Regulation of labeling the equipment that contains PCBs EU PCB_S Directive 96/59/EC; EU Waste Oils Directive 75/439/EEC; Hazardous Waste Directive (91/689/EEC) and Packaging and Packaging Waste Directive 94/62/EC; EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirements 3, 4 & 6); IFC's Environmental, Health & Safety Guidelines for Railways, April 30, 2007;
Protected Natural Areas and Biodiversity	Law on Nature Protection (Official Gazette No. 67/06, 16/06, 84/07) and secondary legislation on Natura 2000 and emerald network; (Emerald Network: Launched in 1998 by the Council of Europe, of which the Republic of Macedonia is a member, as part of the works under the Bern Convention on the Conservation of European Wildlife and Natural Habitats. This ecological network is based on the same principles as Natura 2000, and represents its *de facto* extension to non-EU countries. National Emerald Network in the Republic of Macedonia was implemented between 2002 and 2008.[11]);	EU Directive 92/43/EEC of 21 May 1992 on the conservation of Natural Habitats and of Wild Fauna and Flora, as amended by Directives 97/62/EC and Regulation EC 1882/2003; EU Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (codified version of EU Directive 79/409/EEC as amended); Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein,

[11] This was an important enabling activity/mechanism for the establishment of a coherent European Natura 2000 network. In the period between 1948 and 1960, 11 areas and objects were protected as natural rarities on the basis of the Law on Protection of Monuments of Culture and Natural Rarities applicable in that period, with a total surface area of 131 599 ha – 5.11 % of the national territory. Under the Law on

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
	(Macedonia ratified the Rio Convention in 1997); (Macedonia ratified the Bonn Convention in 1999); (Macedonia ratified the Ramsar Convention in 1977); (Macedonia ratified the Bern Convention in 1997); (Macedonia ratified the CITES Convention in 2000); (Macedonia ratified the Agreement on the Conservation of Bats in Europe (London) in 1999, amended in 2002)	as amended by Regulations (EC) 938/97, 2307/97, 2214/98, 1476/99, 2724/2000, 1579/2001, 2476/2001, 1497/2003, 1882/2003, 834/2004, 252/2005 and 1332/2005; Convention on Biological Diversity (Rio de Janeiro), 1992; Convention on the Conservation of Migratory Species of Wild Animals (Bonn), 1979; Convention on Wetlands of International Importance especially as Waterfowl Habitats (Ramsar), 1971 Convention on the Conservation of European Wildlife and Natural Habitats (Bern), 1972; Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington – CITES Convention), 1973; Agreement on the Conservation of Bats in Europe (London) , 1991;
Noise and Vibration	Law on Noise Protection (" Official Gazette No. 79/07,) Rulebook on noise indicators and the area of application of additional noise indicators (Official Gazette No. 107/08); Rulebook on the permissible level of noise in the environment (Official Gazette No. 147/08); Rulebook on the preparation and contents of strategic noise maps (Official Gazette No. 120/08); Rulebook on the method, conditions and procedure for establishing and operating networks, monitoring methodology, conditions, method and procedure for submitting noise monitoring information and data (Official Gazette No.1/09);	EU Directive 2002/49/EC on Assessment and Management of Environmental Noise; EU Directive 2000/14/EC on noise emissions from outdoor equipment ; EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; IFC's Environmental, Health & Safety Guidelines for Railways, April 30, 2007
Air Quality	Law on Ambient Air Quality (Official Gazette No. 67/04 with amendments Nos. 92/07, 35/10 and 47/11); Decree on limit values of levels and types of pollutants in ambient air and alert thresholds, deadline for achieving limit values, margins of tolerance of the limit value, target values and long term goals (Official Gazette No. 19/05); Rulebook on establishing the emission upper limits on national level (Official Gazette No. 10/90);	Ambient Air Quality Framework Directive (96/62/EC), as amended by Regulation (EC)1882/2003; Benzene and Carbon Monoxide Directive (2000/69/EC); Directive 2002/3/EC on ozone in ambient air; EU Directive (1999/30/EC) on limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient

Natural Rarities Protection enacted in 1960 and its amendments of 1965 and 1973, a further 58 objects were protected, resulting in a total number of 69 protected areas and objects, with a total area of 184 137 ha – 7.16% of the territory of the Republic. With the establishment of a separate Ministry of Environment in December 1998, the process of natural heritage protection continued during the period 1999-2008. Adoption of the Law on Nature Protection in 2004, incorporating the European Directives related to natural heritage protection, has been of particular significance.

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
	Macedonia ratified the Convention on Climate Change on 28 January 1998, entrance into force on 28 Apr 1998; Macedonia ratified the Kyoto Protocol on 18 November 2004, entrance into force on 16 February 2005; Decree on limit and target values for levels and type of pollutants in the ambient air, alert and information thresholds; deadlines for achieving limit and target values for specific substances; margins of tolerance for limit value and target value and long term objectives for specific pollutants (Official Gazette No. 50/05); Rulebook on criteria, methods and procedures for evaluation of the ambient air quality (Official Gazette No.82/06); Rulebook on inventory and determination of the levels of the pollutant emissions in the ambient air in tonnes per year, for all types of duties, as well as other data needed for submission of the Program for monitoring the air in Europe (EMEP) (Official Gazette No. 142/07); Lists of zones and agglomerations for ambient air quality (Official Gazette No.23/2009); Rulebook for methodology for inventory taking and identification of the levels of emissions of pollutants in the ambient air in tons per year for all types of activities, as well as other data required to be submitted under the Program for air monitoring in Europe (EMEP) (Official Gazette No.2/2010); Rulebook on establishing the emission upper limits on national level (Official Gazette No. 10/90); Rulebook for air emission limit values from stationary sources (Official Gazette No. 141/10); (The Rulebook for air emission limit values from mobile sources is not adopted yet, it is planned to be adopted next year (2012) where the limit values for diesel traction locomotives will be transposed (EU Directive 2004/26/EC on measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery)); The diesel fuel specification are prescribed by Rulebook on liquid fuel quality (Official Gazette No. 88/2007, 91/2007, 97/2007, 105/2007, 157/2007, 15/2008, 78/2008, 156/2008, 81/2009);	air; EU Directive (98/70/EC) relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC; EIB Environmental and Social Practices Handboo, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirements 3, 4 & 6); IFC's Environmental, Health & Safety Guidelines for Railways, April 30, 2007; United Nations Framework Convention on Climate Change (New York, May 9, 1992); Kyoto Protocol on Climate Change (Kyoto, December 1997);
Cultural Heritage and Archaeology	Law on Protection of Cultural Heritage(Official Gazette No. 20/04); Regulation for National Registry of Cultural Heritage (Official Gazette No. 25/05); (Macedonia ratified the Convention for the protection of the World Cultural and Natural Heritage in 1991);	European Landscape Convention (Florence) ratified by Macedonia in 2003; Convention for the protection of the World Cultural and Natural Heritage, UNESCO, 1972; EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
		Requirement 8);
Railway Systems	Law on the Railway System (Official Gazette No.48/2010); Law on the Safety of Railway Systems (Official Gazette No. 48/2010); Law on Interoperability of Railway Systems (Official Gazette No.17/2011): Articles (21 -45) cover the train driving license which is in compliance with Directive 2007/59/EC; Law for Transport of Hazardous Materials and amendments (Official Gazette Nos.92/2007, 17/2011 and 54/2011);	EU Railway Policy and EU Directive on Railway Safety (2004/49/EC) and amendments Directive 2008/57/EC (for interoperability) and Directive 2008/110/EC; EU Directive 2007/59/EC on the certification of train drivers operating locomotives and trains on the railway system in the Community; IFC's Environmental, Health & Safety Guidelines for Railways, April 30, 2007;
Community Health and Safety	Law on Safety of Railway Systems (Official Gazette No. 48/10); Law for Health Protection (Official Gazette No. 07/07); Law for Transport of Hazardous Materials and amendments (Official Gazette Nos. 92/2007, 17/2011 and 54/2011); Law for preventing the spreading of the infectious diseases (Official Gazette No. 21/11); Law on Health Protection in the Republic of Macedonia (Official Gazette No.17/97, latest amendments within Official Gazette No.44/2011); Law for Wages (Official Gazette No. 70/94 with latest amendment within No. 97/ 2010); Law on Equal Opportunities for Men and Women, and the National Action Plan for Gender Equality (Official Gazette No. 48/10); Law for Social Protection (Official Gazette No. 79/09); Law for Children Protection (Official Gazette No. 170/10); Crisis Preparedness Planning, June 2009 (for abnormal working conditions like high temperatures, floods and similar);	EU Railway Policy and EU Directive on Railway Safety (2004/49/EC); Outdoor Equipment Directive (2000/14/EC); EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirement 4);
Occupational Health and Safety	Law on Occupational Health and Safety (Official Gazette No. 92/07); Rulebook on minimal requirements for occupational health and safety on working place (Official Gazette No. 154/2008, Art.2); Rulebook for personal protective equipment that uses employees at work (Official Gazette No.92/07); Rulebook for occupational health and safety at work for workers exposed on risk of noise (Official Gazette No. 21/2008);	Directive 89/654/EEC on workplace requirements concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC); Directive (2003/10/EC) no minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (6 February 2003); Directive 1989/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work;

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
		EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirement 4);
Labour & Working Conditions	Labour Relations Act (Official Gazette No. 158/2010); Law on Occupational Health and Safety (Official Gazette No. 92/07); Law for Civil Organisations (Official Gazette No. 52/10); Law for Wages (Official Gazette No. 92/07) and secondary legislation (Nos.121/07 and 92/09); Law on Equal Opportunities for Men and Women, and the National Action Plan for Gender Equality (Official Gazette No. 48/10); Law for Social Protection (Official Gazette No. 79/2009); Law for Child Protection (Official Gazette Nos. 98/00, 17/03, and 65/04); Law on Protection During Work (Official Gazette No. 13/98); Law on Employment & Work of Foreigners (Official Gazette No. 70/07); Law on inspection for implementation of laws for labour and working conditions (Official Gazette No. 35/97); Collective agreement for railways; Collective agreement for construction industry; <u>In 1991 Macedonia ratified a number of International Labour Organization (ILO) conventions including the following:</u> C2 Unemployment Convention, 1919 C3 Maternity Protection Convention, 1919 C8 Unemployment Indemnity (Shipwreck C11 Right of Association (Agriculture) Convention, 1921 C12 Workmen's Compensation (Agriculture) Convention, 1921 C13 White Lead (Painting) Convention, 1921 C14 Weekly Rest (Industry) Convention, 1921 C16 Medical Examination of Young Persons (Sea) Convention, 1921 C17 Workmen's Compensation (Accidents) Convention, 1925 C18 Workmen's Compensation (Occupational Diseases) Convention, 1925 C19 Equality of Treatment (Accident Compensation) Convention, 1925 C24 Sickness Insurance (Industry) Convention, 1927	Directive 89/654/EEC - workplace requirements, concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC); Directive 2003/10/EC on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise); Directive 1989/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work; EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirement 2); ILO Conventions;

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
	C25 Sickness Insurance (Agriculture) Convention, 1927 C27 Marking of Weight (Packages Transported by Vessels) Convention, 1929 C29 Forced Labour Convention, 1930 C32 Protection against Accidents (Dockers) Convention (Revised), 1932 C45 Underground Work (Women) Convention, 1935 C48 Maintenance of Migrants' Pension Rights Convention, 1935 C80 Final Articles Revision Convention, 1946 C81 Labour Inspection Convention, 1947 C87 Freedom of Association and Protection of the Right to Organise Convention, 1948 C88 Employment Service Convention, 1948 C89 Night Work (Women) Convention (Revised), 1948 C90 Night Work of Young Persons (Industry) Convention (Revised), 1948 C94 Labour Clauses (Public Contracts) Convention, 1949 C97 Migration for Employment Convention (Revised), 1949 C98 Right to Organise and Collective Bargaining Convention, 1949 C100 Equal Remuneration Convention, 1951 C102 Social Security (Minimum Standards) Convention, 1952 C103 Maternity Protection Convention (Revised), 1952 C106 Weekly Rest (Commerce and Offices) Convention, 1957 C109 Wages, Hours of Work and Manning (Sea) Convention (Revised), 1958 C111 Discrimination (Employment and Occupation) Convention, 1958 C113 Medical Examination (Fishermen) Convention, 1959 C116 Final Articles Revision Convention, 1961 C119 Guarding of Machinery Convention, 1963 C121 Employment Injury Benefits Convention, 1964 C122 Employment Policy Convention, 1964 C129 Labour Inspection (Agriculture) Convention, 1969 C131 Minimum Wage Fixing Convention, 1970 C132 Holidays with Pay Convention (Revised), 1970 C135 Workers' Representatives Convention, 1971 C136 Benzene Convention, 1971 C138 Minimum Age Convention, 1973 C139 Occupational Cancer Convention, 1974 C140 Paid Educational Leave Convention, 1974 C142 Human Resources Development Convention, 1975 C143 Migrant Workers (Supplementary Provisions) Convention, 1975 C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 C155 Occupational Safety and Health Convention, 1981 C156 Workers with Family Responsibilities Convention, 1981 C158 Termination of Employment Convention, 1982 C159 Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983	

Relevant environmental/ social issues for the project	Relevant national legislation Act, Regulation, Degree (date & ref.)	Relevant EU legislation / Good practice /International organization's standards
	C161 Occupational Health Services Convention, 1985 C162 Asbestos Convention, 1986 Additionally the following conventions have been ratified by Macedonia: 2002: C182 Worst Forms of Child Labour Convention, 1999 2003: C105 Abolition of Forced Labour Convention, 1957 2005: C144 Tripartite Consultation (International Labour Standards) Convention, 1976	
Land Acquisition	The Law on Expropriation (Official Gazette Nos. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08 and 76/10); Law on Property Cadastre (Official Gazette Nos. 40/08, 158/10 and 51/11); Law on Survey and Land Cadastre (Official Gazette Nos. 34/72 and 13/78); Law for the Treatment of Illegally Constructed Objects; (Official Gazette Nos. 23/11, 54/11) Law on Ownership and Other Material Rights (Official Gazette No. 18/01); Law on Nature Protection (Official Gazette Nos. 67/06, 16/06 and 84/07); Law on Agriculture & Rural Development (Official Gazette No. 49/10); Law on Agricultural Land (Official Gazette No. 135/07); Law on Forests (Official Gazette No. 64/2009); The Law on Vine (Official Gazette No. 69/2004); The Law on Organic Agricultural Production (Official Gazette No.16/2004); The Law on Agricultural Inspection (Official Gazette No. 38/2004); The Law on Plant Health (Official Gazette No. 29/2005); The Law on Seed and Seedling material (Official Gazette No. 41/2000);	EIB Environmental and Social Practices Handbook, Version 2: 24/02/2010; EBRD Environmental and Social Policy, May 2008: (Performance Requirement 5);

Table 2-1 Relevant National Legislation, EU Directives and International Treaties

2.1.2 FUTURE PLANNED NATIONAL LEGISLATION RELEVANT TO ESIA

In order to transpose the relevant EU Directives and adopt these within the Macedonian legal framework during the period 2011 to 2013 secondary legislation will be prepared. This will mainly focus on the following sectors that are relevant to the Project's ESIA:

- ***Water Sector***(within the Law on Waters):
    - Degree on criteria for determination of the good ecological status of the surface waters – physical/chemical, biological and morphological conditions;
    - Degree on criteria for determination of the good ecological status of the ground waters – physical/chemical, biological and morphological conditions;
    - Degree on classification and categorization of waters; and
    - Rulebooks on the determination of the sensitive water zones and water bodies.

- ***Noise and Vibration***(within the Law on Noise Protection):
    - Rulebook on the technical measures and conditions that the construction objects should fulfil regarding protection against noise;
    - Rulebook on the noise protection measures that should be included within urban and spatial plans;
    - Rulebook on the noise emissions of outdoor equipment;
    - Rulebook on the preparation of the noise strategic plans for larger agglomerations (Skopje, Bitola, Kumanovo, Tetovo); and
    - Secondary legislation on vibration.

- ***Waste*** (within the Law on Waste):
    - Law on Waste Electronics and Electrical Equipment (WEEE), which is going to be in compliance with EU Directive 2002/96/EC); and
    - Rulebook on waste shipments, and the import, export and transit of waste.

2.1.3 CURRENT STATUS OF IMPLEMENTATION OF NATIONAL LEGISLATION RELEVANT TO ESIA

Although for some sectors relevant to the Project the legislation has been prepared and adopted, some of the legislation has not been fully implemented due to lack of institutional capacity at a national and local level, and due to limits in human resources. There is also still a lack of knowledge, professional skills and financial resources to support the implementation. Some of the issues relevant to the railway Project that have not been implemented yet are summarized below:

- There are no inert waste landfills in all municipalities within the North-Eastern region of Macedonia;
- There is no landfills for the hazardous waste within the North-Eastern region of Macedonia;
- There are numerous waste dumps near by the riverbeds along the Project route;
- The existing municipal landfills are not in compliance with strict national and EU standards and pose very high health and environmental risks;
- There is no facility for medical waste treatment in the North-Eastern region of Macedonia;
- There is a lack of strategic noise maps for major roads and railways (e.g. Corridor X) for the bigger agglomerations;

- There are no permanent measurements of noise level in all the settlements within the North-Eastern region of Macedonia , with measurements only being performed and reported for the City of Kumanovo;
- There is a need for additional air quality monitoring stations in the North-Eastern region based on the preliminary assessment of air quality performed several years ago;
- There are no wastewater treatment plants for urban wastewater in any of the settlements in the North-Eastern region of Macedonia; and
- No water sensitive zones have been identified along the watershed within the North-Eastern region of Macedonia.

2.1.4 NATIONAL ESIA PROCEDURE

The Environmental Impact Assessment procedure has been prescribed into the Law on Environment (Chapter XI/Articles 76-94) where the requirements of the EU Directives on EIA (Directive 85/337/EEC as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC) have been transposed.

The national EIA procedure includes socio-economic aspects as well and therefore is referred to subsequently as the ESIA procedure. The ESIA procedure is presented in *Figure 2-1*. The procedure starts when the Investor (Project Proponent) who intends to implement a project submits *a* Notification Letter, in written and electronic form to the Ministry of Environment and Physical Planning (MoEPP) (Administration for Environment), which is the responsible authority for the entire procedure. The Administration for Environment is obligated to publish the Notification in at least one daily newspaper available throughout the territory of the Republic of Macedonia, and on the website of the MoEPP.

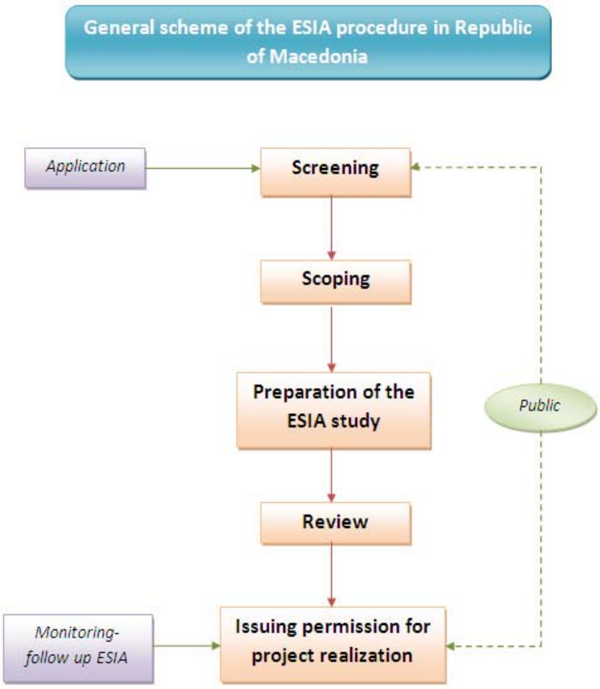


Figure 2-1 ESIA procedure in the Republic of Macedonia

Screening:

The ***Screening*** procedure is a stage of the ESIA procedure during which the MoEPP determines whether an ESIA should be carried out or not for a certain project. For the development of projects that do not belong to the list of the projects for which the ESIA procedure has to be carried out, there is a requirement for the preparation of an “Environmental Impact Report-Elaborate”. The decision from the screening stage has to be published in at least one daily newspaper available throughout the territory of the Republic of Macedonia, and on the website, as well as on the notice board of the MoEPP. The Investor, the legal entities or natural persons concerned, as well as the environmental Non-Government Organizations may appeal against the decision to the *'Second Instance Commission of the Government of the Republic of Macedonia'* responsible for resolution of administrative matters in the area of environment.

After the screening procedure, the MoEPP informs the Investor of the decision on whether or not an ESIA shall be carried out. Based on such information, the Investor applies for a scoping opinion for the ESIA.

Scoping:

The ***Scoping*** phase is the process during which the MoEPP determines the content and extent of the matters which should be covered by the environmental impact assessment study. While drafting the opinion on the scope of the study, the MoEPP shall take into account the opinions of the Investor and the opinions obtained after publication of the decision for screening. Once scoping is completed, the ESIA Study can be undertaken. The Investor prepares the ESIA Study according to the requirements prescribed into the secondary legislation and submits it to the MoEPP in both written and electronic format.

Preparation of ESIA Study:

The Investor ***preparing the ESIA Study*** is obliged to engage at least one person from the List of ESIA Experts, who shall sign the ESIA Study as a responsible person with regard to its quality.

Public Disclosure:

The ***public disclosure*** starts when the MoEPP announces that the draft version of the EIA Study on a certain development project has been prepared and is available to the public in at least one daily newspaper, available throughout the territory of the Republic of Macedonia and local radio/TV station, while the Non-Technical Study (NTS) is published on the website of the MOEPP. This ESIA Study is submitted for consultation to the municipalities where the project will be implemented in order to collect their remarks and opinions. During this phase, the MoEPP is obliged to organize a ***Public hearing*** on the draft ESIA Study and to ensure availability of information needed to the public and public participation in the public hearing event. The MoEPP submits the ESIA Study to the bodies of the state administration responsible for the performance of the activities of the development project.

ESIA Review & Decisions:

The ***Review*** is the process of checking the adequacy of the ESIA Study. The Report of the adequacy of the ESIA Study is prepared by the MoEPP or by persons appointed thereby from the List of Experts for ESIA. On the basis of the study, the ***Report on the adequacy of the ESIA Study***, the public debate and the opinions obtained, the MoEPP issues a ***Decision*** on whether or not to grant consent for the application of the project implementation.

The Decision contains an assessment of whether the ESIA Study fulfils the requirements, and the permit conditions for the project implementation as well as measures for prevention and reduction of the harmful effects. The MoEPP submits the Decision to the Investor, to the body of the state administration responsible for issuance of the permit or decision on the project implementation and to the municipalities where the project will be implemented.

The Decision has to be published in at least one daily newspaper available throughout the territory of the Republic of Macedonia, on the website as well as on the notice board of the MOEPP.

Based on the ***Decision for granting consent*** for the project implementation, the Authority responsible to issue the permit for project implementation, issues the ***Consent for project implementation*** to the Investor.

Public involvement into the ESIA procedure:

Public involvement in national EIA and SEA procedures is regulated in the Law on Environment, secondary legislation on public information (provided in *Table 2-1*), public participation and access to justice and in accordance with International Conventions signed and ratified by Macedonia (e.g. Aarhus Convention and Espoo Convention).

Practical public involvement is performed through:

- disclosing of the information about the project and ESIA process to the public;
- public participation where public can actively be involved in public discussions and submit their written opinion within the different ESIA phases of the procedures; and
- through the mechanism of access to justice, when the public can influence the decision making by submitting appeals to the Court or Second Instance Commission of the Government.

According to the national legislation, the public is involved in every step of the ESIA procedure. Every decision made during the process should be published in the appropriate media and the public can follow and participate through the following steps of the procedure:

a. Announcement of the Notification for the intention for development of project implementation;

b. Publication of the decision on screening;

c. Publication of the decision on scope of ESIA;

d. Announcement of the availability of the draft ESIA Study and Public hearing event/s;

e. Publication of the non-technical summary of the ESIA Study;

f. Publication of the Report on the adequacy of the ESIA Study; and

g. Publication of the Decision on granting consent to or rejecting the application for the project implementation.

The Public hearing stage of the ESIA procedure when the draft ESIA Study has been done is presented in

.

Information on the available public information on the Project, the active consultations with all stakeholders and their opportunities to express their concerns about the project implementation, is contained within the Stakeholder Engagement Plan in Chapter 12.

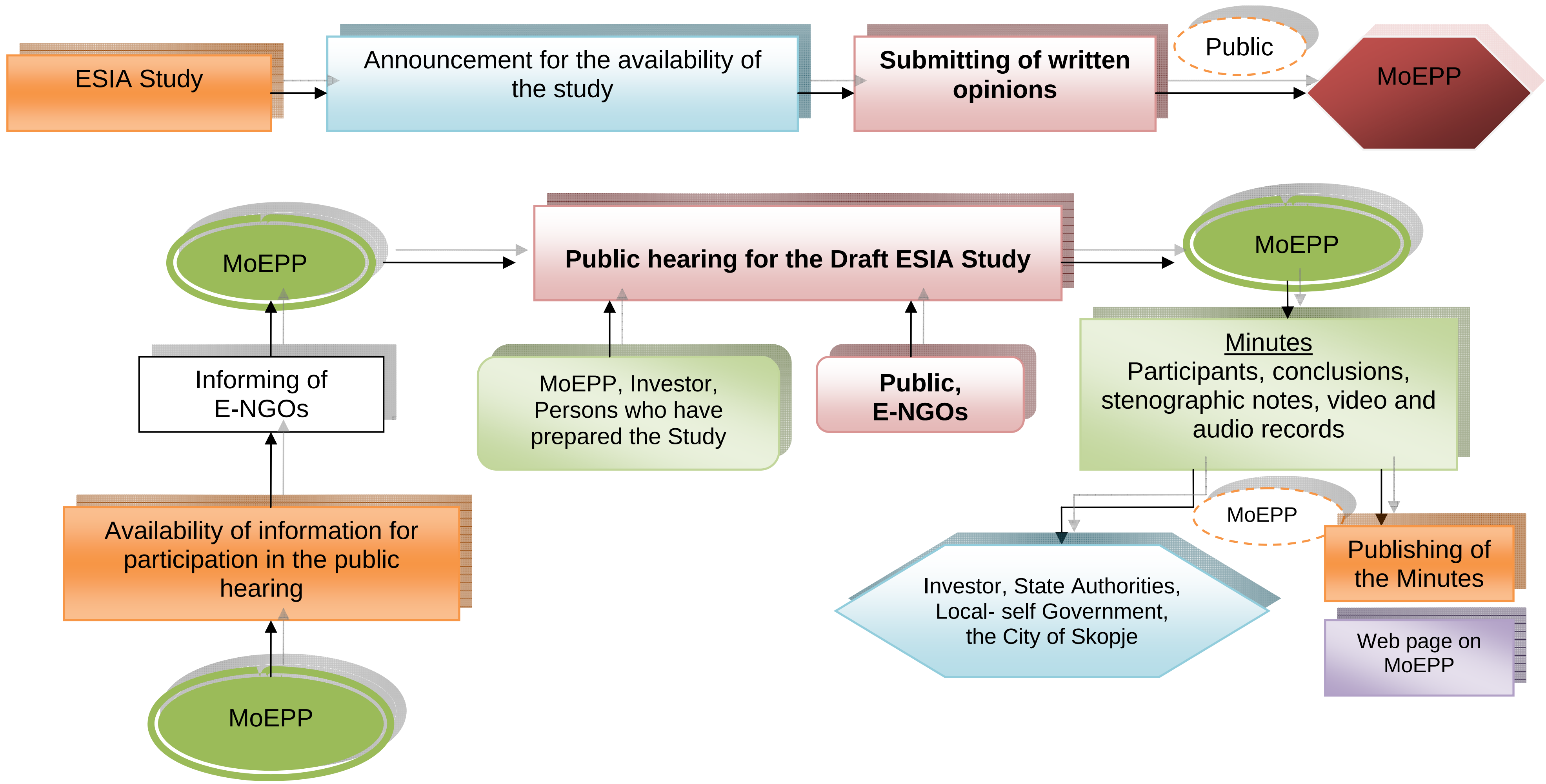


Figure 2-2 Public hearing procedure during developing the ESIA Study

2.1.5 NATIONAL LAND ACQUISITION/EXPROPRIATION PROCEDURE

2.1.5.1 MACEDONIAN EXPROPRIATION LAW

Macedonia, as many countries around the world, typically deal with involuntary resettlement and livelihood restoration under the legal framework for expropriation, with the basic notion that owners of properties are to be compensated for their losses, most often in monetary terms. With compensation, they are expected to be able to acquire new properties and resettle and/or re-establish their businesses in other locations. However, this is often not a straightforward process, and people generally need additional assistance to be able to restore their standards of living and further improve them. This becomes even more evident when the affected population includes vulnerable groups. The most difficult cases involve those who do not possess a legal title for the land they occupy. The Law on Expropriation[12] recognises affected people who have formal legal rights; those without legal title are not entitled to compensation.

The Law on Expropriation regulates the procedure for expropriation of property for projects that are of public interest, and the connected rights for real estate (immovable properties). The construction of railway lines is listed in the expropriation law as projects of public interest. Legal justification of why the project is believed to be in the public interest is submitted together with the request for expropriation (as part of the same process), by the expropriation beneficiary to the administration offices for legal and property affairs over properties.

According to the Macedonian Law on Expropriation, the expropriation-compensation price cannot be lower than the market value of the affected properties and it is assessed against recent market transactions in neighbouring areas. According to the law, compensation can be provided in the form of replacement property or in cash. Macedonian law allows compensation of lost profit/income for affected businesses, if incurred as a result of expropriation.

2.1.5.2 LAND TENURE AND PROPERTY RIGHTS

The following Macedonian legislation is relevant for land tenure and property rights:

- Law on Property Cadastre (Official Gazette Nos. 40/08, 158/10 and 51/11);
- Law on Survey and Land Cadastre (Official Gazette Nos. 34/72 and 13/78); and
- Law on Ownership and Other Material Rights (Official Gazette No. 18/01).

The EC Enlargement Strategy Progress Report for 2010 for Macedonia states that the land register has been established for over 97.5% of the Country's territory. In addition, registration fees have been lowered, administrative procedures considerably shortened and an online registry developed. The laws regulating property registration are the Law on Property Cadastre and the Law on Survey and Land Cadastre.

In Macedonia, current legislation defines the acquisition of property rights over land and/or structures erected on someone else's land. Macedonia is one of the signatories to the 2004 Vienna Declaration on Informal Settlements in South Eastern Europe. With the aim of enabling legalization of informal construction on state owned land, the government adopted a Law for the Treatment of Illegally Constructed Objects (Official Gazette No 23/11, 54/11).

[12] The Law on Expropriation (Official Gazette Nos. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08 and 76/10);

2.1.5.3 RELEVANT LEGISLATION ON RAILWAY SYSTEMS

Article 59 from the Macedonian Law on the Railway System (Official Gazette No. 48/2010) stipulates that along railways that needs to be constructed in the towns; urban plans, state urban planning documentation or local urban planning documentation may envisage structures which may be constructed on a distance not less than 10 meters from the end point of the railroad area. The minimum width of the "railroad area" is 1.0 meter on both sides of the earth body of the railroad. Thus, houses should be at least 11 meters away from where the rail is ending. This law refers to new construction.

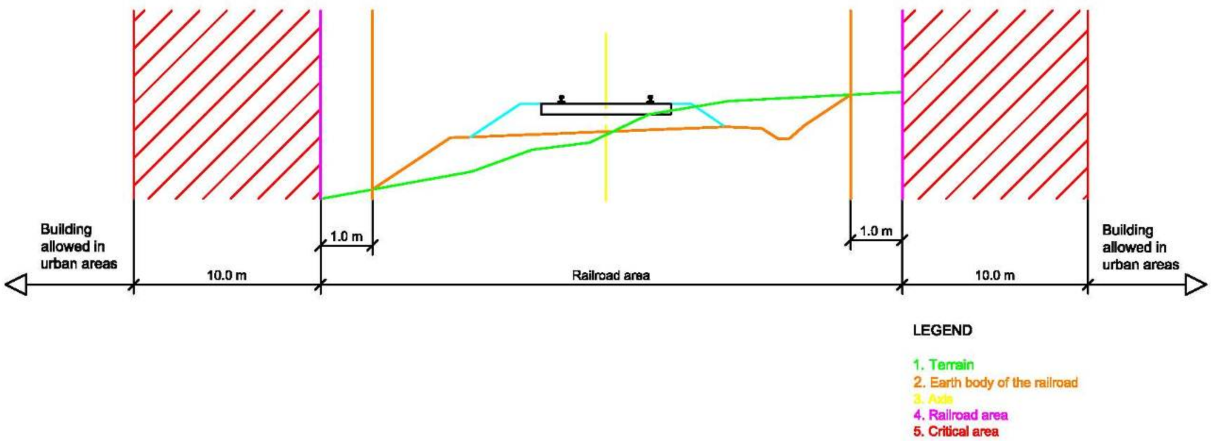


Figure 2-3 Railroad Area Layout

2.1.5.4 PROCEDURE FOR LAND EXPROPRIATION

According to the Law on Expropriation, the procedure for land expropriation initiates with a 'proposal for expropriation'. The proposal is submitted by the Beneficiary of Expropriation (in this case it would be PERI/Railway Department, Ministry of Transport and Communication) to the Property and Legal Affairs Office (expropriation body).

The proposal for expropriation contains data of the proposer of the land expropriation, the real estate for which the land expropriation is proposed, the owner of the real estate, and for which purpose the land expropriation is proposed. As enclosures to the proposal, the following items also have to be submitted:

1. Statement for the act for planning of the space;
2. Numerical data for the real estate for which the land expropriation is proposed;
3. Offer for the type and amount of the compensation for the real estate;
4. Evidence for assets secured for compensation of the expropriated immovable property; and
5. Evidence for ownership of what is offered in compensation, if such an offer exists.

Within the Railway Department, a commission for Land Expropriation with three members is established. The commission is established through a decision enacted by the Director of the Railway Department. Based on a letter of attorney issued by the Director of the Department, the commission members are authorized in the name and on behalf of the Railway Department to carry out the activities necessary for fulfilling the expropriation, i.e. to prepare, sign and submit the proposals for expropriation, to participate in the discussions in front of the property and legal affairs office, and to sign the minutes and the agreement concluded in front of the expropriation body.

For the needs of the expropriation procedure, surveying studies for expropriation should be prepared. These are prepared in accordance with the procedure and manner provided in the regulations for surveying works. The Surveying companies are selected in accordance with the Law on Public Procurement Official Gazette No. 136/07

With the aim of determining the market value of the real estates (structures) which are subject to expropriation, as well as the compensation of any crops (fertile plots), the beneficiary of expropriation engages experts from the relevant areas. The selection of experts for land expropriation follows the same procedure as those for land acquisition. The findings and opinions of the experts are submitted to the expropriation body together with the proposals for expropriation.

The proposals for expropriation will be submitted to the authorized department within the Property and Legal Affairs Office, who again will forward the proposals with all enclosures to the real estate's owners and to the Agency for Real Estate Cadastre, where the expropriation will be registered. Afterwards, the expropriation body arranges for discussions with the real estate owner and the beneficiary of expropriation (the Railway Department).

The discussion can be concluded following agreement of compensation. This kind of agreement is binding and the procedure for land expropriation and for determination of the compensation is considered as completed. The agreement shall be signed by the commission members and the payments should immediately be transferred from the beneficiary of expropriation (the account of Railway Department) to the former owners.

If an agreement has not been reached during the discussions, the expropriation body decides how the expropriation proposal should be settled. Upon the effectiveness of the decision for expropriation, ex officio or with proposal of the former owner, a procedure for determination of the compensation for the expropriated real estate is initiated by the authorized court. The decision of the authorized court will form the basis for execution of payment of the monetary compensation to the former owners.

The expropriation body is responsible for submitting the concluded agreements as well as the final decisions to the authorized bodies responsible for managing the public books, to ensure that the changes of the ownership of the expropriated real estates is recorded.

Courts decide disagreements over title or compensation amounts, this does not postpone expropriation.

2.1.5.5 CUT-OFF DATE

The Cut-Off Date is the date after which persons found to settle in the Project area are not eligible to Project compensation or other resettlement benefits, while similarly immoveable assets or crops established after the Cut-Off Date are not to be compensated.

The intent of the Cut-Off Date is to “freeze” eligible individuals or households and eligible properties thereby avoiding opportunistic attempts at maximising compensation through structures erected intentionally or crops established on purpose. Potentially affected people need to be informed of the Cut-Off Date in order to minimise potential claims related with eligibility. Where opportunistic and/or fraudulent attempts at maximising compensation are assessed as a significant risk, caution must be exerted in disclosing the Cut-Off Date.

The Cut-off Date for eligibility is defined as:

- Either the date when notification of intent of expropriation is delivered to affected owners where expropriation is applicable; or
- The date of the performed census (date to be defined in the further stages of the project).

2.2 INTERNATIONAL RELATED TREATIES, GUIDANCE AND POLICIES

2.2.1 INTERNATIONAL TREATIES & CONVENTIONS

Macedonia has ratified a number of international treaties and conventions along with the ongoing process of transposing European Union (EU) law into the National legal and policy framework. The following international conventions ratified by the Republic of Macedonia were taken into account during the elaboration of the ESIA:

- UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. Adopted on the 25th of June 1998 (Aarhus Convention);
- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention, February 1991);
- Convention on Biological Diversity (Official Gazette No. 54/97);
- Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979 (Official Gazette No. 38/99);
- Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1972 (Official Gazette No. 49/97);
- Fungal species protected to the European Red List of Fungi (Ing 1978);
- Fungal species proposed for protection by the European Council for Conservation of Fungi (33 European fungal species candidates for listing in Appendix I of the Bern Convention, August 2003);
- International Convenant on Economics, Social and Cultural Rights (New York, 16 December 1966). Ratified by Macedonia on 18 January 1994;
- United Nations Framework Convention on Climate Change (New York, 9 May 1992). Ratified by Macedonia on 28 January 1998 (entrance into force on 28 Apr 1998);
- Kyoto Protocol on Climate Change (Kyoto, December 1997). Ratified by Macedonia on 18 November 2004 (entrance into force on 16 February 2005);
- UNESCO World Heritage Convention (November 1972). Notification of succession by Macedonian government on 30/04/1997;
- International Labour Organization Conventions: Macedonia has ratified many ILO conventions. For more details, please refer to *Table 2-1* and link below:

  http://webfusion.ilo.org/public/applis/appl-byCtry.cfm?lang=EN&CTYCHOICE=3440&hdroff=1

Further details regarding the Aarhus Convention and Espoo Convention are outlined below due to their relevance to the ESIA.

2.2.2 AARHUS CONVENTION

The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters was adopted on the 25th of June of 1998 in the Danish city of Aarhus, at the Fourth Ministerial Conference in the 'Environment for Europe' process.

The Aarhus Convention:

- Links environmental rights and human rights;
- Acknowledges that we owe an obligation to future generations;
- Establishes that sustainable development can be achieved only through the involvement of all stakeholders;
- Links government accountability and environmental protection; and

- Focuses on interactions between the public and public authorities in a democratic context.

The Convention is not only an environmental agreement; it is also a Convention about government accountability, transparency and responsiveness.

The Aarhus Convention grants the public rights and imposes on Parties and public authority's obligations regarding access to information and public participation and access to justice.

Convention on access to information, public participation in decision-making and access to justice in environmental matters – was ratified by Macedonia on November 2, 2010 (Official Gazette No. 40/99).

Within the Aarhus Convention, Republic of Macedonia is a Party to the Protocol on Pollutant Release and Transfer Registers (PRTR). It joins South-Eastern European countries such as Albania, Bulgaria, Croatia, Romania and Slovenia that are already Parties to the Protocol. Thereof, Macedonia is competent for entering into international agreements and for implementing the obligations resulting there from, which contributes to the pursuit of the following objectives: preserving, protecting and improving the quality of the environment, protecting human health and rational utilization of natural sources.

2.2.3 ESPOO CONVENTION

Concerns about transboundary impacts from development projects are growing with time as the number and size of developments increase. The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) establishes a procedure to manage transboundary impacts.

The sovereignty of states means that states alone have the competence to take decisions in respect to the natural resources and the environment of their territory. Nevertheless, this structure does not co-exist comfortably with natural systems interrelationship, which does not respect political borders. An activity within one state's territory can have consequences in another state.

International environmental laws, like the Espoo Convention, serve as the principal framework for cooperation among countries to protect the local, regional and global environment. The general aim of the Espoo Convention is to *"ensure environmentally sound and sustainable development"* through the prevention, reduction and control of significant adverse transboundary environmental impacts from proposed activities. More specific objectives are to *"enhance international co-operation in assessing environmental impact, in particular in a transboundary context"*, and "*to give explicit consideration to environmental factors at an early stage in the decision-making process"*. The last mentioned objective recalls the concept of prevention, a core value in EIA.

The countries that ratified the Convention are called parties or members of the Convention. As a signatory of the Convention since 1999, Macedonia has incorporated its provisions into the national legislation (Law on Environment) and has nominated a national focal point for ESPOO Convention:

Ministry of Environment and Physical Planning,
Address: Bul. "GoceDelcev", MRTV building (10,11,12 floor)
1000 Skopje, Republic of Macedonia; http://www.moepp.gov.mk
Telephone: +389 3 251 400
Fax: +389 3 220-165
e-mail: info@moepp.gov.mk

The Convention defines environmental impacts in a broad sense meaning *"any effect caused by a proposed activity on the environment including human health and safety, flora, fauna, soil, air, water, climate, landscape and historical monuments or other physical structures or the interaction among these factors; it also includes effects on cultural heritage or socio-economic conditions resulting from alterations to those factors"* (Espoo Convention, 1991). The strongest motivation for the Espoo Convention was the application of the already working EIA framework to assess transboundary impacts and to prevent conflicts between countries.

The main mechanisms of the Convention intended to achieve its objectives are summarized below:

- Obligation to carry out an EIA procedure: EIA should be undertaken before decision making is done and it is applied to the project level;
- Consultations among countries: Consultations should occur along the whole EIA procedure (i.e. notification, preparation of the EIA documentation, consultations on the basis of the EIA documentation, final decision and post-project analysis);
- Public participation: Public participation in both the affected party and the party of origin should be facilitated during the whole Espoo process;
- Bilateral and Multilateral agreements; and
- Settlement of disputes.

Article 3 of the International Convention on Environmental Impact Assessment in a Transboundary Context states that *"for a proposed activity listed in Appendix I"* the *"construction of lines for long-distance railway traffic"* being included in this list *"the Party of origin shall, for the purposes of ensuring adequate and effective consultations under Article 5, notify any Party which it considers may be an affected Party as early as possible and no later than when informing its own public about that proposed activity"*.

Accordingly, the Macedonian Ministry of Environment and Physical Planning shall inform (based on the Notification of Intention for the project and the ESIA screening process) the Bulgarian governmental institutions and Bulgarian ESPOO focal point about the start-up of the ESIA procedure, description of project and preliminary project environmental and social impacts. Thereafter, Bulgaria will have a period of 30 days to respond if they decide to participate in the ESIA process. If they respond that they do want to participate, the obligation is to have equivalent consultations with public in the affected country to that in the country where the project is located. The Macedonian Ministry of Environment and Physical Planning will send to Bulgaria as well, the draft ESIA Study, the Report on adequacy of the ESIA study (the consultations with Bulgarian governmental bodies about the mitigation measures will be performed as well), and the final Decision on granting consent to or rejecting the application for the project.

With regards to the Project "Railway Corridor VIII-Eastern Section" the Macedonian Ministry of Environment and Physical Planning informed the Bulgarian governmental institutions and Bulgarian ESPOO focal in August 2011 in English and on 17 January 2012 in Bulgarian language.

On the western part of Corridor VIII, which connects Macedonia and Albania, there is a separate project ongoing and an ESIA has been already prepared. At the present moment, the project is in design stage and application for funds started. The obligation of the Macedonian government for informing the Albanian State on the ongoing activities for Corridor VIII in Macedonia has been fulfilled under that project.

2.3 INTERNATIONAL LENDER POLICIES, GUIDANCE & REQUIREMENTS

The European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) are considering providing a loan for the rehabilitation and construction works for this Project.

As part of their decision-making process, EBRD and EIB require an evaluation of the proposed project through an Environmental and Social Impact Assessment (ESIA) that meets EBRD, EIB and other applicable international policies, guidelines and requirements. Therefore, the EBRD Performance Requirements given in the EBRD Environmental and Social Policy (2008) as well as the EIB's environmental and social requirements outlined in their Environmental and Social Practices Handbook (Version 2: 24/02/2010) were followed and participatory assessment process was carried out. The development of the Macedonian EIA and EBRD's ESIA has been consolidated into one process and documented in this single report.

The key relevant international policies, guidelines and requirements considered relevant to the ESIA are summarized below.

2.4 EBRD ENVIRONMENTAL AND SOCIAL POLICY

Project "Railway Corridor VIII-Eastern-Section" has been categorized as a Category A project as it is included in Appendix 1: 7 Construction of motorways, express roads and lines for long-distance railway traffic of EBRD's 2008 Environmental and Social Policy. Therefore, as a Category A project it could result in potentially significant and diverse adverse future environmental and/or social impacts and issues which require a formalized and participatory assessment process carried out by an independent third party specialists in accordance with the Performance Requirements established under the EBRD 2008 Environmental and Social Policy. The Bank requires the preparation of an ESIA and public disclosure of the report prior to its decision to approve financing for the Project in accordance with EBRD's 2008 Environmental and Social Policy and its Environmental & Social Performance Requirements. For more details please refer to:

http://www.ebrd.com/pages/research/publications/policies/environmental.shtml

2.4.1 EIB ENVIRONMENTAL AND SOCIAL POLICY

The environmental and social policies, principles and standards as well as operational practices of EIB derive from and reflect the evolving EU approach and that from other international institutions towards the promotion of environmental sustainability and well-being in the broader context of the goal of sustainable development. This is reflected in the objectives and targets of its Corporate Operational Plan (COP-http://www.eib.org/attachments/strategies/cop_2010_en.pdf) as well as in its environmental and social safeguards, through the EIB Statement on Environmental and Social Principles and Standards. Such procedures, principles and standards are translated into the routine practices of the EIB in the Environmental and Social Practices Handbook, which is subject to regular review and revision (the current version is Version 2: 24/02/2010).

The EIB applies a number of core environmental and social safeguarding measures that reflect international good practice. It requires all its projects to:

- Apply the European Principles for the Environment, i.e. comply with EU environmental principles, standards and practices, if practical and feasible in some regions;
- Comply with the EU environmental Acquis on environmental assessment as defined in the EIB Sourcebook on EU Environmental Law;
- Comply with international conventions and agreements ratified by the EU;
- Comply with the EU social Acquis as defined in the EIB Reference Book on EU Social Legislation and through the EIB Social Guidance Notes;
- Apply "best available techniques", as appropriate;
- Apply good environmental management practices during project implementation and operation; and
- Adhere to other specific international good environmental and social practices.

Environmental and social sustainability according to the EIB Statement is a condition for projects to receive support from the Bank. Environmental and social assessment is therefore an integral part of the Bank's appraisal and monitoring process. EIB Environmental and Social Statement require that all projects, irrespective of location, comply with the process and content consistent with the requirements of the EU EIA Directive. Therefore, according to EIB's procedure, a full EIA, including public consultation, will be required for all projects listed in Annex I of the EIA Directive 85/337/EEC, amended by Directives 97/11/EC and 2003/35/EC (Annex 11 of the EIB Handbook). Project "Railway Corridor VIII-Eastern-Section" is included in this Annex as "7. Construction of lines for long-distance railway traffic".

For more details please refer to:

http://www.eib.org/attachments/thematic/environmental_and_social_practices_handbook.pdf

2.5 SUMMARY OF DIFFERENCES BETWEEN NATIONAL MACEDONIAN LEGISLATION AND EBRD/EIB/IFC/EUROPEAN ENVIRONMENTAL & SOCIAL STANDARDS

Table below shows an overview of EBRD, EIB/IFC and EU requirements on environmental and social aspects, requirements of national legislation, gaps between and proposed response:

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
ESIA procedure	The EIA EU applies to a wide range of defined public and private projects and requires for all projects who have significant effects on the environment EIA to be prepared EBRD and EIB require an evaluation of the proposed project through an Environmental and Social Impact Assessment (ESIA) that meets EBRD, EIB and other applicable international guidelines and requirements. IFC Environmental and Social Safeguard Policies and its Disclosure Policy, IFC Sustainability Framework, articulates IFC's strategic commitment to sustainable development and is an integral part of their approach to risk management.	According to Macedonian Law on environment, potential environmental impacts of the project must be evaluated by an Environmental Impact Assessment (EIA) process and documented in an environmental impact statement.	In Macedonian law on environment, requirements of the EU EIA Directive (85/337/EEC amended) have been transposed, however there is a gap for social assessment required by EBRD and EIB and only EIA required by Macedonian law	Full ESIA to be prepared
Access to environmental information and public participation in environmental decision making process	EU directives covers access to environmental information, for public participation in respect of the drawing up of certain plans and programs relating to the environment (public participation and access to justice) The EBRD Environmental and Social Policy from 2008 considers stakeholder engagement as an essential part of good business practices and corporate citizenship, in particular effective community engagement is central to the successful management of risks and impacts on communities affected by project as well as central to achieving enhanced community benefits. EIB Environmental and social practices handbook requires public consultation in the EIA process which will identify and address public concerns and issues, providing to the public opportunity to receive information and make meaningful input into the project assessment and development. IFC's Policy on Disclosure of Information sets out the policy of the Corporation regarding the scope of information that it makes available to the public either as a routine matter or upon request. IFC believes that transparency and accountability are fundamental to fulfilling its development mandate and to strengthening public trust in IFC and its clients. This Policy reaffirms and reflects IFC's commitment to enhance transparency about its activities and promote good governance.	Macedonian law on Environment stipulates that public participation in the EIA process is obligatory	Macedonian law covers access to environmental information and public participation in environmental decision making process, period required for public disclosure is 30 days according to Macedonian law and 120 days according to EBRD	To follow national legislation which is in compliance with EU directives, EBRD, EIB and IFC requirements. To meet EBRD requirements, 120 days public disclosure needs to be provided.
Hydrology (Surface Water) &Hydrogeology (Groundwater)	EU directives establish the list of priority substances in the field of water policy, on environmental quality standards in the field of water policy, on pollution caused by certain dangerous substances discharged into the aquatic environment, urban waste water treatment, nitrates, dangerous substances to water discharges, quality of water intended for human consumption, protection of groundwater against pollution caused by certain dangerous substances. The EBRD Environmental and Social Policy from 2008 requires implementation of the pollution prevention and abatement measures,	The most important aspects of legislation of the Republic of Macedonia in the field of water management are already established within the horizontal environmental legislation and the Law on Waters (Official Gazette no. 87/08, 6 / 09, 161/09, 83/10, 51/11).The determination of the water quality status of the main surface watercourses is	At this point legislation in the field of water management, which is already or will be transposed, is in compliance with the European Union water legislation. Following degrees will be prepared until the middle of 2012 within the Law on Waters: - Degree on criteria for determination of the good ecological status of the	To follow national legislation which is in compliance with EU legislation, issues that still need to be covered with outstanding degrees to be covered with relevant EU

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	as signatory of European principles for the environment the EBRD requires compliance with relevant EU environmental standards on water The environmental standards of the EIB are intended to protect and enhance the natural environment, to improve the quality of life, economic development and social-being. The Bank requires its promoters to apply point source-specific emission standards according the IPPC Directive and sector-specific Directives (e.g. the Water Framework Directive). The ambient standards that relate to accumulated pollution in air, water and soils are also determined by the requirements of EU Directives and the projects should meet the relevant ambient standards. The procedural standards that are broadly defined as the management and administrative requirements related to the protection of the environment should be fulfilled as well (the Water Framework Directive is one of these EU Directive that contains these kind of standards). General IFC`s EHS Guidelines apply to projects that have either direct or indirect discharge of process waste water, wastewater from utility operations or storm water to the environment. Projects with potential to generate process wastewater, sanitary (domestic) sewage or stormwater should incorporate the necessary precautions to avoid, minimize and control adverse impacts to human health, safety or the environment. The wastewater management including water conservation, wastewater treatment, stormwater management and waste water and water quality monitoring are also required to be met. The EHS Guidelines for Railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. The document targets mainly rail operations, covering construction and maintenance of rail infrastructure as well as operation of rolling stock, such as locomotives and rail cars; and locomotive maintenance activities, including engine services, and other mechanical repair and maintenance of locomotives and railcars. In this document all the environmental issues are elaborated and guidelines for minimizing the potential impact to the environment are explained. The Guidelines recommend measures to prevent, minimize or control wastewater effluents coming from passenger terminals and from passenger rail service.	prescribed by the Law on Water (Official Gazette No. 87/08, 6 / 09, 161/09, 83/10, 51/11) and Decree on classification of waterways, lakes, accumulations and ground waters (Official Gazette No.18/99, 71/99). As established in the national legislation, there is a list of parameters that needs to be analysed, and reports to be prepared annually by the Ministry of Environment and Physical Planning.	surface waters – physical/chemical, biological and morphological conditions; - Degree on criteria for determination of the good ecological status of the ground waters – physical/chemical, biological and morphological conditions; - Degree on classification and categorization of waters; and - Rulebooks on the determination of the sensitive water zones and water bodies	legislation.
Climate and Air Quality	The main requirements of the Air Quality Framework Directives are related on benzene and carbon monoxide limit values in ambient air, on ozone in ambient air, on limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, on arsenic, cadmium, mercury, nickel and PAH in ambient air.	In Macedonia, the air quality regulation is provided by Law on Ambient Air Quality (“Official Gazette of the Republic of Macedonia” No. 67/04 with latest amendment No. 92/07, No. 35/10 and	Requirements of EU directives have been transposed into national legislation. Only the Rulebook for air emission limit values from mobile sources is not adopted yet; it is planned	If Rulebook for air emission limit values from mobile sources will not be adopted, directive (EU

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	EIB Environmental and Social practices Handbook requires assessment regarding project`s activities impact on climate change (carbon credit potential, vulnerability and carbon footprint) on which issues EIB is committed to support EU leadership role in combating climate change and recognises the need for an appropriate response. EIB requires reducing the impact of environment on human health e.g. supply of quality potable eater and improvement of air quality. The EBRD Environmental and Social Policy from 2008 requires implementation of the pollution prevention and abatement measures, as signatory of European principles for the environment the EBRD requires compliance with relevant EU environmental standards, in particular those related to air. IFC Environmental, Health&Safety Guidelines provides information about common techniques for emissions management that may be applied, provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. It is also intended to provide additional information on approaches to emissions management in projects located in areas of poor air quality, where it may be necessary to establish project-specific emissions standards, gives recommendations for reduction and control of greenhouse gases, emissions and air quality monitoring programs provide information that can be used to assess the effectiveness of emissions management strategies. IFC EHS Guidelines for railways covers air pollution caused by locomotive engines as significant contributors to airpollution in urban areas, especially in the vicinity of rail yards. Recommends measures for prevention, minimizing, and controlling of air emissions.	No. 47/11). Adopted secondary legislation has adopted transposing teh relevant EU directives and technical standards like decree on limit and target values for levels and type of pollutants in the ambient air, alert and information thresholds; deadlines for achieving limit and target values for specific substances; margins of tolerance for limit value and target value and long term objectives for specific pollutants, decree on limit and target values for levels and type of pollutants in the ambient air, rulebook on criteria, methods and procedures for evaluation of the ambient air quality, rulebook on inventory and determination of the levels of the pollutant emissions in the ambient air in tonnes per year, for all types of duties, as well as other data needed for submission of the Program for monitoring the air in Europe (EMEP), lists of zones and agglomerations for ambient air quality, rulebook for methodology for inventory taking and identification of the levels of emissions of pollutants in the ambient air in tons per year for all types of activities, as well as other data required to be submitted under the Program for air monitoring in Europe (EMEP), rulebook on establishing the emission upper limits on national level, than air emission limit values from stationary sources, than rulebook on liquid fuel quality, national action plan for ratification and implementation of the heavy metals protocol, POPs protocol and Goteborg protocol.	to be adopted in 2012 where the limit values for diesel traction locomotives will be transposed (EU Directive 2004/26/EC) on measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.	Directive 2004/26/EC) on measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery will be relevant.
Noise and Vibration	EU directives covers the assessment and amendment of environmental noise and on noise emissions from outdoor equipment EBRD does not have particular requirements, however as signatory of European principles for the environment the EBRD requires	The protection against environmental noise pollution is addressed in the Law of Noise Protection (Official Gazette of the Republic of Macedonia No.79/07,	Relevant EU directives are transposed to national legislation; the basic recommendations of the European Union are met, providing full access to	There is a legal basis for the development of secondary legislation on

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	compliance with relevant EU environmental standards, in particular those related to noise and vibrations. Project must be designated to comply with relevant EU environmental requirements as well as with applicable national law and will be operated in accordance with these laws and requirements. EIB Environmental and Social practices Handbook requires that project must comply with EU standards in potential candidate country as is it Macedonia, the benchmark is EU standards. Where EU standards are more stringent than national standards, the higher EU standards are required if practical and feasible. IFC Environmental, health and safety guidelines for railways recommends noise management strategy as measures for mitigating railway noise	124/10, 47/11). The law establishes the need to reduce harmful effects that are consequence of exposure to noise in the media and the environment, and to provide a basis for developing measures to reduce noise from its entire sources. The ultimate objective is the protection of the health and wellbeing of the population.	the management of environmental noise. A series of secondary pieces of legislation has been adopted in the period 2007-2011 transposing the EU and WHO (World Health Organisation) Guideline values for community noise in specific environments. The national noise exposure limit values are in line with the WHO guideline values for community noise in specific environments and with IFC noise level guidelines provided in the General EHS Guidelines: Noise Management. Macedonian legislation on environmental noise is in line with EBRD's Performance Requirements PR 4 Community Health and Safety Requirements and PR 3 Pollution Prevention and Abatement), EIB's Environmental and Social Principles, environmental emissions and ambient standards derived from EU environmental legislation. The exposure of workers to noise disturbance is regulated with the Law on Occupational Health and safety (Official Gazette of RM No. 92/07) and the Rulebook for Occupational Health and Safety at Work for Workers Exposed to Noise Risks (Official Gazette of RM No. 21/2008), which are in full line with the requirements of EU Directive 1989/391/EEC on the Introduction of Measures to Encourage Improvements in the Safety and Health of Workers at Work and Directive 2003/10/EC on Minimum Health and Safety Requirements Regarding the Exposure of Workers to the Risks Arising from Physical Agents (Noise). These requirements are in compliance with EBRD's Performance Requirement	conditions for noise protection from roads, railways, airports and marine ports within the Law on Noise Protection, but it has not been accomplished yet. Also, there are no national standards developed for outdoor equipment where the requirements from EU Directive 2000/14/EC on Noise Emissions for Outdoor Equipment will be transposed. According to the National Program for Approximation of Legislation, these pieces of legislation are planned to be developed and adopted by 2013. The responsible institutions for noise monitoring are the National Noise Monitoring Network (not developed yet) and public health institutes at municipality level. Currently, the assessment of the adverse noise impact on the community health is made by the Public Health

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
			PR 2, EIB's emission standards, and IFC noise limits for various working environments. Following secondary legislation is planned to be prepared until the end of 2012 within the Law on Noise): - Rulebook on the technical measures and conditions that the construction objects should fulfil regarding protection against noise; - Rulebook on the noise protection measures that should be included into the urban and spatial plans; - Rulebook on the noise emissions of outdoor equipment; - Rulebook on the preparation of the noise strategic plans for larger agglomerations (Skopje, Bitola, Kumanovo, Tetovo); and - Secondary legislation on vibration	Institutes only in three cities: Bitola, Kicevo and Kumanovo. The data is processed by the Macedonian Environmental Information Centre (MEIC), a division within the Ministry of Environment and Physical Planning. The MEIC is prepares on an annual basis the State of the Environment Reports, which include the state of noise in these three cities. In the absence of a National Noise Monitoring Network, there is no data on noise level measurements for the broader area where the Railway Corridor VIII-Eastern Section project is located (except Kumanovo). Consequently, there are no planning municipal documents, nor strategic noise maps, nor action plans with preventive mitigation measures. If national legislation will not be developed relevant EU law to cover

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
				these issues.
Waste management	EU directives regulates the waste management, establishes a list of wastes and list of hazardous waste, disposal on waste oil, landfill, labelling the equipment that contains PCBs EU PCBs and waste oils The EBRD Environmental and Social Policy from 2008 requires implementation of the pollution prevention and abatement measures, as signatory of European principles for the environment the EBRD requires compliance with relevant EU environmental standards on waste management. Project must be designated to comply with relevant EU environmental requirements as well as with applicable national law and will be operated in accordance with these laws and requirements. According to EBRD requirements clients will avoid or minimise the generation of hazardous and non-hazardous waste materials and reduce its harmfulness as far as practicable. EIB Environmental and Social practices Handbook requires that project must comply with EU standards in potential candidate country as is it Macedonia, the benchmark is EU standards. Where EU standards are more stringent than national standards, the higher EU standards are required if practical and feasible. IFC Environmental, health and safety guidelines for railways, recommends waste management strategies for management of waste that will be generated from railway operation which will depend on the number of passengers handled and the services provided, trains and passenger train terminals which may generate solid, non-hazardous, food waste from food establishments, in addition to packaging materials from retail facilities, and paper, newspaper, and a variety of disposable food containers from trains and common passenger areas, from maintenance and upgrading of rail infrastructure.	With regards to policy documents, the Republic of Macedonia prepared the main strategic documents: • Waste Management Strategy of the Republic of Macedonia (2008 – 2020), Government of the Republic of Macedonia, 2008 • National Waste Management Plan (2009 – 2015) of the Republic of Macedonia, Ministry of Environment and Physical Planning, 2008 In Macedonia, the main national legislation regarding the waste management sector is the Law on Waste Management (Official Gazette No. 68/04, 71/04 and 107/07) and some technical rules and guidelines. The Law on Waste Management significantly contributes to the approximation process in establishing a modern and comprehensive waste management system based on the main EU directives on different waste streams including hazardous waste. The Law on Waste Management as a framework regulation act provides general rules applying to the following issues: definitions and applicability regarding types of waste, strategy, plans and program formulation at different levels; competent authorities to draw up waste management procedures and issuing permits; landfills; incineration and co-incineration of waste, import, export and transit of waste; monitoring, reporting, data management; supervision of competent authorities, punitive provisions; transitional and final provisions. Within the Law on Waste Management the Waste Framework Directive (2006/12/EC) amended with EU Directive	National legislation follows the recommendations of international organizations such as IFC EHS General Guidelines (waste oils, batteries & accumulators, oil leakage, packaging & packaging waste). In reviewing IFC EHS Guidelines for Railways on waste from Passenger Trains and Terminals and Waste from Field Operations (hazardous waste, chemicals, oil leakage), they are already included in national legislation. All principles for good proper waste management and guidelines for different waste streams management provided in IFC EHS General Guidelines and EBRD PR 3 and EIB principles and standards are also in line within the national regulation. Following legislation is planned to be prepared until the middle of 2012 within the Law on Waste: - Law on Waste Electronics and Electrical Equipment (WEEE), which is going to be in compliance with EU directive 2002/96/EC) is in preparation); - Rulebook on the waste shipments, import, export and transit of waste	National legislation is in full compliance with EU, EBRD, EIB and IFC requirements, on issue which are not covered with relevant laws EU legislation will be relevant

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
		2008/98/EC has been transposed. The Law on the Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette No. 48/97) and the Law on Environment give the legal basis for the Rulebook on format and content of the forms for transboundary movement of waste (Official Gazette No. 37/03, 38/03).The Law on Waste Management represents the basis for the adoption of secondary legislation, which regulates specific waste streams management at all levels according to the hierarchy waste principles. Secondary legislation, based on the Law on Waste Management and adopted in years 2007 and 2008, regulates permitting procedures and sets technical and other conditions for waste storage and transfer, for acceptance to landfill and for landfill operations. Separate Rulebooks already adopted are listed in Chapter 2.		
Nature Conservation & Biodiversity	EU directives covers conservation of natural habitats and wild fauna and flora, wild birds, protection of species of wild fauna and flora by regulating trade terrain. EBRD Performance Requirement PR 6 for Biodiversity Conservation and Sustainable Management of Living Natural Resources supports a precautionary approach to the conservation and sustainable use of biodiversity and then management of impacts upon it in line with the Rio Declaration and the CBD. Annex 7 of EIB's Environmental and Social Practices Handbook gives general approach to biodiversity assessment. Likewise, IFC's Policy and Performance Standards on Social and Environmental Sustainability commitment for protecting nature and biodiversity is contained in Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management. This standard is specifically referred to in IFC's Environmental, Health, and Safety Guidelines for Railways.	The basic law in the area of nature protection is the Law on Nature Protection (Official Gazette of the Republic of Macedonia Nos. 67/04, 14/06 and 84/07).	Most of the EU legislation on nature conservation has been transposed into this Law, which also contains obligations from relevant ratified international agreements. Full implementation of the Law is still to be achieved with the adoption of several by-laws. Thus, with regards to the transposition of the two directives that comprise the cornerstones of EU nature protection policy, the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC), there are still many requirements pending of full transposition.	Requirements which are still pending to be covered by relevant EU legislation
Cultural	European Landscape Convention (Florence) is only relevant EU	The main regulation in the Republic of	Macedonia ratified the Convention for	No response

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
Heritage and Archaeology	legislation additionally to UNESCO. The EBRD recognises the importance of cultural heritage for present and future generations. The objectives of Performance Requirement 8 "Cultural Heritage" are, among others, to support the conservation of cultural heritage in the context of EBRD-financed projects, and to protect cultural heritage from adverse impacts of project activities. EIB Environmental and Social Practices Handbook provides advice on planning and managing the environmental and social appraisal and monitoring, including the Sustainable Development Paradigm applied to EIB activities where cultural heritage is covered. IFC`s policy on social and environmental sustainability requirements is a consistent approach to avoid adverse impacts on workers, communities and the environment, or if avoidance is not possible, to reduce, mitigate, or compensate for the impacts, as appropriate.	Macedonia applied in the field of cultural heritage and archaeology is Law on Preservation of Cultural Heritage (Official Gazette of the Republic of Macedonia No. 20/04). The preservation of the cultural heritage in its genuine condition is one of the main goals of the law, and is to be achieved through the carrying out of activities to prevent activities, events and effects, which produce or may cause damage, destruction, disarrangement, vanishing, degradation and illegal seizure of the cultural heritage.	the protection of the world cultural and natural heritage in 1991.	required
Railway systems	EU railway policy and EU directive on railway safety and amended directives (interoperability), directive on the certification of train drivers gives EU legal framework for railway systems IFC Environmental, health and safety guidelines for railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. The document is organized into two main areas, namely rail operations, covering construction and maintenance of rail infrastructure as well as operation of rolling stock, such as locomotives and rail cars; and, locomotive maintenance activities, including engine services, and other mechanical repair and maintenance of locomotives and railcars.	Railways in Macedonia are in process of transformation and integration into the European Railway Network. 4 laws are adopted and about 50 by-laws are fully harmonized. Macedonian railways are member of European Railway Agency. Following laws are relevant: Law on the railway system, law on the safety of railway systems, law on interoperability of railway systems, law and amendments to the law for transport of hazardous materials, law on interoperability of railway systems which also covers the train driving license.	Macedonian legislation is in compliance with EU legislation. Some changes are planned for the entities responsible for Macedonian railway system. Namely, regarding safety issues Directorate for railway safety which is established under Ministry of transport and communication at present is consist from 3 professors which in the practice were shown as not very effective solution especially in regards with availability of members when that is required	To follow national legislation which is full compliance with relevant requirements
Community health and safety	EU directives on railway safety covers community health and safety during operational phase. Outdoor equipment directive covers construction phase. Legislation on air, water and noise is relevant for this issue. EBRD Environmental and social policy requires identification and evaluation of the risks and potential impacts to the health and safety of the affected community during the design, construction and operation of the project, establishing preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. These measures to favour prevention or avoidance of risks and impacts over minimisation and reduction. EBRD requirements on air, water and noise is relevant for this issue. EIB Environmental and social practices handbook requires responsibility for identification and avoidance the risks and adverse	Macedonian legislation which covers this issue is the law on railway safety, law for health protection, law for transport of hazardous materials, law for preventing the spreading of the infectious diseases law. Issues related with community health and safety are covered as well under other issues like noise and vibrations, labour and working conditions, air quality and climate and hydrology	Relevant national legislation covers all issues related with community health and safety	To follow national legislation which is in full compliance with relevant requirements

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	impacts to community health, safety and security that may arise from project activities towards community health and safety. EIB requirements on air, water and noise is relevant for this issue. IFC`s refers to community health and safety impacts during the construction, rehabilitation, and maintenance of railways which are very common for this kind of infrastructure. IFC recommends management plan for these impacts. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labour during construction phase and safety during operational phase. IFC`s requirements on water, air and noise are relevant for this issue.			
Occupational health and safety	EU directives regulate workforce requirements concerning the minimum safety and health requirements for the workplace, covers the minimum health and safety requirements regarding exposure of workers to the risks arising from physical agents, and introduction of measures for encouraging improvements in the safety and health of workers at work EBRD requires: The client will provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular sector and specific classes of hazards in the client's work areas, including physical, chemical, biological, and radiological hazards. The client will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice, the client will address areas, including: the identification of potential hazards to workers, particularly those that may be life-threatening; provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; training of workers; documentation and reporting of occupational accidents, diseases, and incidents; and emergency prevention, preparedness and response arrangements EIB Environmental and Social Practices Handbook requires that labour issues should be screened for all projects financed by EIB. The main aim of the bank is to ensure the adherence to the principles and application of the Core Labour Standards of the International Labour Organisation (ILO), alongside relevant EU legislation. IFC`s policy on social and environmental sustainability requires that employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. IFC provides guidance and examples of reasonable precautions to implement in	Macedonian law on Occupational Health and Safety and secondary legislation requires: employers will take all the necessary measures and maintain acceptable working conditions. Employees are under the obligation to obey and observe all the measures taken to ensure acceptable occupational health and safety. Employers must inform the employees of the occupational risks and preventative measures that must be taken to address these risks. The employer must inform employees of their legal rights and obligations and must provide the employees with the necessary training on occupational health and safety. The Employer is responsible for the provision of a safe working environment and must provide workers all the required personal protective equipment. The employer must regularly check this and all other health and safety equipment and ensure that it is in good working order. The employer must take necessary measures to prevent occupational illnesses. The employer must prepare a health and safety plan prior to the commencement of construction works.	Macedonian legislation is in line with EU/EBRD/EIB and IFC requirements	To follow national legislation which is in full compliance with relevant requirements

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of project, much of the guidance also applies to construction phase.			
Labour&working conditions	EU legislation for Occupational health and safety is relevant for Labour&working conditions EBRD general requirement is that the project is required to comply, at a minimum, with: national labour, social security and occupational health and safety laws, and the principles and standards embodied in the ILO conventions. EIB Environmental and Social Practices Handbook require that labour issues should be screened for all projects financed by EIB. The main aim of the bank is to ensure the adherence to the principles and application of the Core Labour Standards of the International Labour Organization (ILO), alongside relevant EU legislation. IFC`s policy on social &environmental sustainability requirements on labour and working conditions have been in part guided by a number of international conventions negotiated through the International Labour Organization (ILO) and the United Nations (UN). IFC guidelines for railways refer specifically to labour working conditions during operational phase of railway.	Macedonian legislation regulates labour relations between employer and employee, including characteristics of employment of minors, prohibition of discrimination, grounds for labour relations, issues related to work, recess, rest and vacation, maternity rights and benefits, compensation and arbitration issues, child labour, forced labour, workers organization, .	ILO conventions are ratified by Macedonian Parliament and they are part of the Macedonian legislation which comply with EBRD requirements. There are two gaps. First Macedonian legislation has limitation for employment of children under 15 years. EBRD requirements are about 18 years. According to EBRD requirements a grievance mechanism must be provided for workers (and their organizations, where they exist) to raise reasonable workplace concerns. There is provision for this issue in Macedonian legislation.	EBRD requirement to be met, no employment of children below 18 is allowed, since in the Macedonian legislation there is no specific provisions about the form and structure of the grievance mechanism, EBRD requirements about grievance mechanism should be directly applied by PERI and Contractor/s
Land acquisition	EBRD regulates land acquisition, involuntary resettlement and economic displacement. EBRD require support and consistency with the universal respects for, and observance of human rights and freedoms and specifically the right to adequate housing and the continuous improvement of living conditions. Persons who have no recognisable legal right or claim to the land they occupy are not entitled to compensation for land, but they should be compensated for the structures that they own and occupy and for any other improvements to land at full replacement cost. In addition, they should be offered resettlement assistance sufficient to restore their standards of living at a suitable alternative site. Options for resettlement assistance should be generated through consultation with the displaced persons. Special attention to be given to vulnerable groups. Vulnerable groups, as all other affected people, must be engaged in meaningful consultations regarding resettlement options and assistance. However, consultation with vulnerable groups may require a special approach that will enable them to participate equally in the process (i.e. involvement of social workers, use of a different language, or carrying out the consultations in an accessible venue, for people with disabilities, at a particular time of day when e.g. affected single parents are available, etc.) EBRD requires resettlement action	The Law on expropriation regulates the procedure for expropriation of property for projects that are of public interest and the connected rights for real estates (immovable properties). Construction of railway line belongs to item construction of transport listed in expropriation law as project of public interest. Legal justification of why the project is believed to be in the public interest is submitted together with the request for expropriation (as part of the same process), by the expropriation beneficiary to the offices for legal and property affairs over properties. Macedonia as many countries around the world typically deal with involuntary resettlement and livelihood restoration under a legal framework for expropriation, with the basic notion that owners of properties are to be	Expropriation is often not a straightforward process and people generally need additional assistance to be able to restore their standards of living and further improve them. This becomes even more evident when the affected population includes vulnerable groups. The most difficult cases involve those who do not possess legal title to the land they occupy which is not covered by Macedonian legislation.	To meet EBRD, EIB and IFC requirements on issues not covered with Macedonian legislation. Resettlement action plans needs to be prepared following Resettlement Compensation Framework, meaning to entitle those without legal right on land to be compensated for the structures that they own and occupy and for any other improvements to land at full

Issue	EU/EBRD/EIB/IFC requirements	Provisions of Macedonian law	Gap/comment	Proposed response
	plans to be prepared taking into consideration all aspects referred. EIB Environmental and social practices handbook requires: fairly dealing with the issues, determination of type and cost of any technical assistance that may be required, assess the capacity of public authorities to support the processes involved (e.g. approaches to issues of land acquisition and compulsory purchase, procedures for handling disputes, land registration, and the provision of social safety nets), use every possibility that might minimize displacement, restoring and preferably improving livelihoods, to ensure availability of adequate resources, addressing the impoverishment risks (e.g. those resulting from changes from land based livelihood strategies to wage-based strategies, the security of alternative employment strategies, opportunities for employment in the company); and addressing arrangements for internal and/or independent monitoring and evaluation IFC through Resettlemnt handbook provides guidance in the planning and execution of involuntary resettlement associated with IFC investment projects. IFC's policy on involuntary resettlement applies to any project that may result in the loss of assets, the impairment of livelihood, or the physical relocation of an individual, household, or community. The audience for this handbook includes: IFC clients; host government agencies that support private investment in development projects; nongovernmental organizations; and the people whose lives and livelihoods will be affected by projects financed by IFC.	compensated for their losses, most often in monetary terms. With compensation, they are expected to be able to acquire new properties and resettle and/or re-establish their businesses in other locations. The Law for expropriation recognise affected people who have formal legal rights, those without legal title are not entitled to compensation. National legislation does not include special requirements for organising consultations and relocation assistance for vulnerable groups. There is no request for preparing Resettlement action plan. Law on expropriation covers the legal procedure for expropriation.		replacement cost. In addition, they should be offered resettlement assistance sufficient to restore their standards of living at a suitable alternative site. Options for resettlement assistance should be generated through consultation with the displaced persons.

Table 2-2 EBRD, EIB/IFC and EU Requirements on Environmental and Social Aspects

2.6 COMPLIANCE WITH EUROPEAN RAILWAY STANDARDS

The European Commission introduced the Railway Safety Directive (Directive 2004/49/EC– on the safety of Community's railways and amending Directive 95/18/EC) as part of the Second Railway Package in April 2004. Macedonian Law on the Safety of Railway Systems (Official Gazette No. 48/2010) is in full compliance with this Directive. Fundamentally, the introduction of this Directive reflects the Commission's understanding that progress with interoperability and the development of an open market was being hampered due to the varying approaches to safety management and standards throughout the EU, effectively creating a 'virtuous barrier' to market development. The Directive's main goal, therefore, is to establish a framework that will harmonize and clarify the various requirements, methodologies and responsibilities for safety throughout the EU.

Directive 2004/49/EC has been amended by Directives 2008/57/EC and 2008/110/EC. Directive 2008/57/EC repeals Article 14 on 'Placing in service of in-use rolling stock'. Directive 2008/110/EC makes a number of miscellaneous amendments and introduces a new Article 14a on 'Maintenance of vehicles'..

A major influence in co-operation between national railways is the UIC (Union Internationale des Chemins de fer-International Union of Railways), whose standards are not mandatory in EU law, but are a major component of acceptance criteria throughout Europe. Macedonian Railways - Infrastructure and Macedonian Railways - Transport are the active members of UIC in Macedonia.

UIC's RIV (Regolamento Internazionaledei Veicol-International Wagon Regulations) and RIC (Regolamento Internazionaledelle Carrozze-International Coach Regulations) codes for international acceptance of goods wagons and passenger carriages are long established, widely used and maintain their authority. The UIC is also proactive across a wide range of harmonization activities, including safety.

Harmonization of EU railway standards in Macedonia has focused on compatibility between railways in primarily engineering terms. The harmonization process involves a large and complex administrative structure, with many technical committees developing standards: CEN, CENELEC and ETSI[13]. Further technical work is required in regards to adopting and improving Technical Specifications for Interoperability.

According to the CR TSI INS (Conventional Rail 'Infrastructure' Technical specification for interoperability relating to the subsystem infrastructure), the existing Section 1 and Section 2 refer to category VII-M (upgraded lines, mixed traffic); Section 3 refers to category VI-M (new lines, mixed traffic).

The following table shows the values of TSI (Technical Specification for Interoperability) parameters for categories VII-M and VI-M, and indicates whether or not the project sections are in compliance with them.

According the CR TSI INF (Directive 2011/275/EC) the specified performance parameters are relevant for the different categories and may also is used to categorize existing lines. For locations, where geographic, urban and environmental constraints exist, it is permissible to design for less line speed and less train length. With regard to the topographical constraints of the corridor along the Kriva Palanka valley and the urban developments in Kumanovo and Kriva Palanka this clause can be applied to the chosen alternative.

Literally the regulations of the TSI do not apply to the project. The geographic scope of the TSI is defined in the directives 2008/57/EC and 1692/96/EC and comprises the lines for conventional rail transport of the Trans-European Network (TEN) within the EC. The relevance of the TSI for the Project arises from the need of interoperability along the Trans-European corridor and from the prospective integration of the line in the TEN.

In the design phase, the Project should be adapted to the requirements of the UIC-C gauge. Based on available information at this point, it could be stated that most likely the existing structures apply to UIC-B.

[13]CEN: Comitée Européen de Normalization - EuropeanCommittee for Standardization
CENELEC: Comité Européen de NormalizationEléctrotéchnique - European Committee for Electrotechnical Standardization
ETSI:EuropeanTelecommunicationsStandardsInstitute

Overview of UIC gauges is given in figure *Figure 2-4* UIC Gaugesof but this must be determined for each structure separately.

Item	K.P. 66 – Bulgarian border Category VI-M		Kumanovo – K.P. 66 Category VII-M	
	TSI parameter	comply	TSI parameter	comply
Gauge	UIC -C	no(1)	UIC-A	yes (2)
Train length	500 m	yes(3)	500 m	yes
Axle load	22.5 tonnes	yes	20 tonnes	yes
Speed	140 km/h	no	120 km/h	no
Cant, - deficiency	160 mm, 130 mm	yes	160 mm, 130 mm	yes
Max. gradient	12.5‰,20‰ if L < 3 km	no (4)	Existing gradient	yes

Table 2-3 European Technical Specification for Railways

1. The tunnel cross-section of the section K.P. 66 – Bulgarian border refers to a structure gauge which includes UIC-C. The gauge has to be applied for all structure design of this section.
2. Most existing international transport lines offer at least UIC-B gauge. The difference to UIC-A applies to the upper part of the gauge. The existing or partly constructed structures have to be checked if they provide sufficient space for UIC-B.
3. The AGTC (European Agreement on International Combined Transport Lines) recommends a target value of 750 m length. At stations with regular freight train crossing one siding with this length will be provided.
4. Due to the topographic constraints in the Corridor the required maximum gradient cannot be achieved.

With regards to the train length parameter, the design phase must consider compliance with AGTC (European Agreement on International Combined Transport Lines), where the recommended length of the train is 750m. Due to this, designers should take into consideration that at stations with regular freight train crossings at least one siding with this length should be provided.

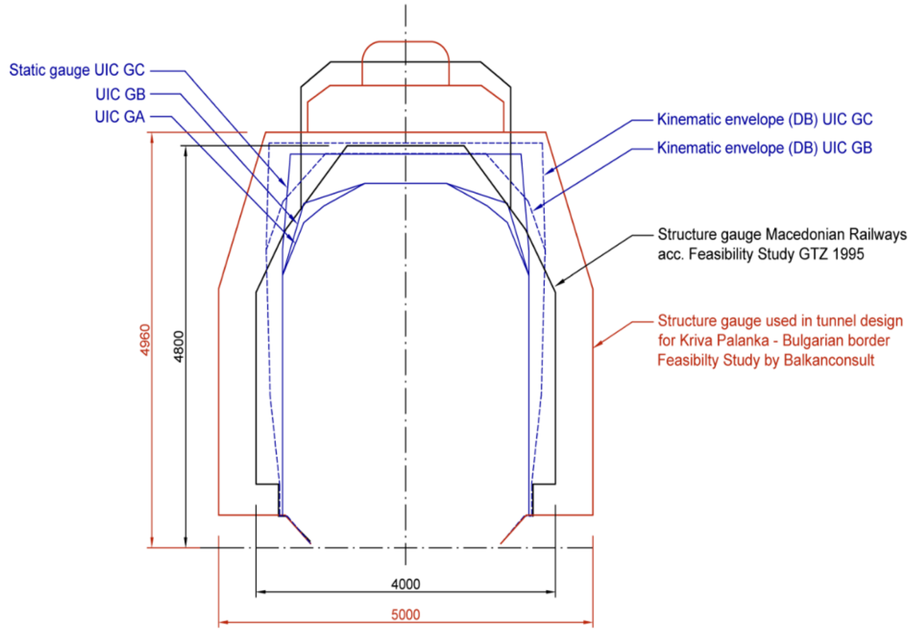


Figure 2-4 UIC Gauges

Chapter 3 Project Description & Consideration of Alternatives

Describes the technical specification of the Project and its background, need and objectives along with outlining the expected benefits from the Project, the land use and land take, the Project phases and programme, and the proposed labour and workforce arrangements and facilities. The Chapter also describes the route alternatives considered and the selection of the final route.

3 PROJECT DESCRIPTION & CONSIDERATION OF ALTERNATIVES

3.1 BACKGROUND TO THE PROJECT

At the end of 19th Century, a railway corridor was already envisaged to link the Black Sea and the Adriatic Sea via Sofia and the city of Skopje, of which the railway line from Kumanovo to Bulgaria was a part. Works on the railway line started in 1873 between Sofia and Kumanovo, however, this was stopped one year later due to Balkan wars. Bulgarian railways (BDZ) completed the railway line between Sofia and Gueshevo (at the Macedonian border) in 1910. During World War I, when Macedonia was occupied by Bulgaria, Bulgarian Railways studied the missing railway line section linking Kumanovo. In the 1930’s, Bulgaria and Yugoslavia agreed to build several railway links, among them the missing Kumanovo-Gyueshevo section. From 1941 to 1944, the Bulgarian army designed and started the works of the Kumanovo-Gueshevo railway line, building 43 bridges and digging 26 tunnels. After World War II, Yugoslavian Railways completed the works from Kumanovo to Beljakovce, according to the Bulgarian design. This section was operating from 1956 to 1994.

On December 28th of 1994, the Law for adopting and providing funds for financing the Program for the construction of the railway line Kumanovo-Beljakovce-Kriva Palanka-Deve Bair (border with Bulgaria) in 1994, 1995 and 1996, was adopted by the Macedonian Parliament. 120 million US Dollars were approved for implementing the construction program of the railway line to the border with Bulgaria. The funds for the Program were provided by the State Budget, from the Public Enterprise Rail Transport Enterprise Skopje, and part from foreign funds in the form of commodity loans for the purchase of tracks.

Design work followed with construction works for rehabilitation of the section between Kumanovo and Beljakovce and construction of the section between Beljakovce and the border tunnel in Deve Bair started in 1994. The alignment of the section to be constructed remained nearly the same as it had been designed 50 years earlier. However, the longitudinal profile differed because it took into account a proposed dam project and creation of an artificial lake near Kratovo. At the end of 2004, the Government of the Republic of Macedonia took the decision to stop the works due to the lack of funds. By that time, several bridges and tunnels had been partly constructed between Beljakovce and approximately 5.5 km west of Kriva Palanka.

Given its historical background, the development of Project “Railway Corridor VIII - Eastern Section’ was divided into three sections:

Section 1**: Kumanovo to Beljakovce** – corresponds to the first 30.764 km of the line which had been previously operational. The section starts in K.P. 0.400 at the northern end of the station Kumanovo. Section 1 requires rehabilitation.

Section 2: **Beljakovce to Kriva Palanka** – the middle section of the alignment runs from K.P. 31.164 to K.P. 65.091 just before Kriva Palanka. In this section, around one third of all construction works has been previously completed.

Section 3: **Kriva Palanka to Bulgarian Border** – the last section goes from K.P. 65.091 up to the border of Bulgaria, in Deve Bair, at K.P. 88.514. This section is to be newly constructed.

These sections correspond to those of the selected alignment or “Reference” alignment, where the first two sections are partially established (please refer to Subchapter 3.5.1.2).

3.2 NEED FOR THE PROJECT

Rail transportation has played and keeps playing an important role in the economic and social development of regions worldwide due to its ability to haul large quantities of goods and significant numbers of people over long distances and reasonable travel times. It is a highly competitive energy efficient means of land transport in that its consumption of energy per unit load per km is lower than road modes. With CO_2 emissions from transport being dominated by road, and rail being a low carbon transport mode offering a great potential for decarbonising transport, rail is called to play an important role in the fight against climate change.

Moreover, relentlessly rising energy costs, which tend to curb the development of private car and truck traffic, are further making railway more important. With newly opened markets in the region to the East and West and its steady integration in the European market, an efficient railway system is thus essential to the socio-economic growth of the North-Eastern region of Macedonia, the whole Macedonia and South East Europe, bringing sustainable benefits to the population, businesses and the economy as a whole.

In 1995, the Government of Macedonia prepared a new Spatial Plan for the country as a result of the political, economic and strategic changes in the State as well as the expiration of the previous spatial plan. The basis for the development of the Spatial Plan was the National Strategy for Economic Development of the Republic of Macedonia. The Spatial Plan was adopted in 2004 with an expiring horizon in 2020. It was established by the Parliament of the Republic of Macedonia, following an expert consultation process with participation of public expertise, representatives from departments of the State government, representatives of local self-governments, institutions responsible for the preservation of cultural heritage, scientific institutions, communal enterprises, and Non-Government Organizations (NGOs). The Spatial Plan includes the spatial arrangement of transport and other infrastructures. Corridor VIII is considered as a very important transport corridor within the Spatial Plan, which makes direct reference to the “Reference” alignment. The development of the railway system through the modernization and extension of the rail network, as well as the connection of the Macedonian rail network with the Albanian and Bulgarian networks, is seen as imperative for the progress of the country. According to the Spatial Plan, it is expected that the railway lines Beljakovce-Guesevo and Kicevo-Kjafasan are completed during the planning period ending in 2020.

The Republic of Macedonia, with its geographic situation in the heart of the Balkan Peninsula, is a natural crossroad between Northern, Central and Southern Europe, as well as between the Mediterranean and Eastern Europe, Asia and Russia. In this context, it has long recognised the importance of rail transportation in the social and economic development of the region.

In 2004, the Republic of Macedonia signed the Memorandum of Understanding for the Development of the Core Regional Transport Network (MoU), which is aimed at stimulating the development of transport infrastructure in South East Europe (SEE) by strengthening links with neighbouring countries, expediting the flow of international trade, and giving better connectivity with the SEE region remote areas.

The Core Network is a multimodal network which includes road, rail and inland waterway links in the seven participants countries (Albania, Bosnia and Herzegovina, Croatia, Republic of Macedonia, Serbia, Montenegro and Kosovo). The Core Rail Network comprises 4,615 km of railway lines included in Pan-European Corridors V, VIII and X. Rail Corridor VIII, in which this Project is included, encompasses 617 km of which 259 km are in the Republic of Macedonia.

Figure 3-1 Location of Railway Corridor VIII in Macedonia shows the location of railway corridors in the Republic of Macedonia, including Corridor VIII-Eastern Section.

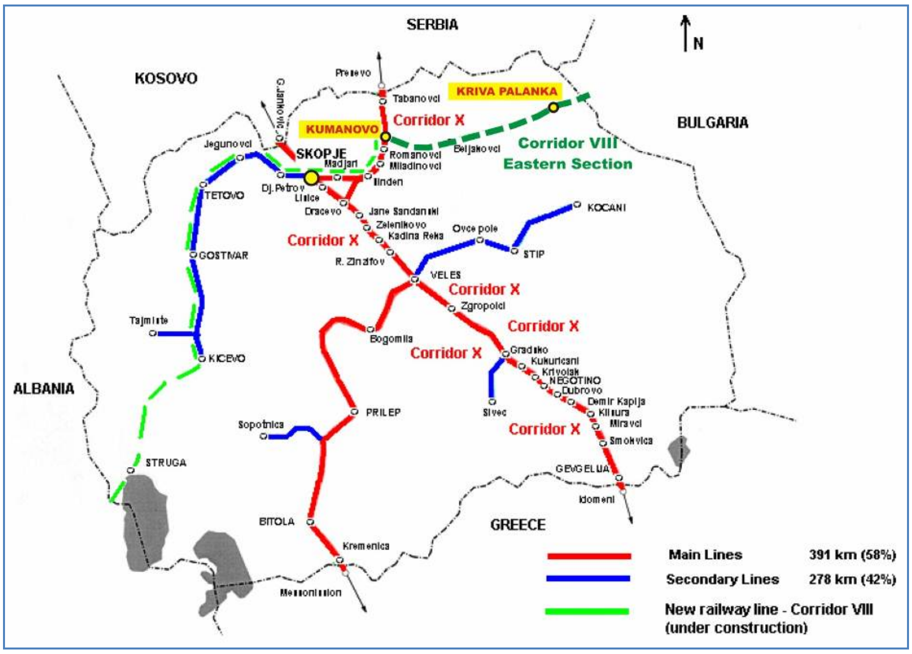


Figure 3-1 Location of Railway Corridor VIII in Macedonia

The commitment of the Republic of Macedonia to the development of the regional Core Network was confirmed in the National Strategy of Transport of 2009, which ratified Corridor VIII as a high governmental priority for the country.

Finally, it should be noted that, as a candidate country for an EU membership since 2005, the Republic of Macedonia needs to address the ability of the country to assume the obligations of the membership, including the completion of the infrastructure projects along the Pan-European Corridors as part of the Trans-European Networks (TEN). These corridors are considered to be the bloodstream of the EU's Single market, which cannot function effectively unless there is a sound and a high quality of infrastructure which connects that market.

Thus, it can be concluded that the need for the Project arises from the necessity to advance in the development of Pan-European Corridor VIII with a highly efficient rail system that will contribute to bring the Republic of Macedonia and the South Eastern Europe region integrated and sustainable economic and social growth.

3.3 OBJECTIVES OF THE PROJECT

The overall objective of the Project is the reconstruction, construction and operation of Railway Corridor VIII-Eastern Section (Kumanovo – Beljakovce – Kriva Palanka – MK/BG Border) and completion of one part of missing section of Corridor VIII in Macedonia as part of the commitment of the Government to contribute in promoting Balkan regional economic development by supporting continued development of Transportation Corridor VIII and to take advantage of the significant potential for national and regional economic growth and job creation that development of the Corridor represents.

3.4 PROJECT EXPECTED BENEFITS

The expected benefits of the Project will be as follows:

- Provide part of the transnational route connecting the Mediterranean/Adriatic Transport Area with the Black Sea Transport Area;
- Facilitation and boosting of trade exchanges between Bulgaria, Macedonia and Albania by a capable railway route with access to Bulgarian and Albanian sea ports;

- Connection to the TRACECA Corridor[14];
- Better connection of the regional catchment area of Corridor VIII to main Southern Italian ports and their hinterland access by rail / sea;
- Direct railway route between Macedonia and Bulgaria; avoidance of Serbian transit and facilitation of external trade with Bulgaria;
- Creation of an alternative railway access of Macedonia to ports in Bulgaria and Albania; alternative route to Macedonia - Thessalonica;
- Opening of a capable railway access for the North- Eastern Region to other Macedonian regions (freight and passenger); and
- Opportunity to offer attractive passenger services by rail along the project section and to/from destinations like Skopje and other regions in Macedonia and Bulgaria.

Figure 3-2 Linkages of Corridor VIII illustrates the location of Corridor VIII in the Republic of Macedonia and the various links with other corridors and countries.

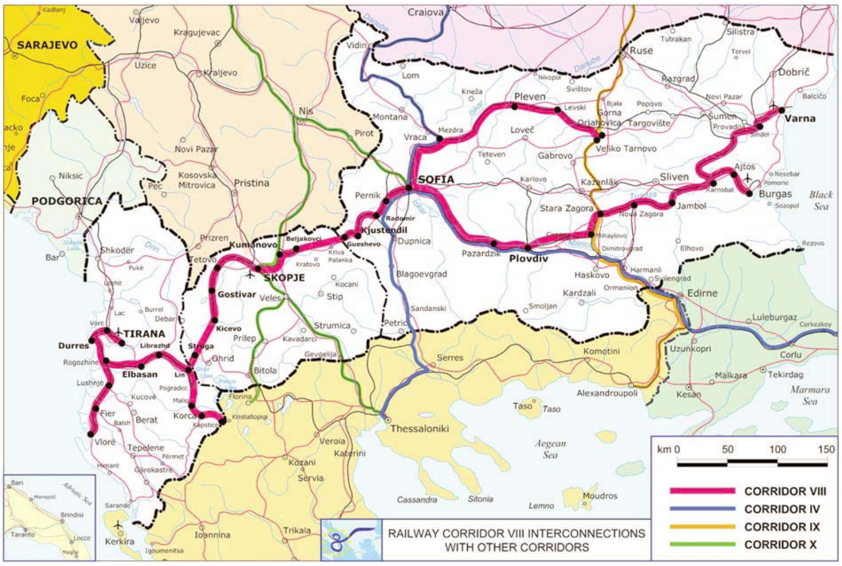


Figure 3-2 Linkages of Corridor VIII

3.5 CONSIDERATION OF ALTERNATIVES

3.5.1 SUMMARY OF ALTERNATIVES

Three alternatives were considered for the Railway Corridor VIII – Eastern Section Project:

1. ‘Do nothing’ alternative
2. Reference alignment

[14] TRACECA is the acronym for Transport Corridor Europe-Caucasus-Asia). It is a Europe Aid technical assistance programme launched in May 1993 for the development of the transport corridor between Europe and Asia across the Black Sea, the countries of the South Caucasus, the Caspian Sea and the Central Asian countries. TRACECA aims at supporting political and economic independence of the Republics by enhancing their capacity to access European and World markets through alternative transport routes, encouraging further regional co-operation among the partner countries and increasingly being a catalyst to attract the support of International Financial Institutions (IFIs) and private investors. In September 1998 at the historic Summit in Baku 12 TRACECA countries signed the “Basic Multilateral Agreement on International Transport for Development of the Europe-the Caucasus-Asia Corridor” (MLA) with the aim of implementing in full of their geopolitical and economic potentials. In 2009, the Islamic Republic of Iran joined to TRACECA.
Today the TRACECA route comprises the transport system of the 13 member-states of the MLA: Azerbaijan, Armenia, Bulgaria, Georgia, Iran, Kazakhstan, Kyrgyzstan, Moldova, Romania, Tajikistan, Turkey, Ukraine and Uzbekistan. The railway line of Corridor VIII between Gyueshevo and Sofia in Bulgaria is one of the TRACECA routes.

3. Alternative alignment

The Reference alignment corresponds to the railway corridor formerly proposed by Macedonian Railways. An Alternative alignment, which more or less follows the route of the planned motorway Corridor VIII shown in *Figure 3-3* Planned motorway Corridor VIII, has also been analysed.

Figure 3-3 Planned motorway Corridor VIII

Both the Reference alignment and the Alternative alignment are divided into three sections (Section 1, 2 and 3). The total length and the lengths of the sections in each alignment are as follows:

	Reference alignment	Alternative alignment
Section 1	30.764 km (K.P. 0.4 to 31.2)	25.3 km (K.P. 0.4 to 25.7)
Section 2	33.927km (K.P. 31.2 to 65.1)	33.9 km (K.P. 25.7 to 59.6)
Section 3	23,423 km (K.P. 65.1 to 88.5)	19,9 km (K.P.59.6 to 79.5)
Entire alignment	88.114 km	79.1 km

Table 3-1 Total Lengths and Length per Section of Reference and Alternative Alignments

The routes of the Reference alignment and the Alternative alignment are shown in *Figure 3-4* Layout of Reference and Alternative Alignments.

Although the total length and the lengths of the sections in each alignment are different, the starting and ending points of each section in each alignment are at a geographical point common to both alignments, as it can be seen in *Figure 3-6* Layout of the Reference Alignment - Section 1 *Figure 3-9* Layout of the Reference Alignment - Section 2*,* *Figure 3-10* Layout of the Reference Alignment - Section 3 *Figure 3-11* Layout of the Alternative Alignment - Section 1 *Figure 3-12* Layout of the Alternative Alignment - Section 2and *Figure 3-13* Layout of the Alternative Alignment - Section 3 (in fact, except for the ending/starting points of Sections 1 and 2, all the other starting and ending points are common in both alignments). This allows the comparison of both alignments from the technical, traffic, environmental, social, economic, and financial point of view (see Subchapter 3.5.2).

A comparison of the key technical characteristics between the two alignments is given in *Table 3-2*. The design parameters established for Section 1 and Section 2 in the Reference alignment are used as the comparison criteria between the Reference and Alternative alignments.

With larger radius curves, the Alternative alignment has been designed for the speed of 160 km/h, whereas that of the Reference alignment will be 100 km/h.

The Alternative alignment follows the Reference alignment until K.P. 25 where it diverts to the North-East and separates from the Reference alignment to follow the route of the planned motorway Corridor VIII, crossing an area with a higher relief. The Alternative alignment joins again the Reference alignment a few kilometres east of Rankovce. Then both alignments run jointly, more or less parallel to each other and to the planned motorway, along the right bank of the Kriva River. The Alternative alignment changes from K.P. 59.6 towards northern side of the motorway arriving at Kriva Palanka at a higher level than the reference alignment, avoiding passing through the densely populated valley. The Alternative alignment goes north above the town and south of the planned motorway. The Reference alignment crosses the part of the town in a tunnel.

After stations in Kriva Palanka, the Alternative changes again to the north side of the motorway. At K.P. 70 the Alternative alignment crosses the motorway and the river and goes to the south side of the valley while the Reference alignment crosses the motorway at K.P. 80 The Alternative line turns first to the southeast and then to northeast and joins the Reference alignment at the entrance to the border tunnel.

The design parameters of the Alternative alignment comply with the European standards for 25 tonnes per axle of maximum gradient at 15 % and 25 % in the border section. For the Reference alignment, which was designed originally to 100 km/h, the geometry of the track could be adapted in order to allow upgrading and reaching speeds up to 160 km/h in the future.

Both alternatives will operate with single track. The line will be electrified with 25 kV – 50 Hz, while signalling will be electronic interlocking system compatible with the existing one along the Corridor X, Skopje – Kumanovo. It will also comply with ERTMS[15] requirements.

The capacities of the line will be of 64 trains per day for the Reference alignment and 73 for the Alternative alignment. The best transit times will be approximately 60 minutes for the Reference alignment and 40 minutes for the Alternative alignment.

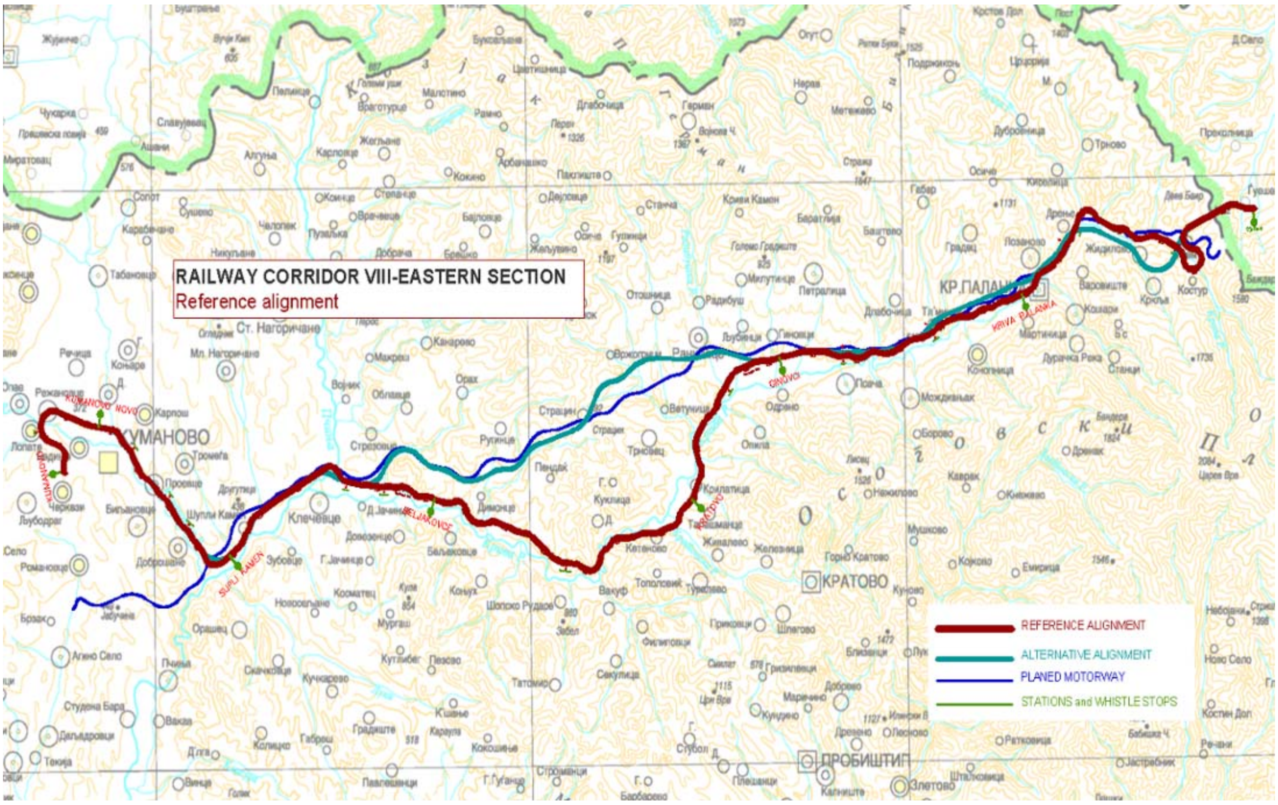


Figure 3-4 Layout of Reference and Alternative Alignments

15 European Rail Traffic Management System

	Reference Alignment			Alternative Alignment		
	Section1	Section 2	Section 3	Section1	Section 2	Section 3
	Existing line Kumanovo - Beljakovce	Line under construction Beljakovce – km 65.1	Feasibilty study of PERI	Existing line Kumanovo – Klecevce upgraded to 160 km/h	Motorway corridor Klecevce – km 59.6	Motorway corridor Km 59.6 – Bulgarian border
Length	30.8 km	33.9 km	23.4 km	25.7 km	34.6 km	19.9 km
	88.1 km			80.2 km		
Design speed	100 km/h	100 km/h	100 km/h	100/160 km/h	160 km/h	160 km/h
Minimum curve radius	500 m	500 m	500 m	700 m / 1100 m	1100 m	1100 m
Maximum gradient	15 o/oo	15 o/oo	24 o/oo	15 o/oo	24 o/oo	24 o/oo
Number of stations and halts	3 stations	2 stations	2 stations	2 stations	3 stations	2 stations
	6 halts	3 halts	3 halts	6 halts	1 halt	3 halts
	7 stations, 12 halts			7 stations, 10 halts		
Length of viaducts	200 m	3931 m	4410 m	250 m	5637 m	3453 m
	8341 m			9341 m		
Length of tunnels		3390 m	9036 m		7150 m	8735 m
	12426 m			15885 m		
Motorway crossings	1		5	1	3	3
	6 crossings			7 crossings		

Table 3-2 Comparison of technical characteristics of the Reference and Alternative Alignments

3.5.1.1 "DO NOTHING" ALTERNATIVE

In the "do nothing" alternative, the situation will remain the same. However, already completed works regarding the railway section between Kumanovo and Kriva Palanka shall have to be removed or dismounted in order to return to the natural environmental conditions existing before the execution of the works started 70 years ago.

In total, 27 viaducts were built, with a level of completion of 44% for superstructures, and 82% for sub-structures. Fourteen tunnels with different levels of completion were drilled. This means that a significant portion of the structures is finished. However, since 2004, when construction works stopped, works for conservation have not been carried out, a situation, which in the long term could give rise to safety issues for the residents in the vicinity. Dismantling of the already built structures and their disposal in appropriate sites, even if part of the dismantled materials are reused or recycled, is not exempt from environmental impacts, which would be similar to those of the construction phase of the civil infrastructure.

In addition, the decommissioning works would be costly and unacceptable from an economical point of view since the Government has already invested significant funds for their construction. Furthermore, the "do nothing" alternative would ignore the obligations of the Republic of Macedonia as a candidate for EU membership, which address the need for a sound, high quality, and integrated transportation network to effectively connect the European market.

For all the above reasons, it was considered that the choice of this alternative was not prudent and not considered further within the selection of the alignment.

3.5.1.2 REFERENCE ALIGNMENT ALTERNATIVE

The Reference alignment corresponds to the railway corridor proposed by Macedonian Railways. It consists of three different sections:

- Section 1: Existing line from Kumanovo to Beljakovce;
- Section 2: Line under construction (stopped in 2004) from Beljakovce to Kriva Palanka
- Section 3: Kriva Palanka to the Bulgarian border.

Section 1: Kumanovo to Beljakovce

The existing line from Kumanovo to Beljakovce of 30.764 km in length was completed in 1956 and it was operational till mid of 1996. The line starts at the northern end of the station of Kumanovo (at K.P. 0.4). The line diverts directly from the single track mainline Skopje – Tabanovci. It follows the mainline for about 2.3 km in a North-West direction, and then turns with a 180° curve (R = 700 m) to the South-East direction. At the eastern limit of the town of Kumanovo, the line follows, in this same direction, the valley of the Kumanovska River until reaching the valley of the Pcinja River (at K.P.15, approximately), where it turns to the North-East following this valley. At K.P. 25, the line crosses the Pcinja River and then follows the northern embankment of the Kriva River up to the station of Beljakovce.

Figure 3-6 Layout of the Reference Alignment - Section 1shows the Reference alignment for Section 1.

Reconstruction works for rehabilitation of the section between Kumanovo and Beljakovce were undertaken in the period from 1994 to 2004. This section has been renewed up to K.P. 23.600. From K.P. 0.000 to K.P. 2.667 no interventions were done. From K.P. 2.667 to K.P. 23.600, reconstruction was performed on the substructure, with new ballast and sleepers but using existing rails. The line was upgraded to a minimum curve radius of 500 m. Part of rehabilitated railway is shown on *Figure 3-5* Railway Line Rehabilitated Near Kumanovo.

Figure 3-5 Railway Line Rehabilitated Near Kumanovo

Presently, for this section, 3 stations and 6 halts or stops are planned as sumarized below:

- Kumanovo Novo station at K.P. 6.8 with 2 sidings;
- Šupli Kamen station at K.P. 17.4 with 2 sidings and one loading track;
- Beljakovce station at K.P. 30.5 with 2 sidings and one loading track;
- Lopate stop at K.P. 2.8;
- Pero Cico stop at K.P. 9.1;
- Proevce stop at K.P. 12.2;
- Dobrosane stop at K.P. 14.0;
- Klecevce stop at K.P. 24.8; and
- Dovezance stop at K.P. 27,9.

Works to be undertaken for Section1 are summarized below:

- The rails will to be completely renewed and the track will be re-ballasted and realigned;
- At Šupli Kamens station, the track will be dismantled and renewed;
- The existing bottleneck at the northern end of Kumanovo station will be eliminated;
- At K.P. 2.3 there is a siding to a pipe mill;
- At the Pero Čičo settlement where existing buildings are close to the railway track, a safety and noise barrier will be constructed to protect the neighbourhood against the rail traffic;
- The existing reinforced concrete bridges will be refurbished;
- The existing road overpasses will be equipped with electric shock protection and earth conductors;
- A slab track steel bridge at Lopate will be replaced by a bridge with ballasted track;
- The destroyed railway bridge over the Pcinja River will be replaced by a new one located upstream of the existing one; and
- The existing 18 level crossings in this section will be substituted by 12 over or underpasses.

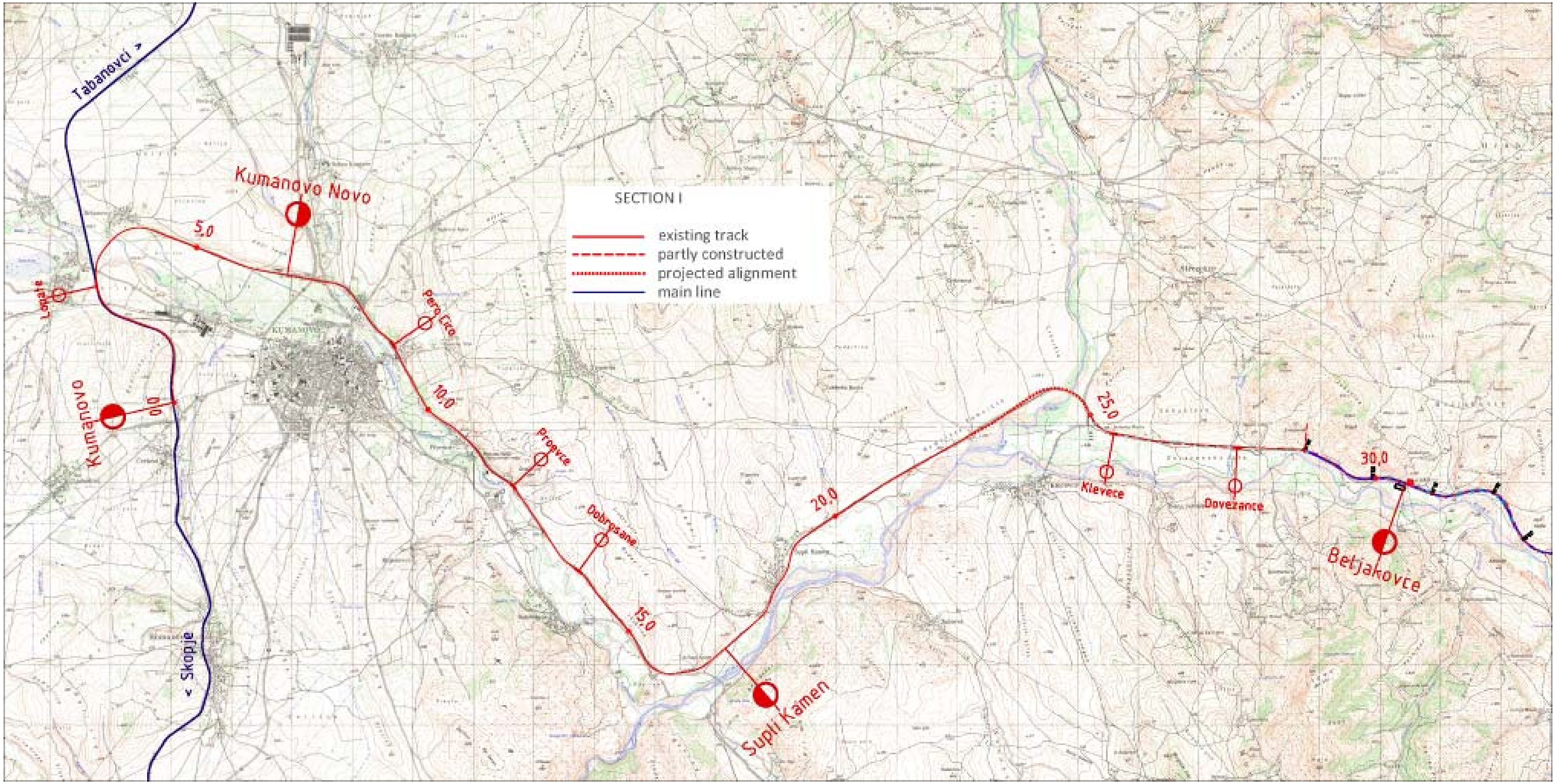


Figure 3-6 Layout of the Reference Alignment - Section 1

Section 2: Beljakovce to Kriva Palanka

From Beljakovce and up to 5.5 km west of Kriva Palanka (approximately at K.P. 65), a new railway line was under construction until 2004, when works stopped. Unlike the road, which follows a straight line between Kumanovo and Kriva Palanka, the railway follows the valley of the Kriva River. Generally, the line goes along the hillside side, 30-50 m above the river level.

From Beljakovce up to K.P. 41, the line follows the northern embankment of the Kriva River. Despite numerous curves with a minimum radius of 500 m, the line has 8 bridges and 2 tunnels in this section.

In front of the projected Vakuf dam (*Figure 3-7* Location of planned Vakuf Dam Reservoir Location with Railway Layout (K.P. 41 to K.P. 50)), the line crosses the river and follows the southern border of the future reservoir up to K.P. 51. With respect to the future water level, the railway level is at approximately 460 m. In this section there are 9 bridges and 6 tunnels. From K.P. 51 onwards, the line follows again the northern border of the valley, which in this part of the section is wider; the line is about 1 km away from the river and has no bridges or tunnels between K.P. 54 and K.P. 61. From K.P. 61 the valley becomes narrower and the line is closer to river. The section ends with the last constructed bridge at approximately K.P. 65.

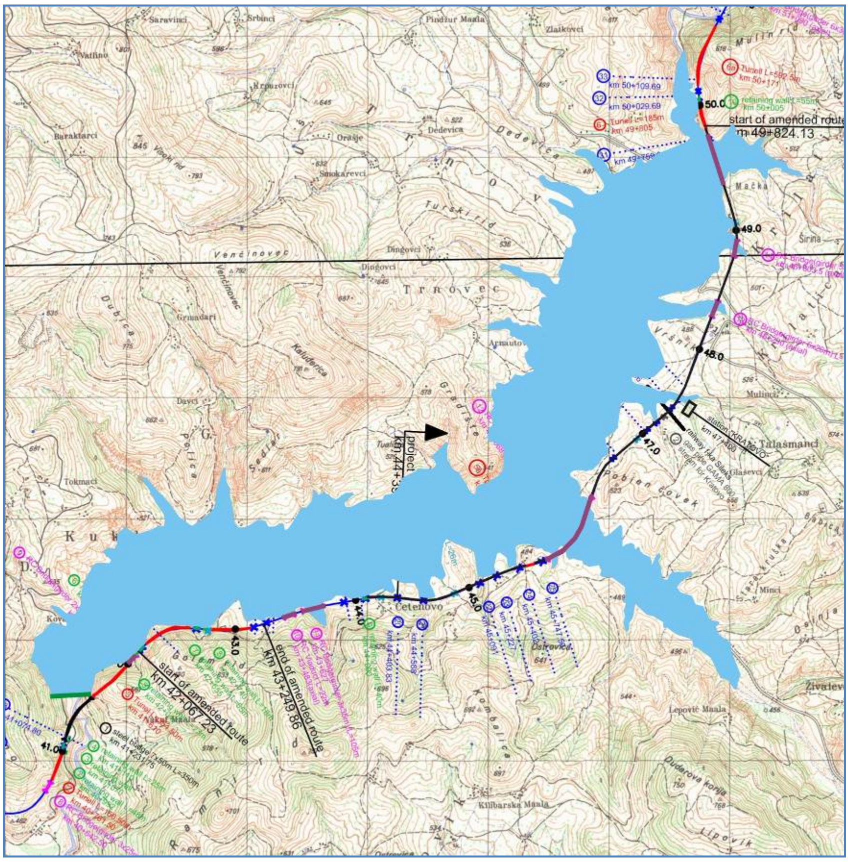


Figure 3-7 Location of planned Vakuf Dam Reservoir Location with Railway Layout (K.P. 41 to K.P. 50)

Figure 3-9 Layout of the Reference Alignment - Section 2shows the Reference Alignment for Section 2.

For this section, 2 stations and 3 halts or stops are planned to be constructed as summarized below:

- Kratovo station at K.P. 47.4 with 3 sidings, freight yard and several loading tracks;
- Ginovci station at K.P. 58.1 with 3 sidings, freight yard and several loading tracks;
- Sopsko Rudare at K.P. 38.9;
- Krilatice at K.P. 53.4; and
- Psaca at K.P. 61.7.

Works to be undertaken for Section 2 are summarized below:

- The execution and completion of earthworks and drainage;
- The construction of 11 bridges;
- Design check for the requirements UIC-B gauge and construction of 4 tunnel;
- Design and construction of a long span bridge in front of Vakuf Dam;
- Construction of 33.3 km of main track and 7.05 km station tracks;
- Installation of 28 turnouts;
- Construction of a substation near Beljakovce;
- Completion of 25 bridges;
- Design check for the requirements UIC-B gauge and completion of construction for 10 tunnels.

During the construction works undertaken between 1994 and 2004, this section was divided into 4 constructions lots and the detailed design was carried out by construction companies. Several viaducts and tunnels in different stages of completion can be found along the route; none of these structures is completely finished, as illustrated in *Figure 3-8* Unfinished Bridge near Kratovo Station. Presently, there are 34 bridges and 14 tunnels partially built in Section 3.

Figure 3-8 Unfinished Bridge near Kratovo Station

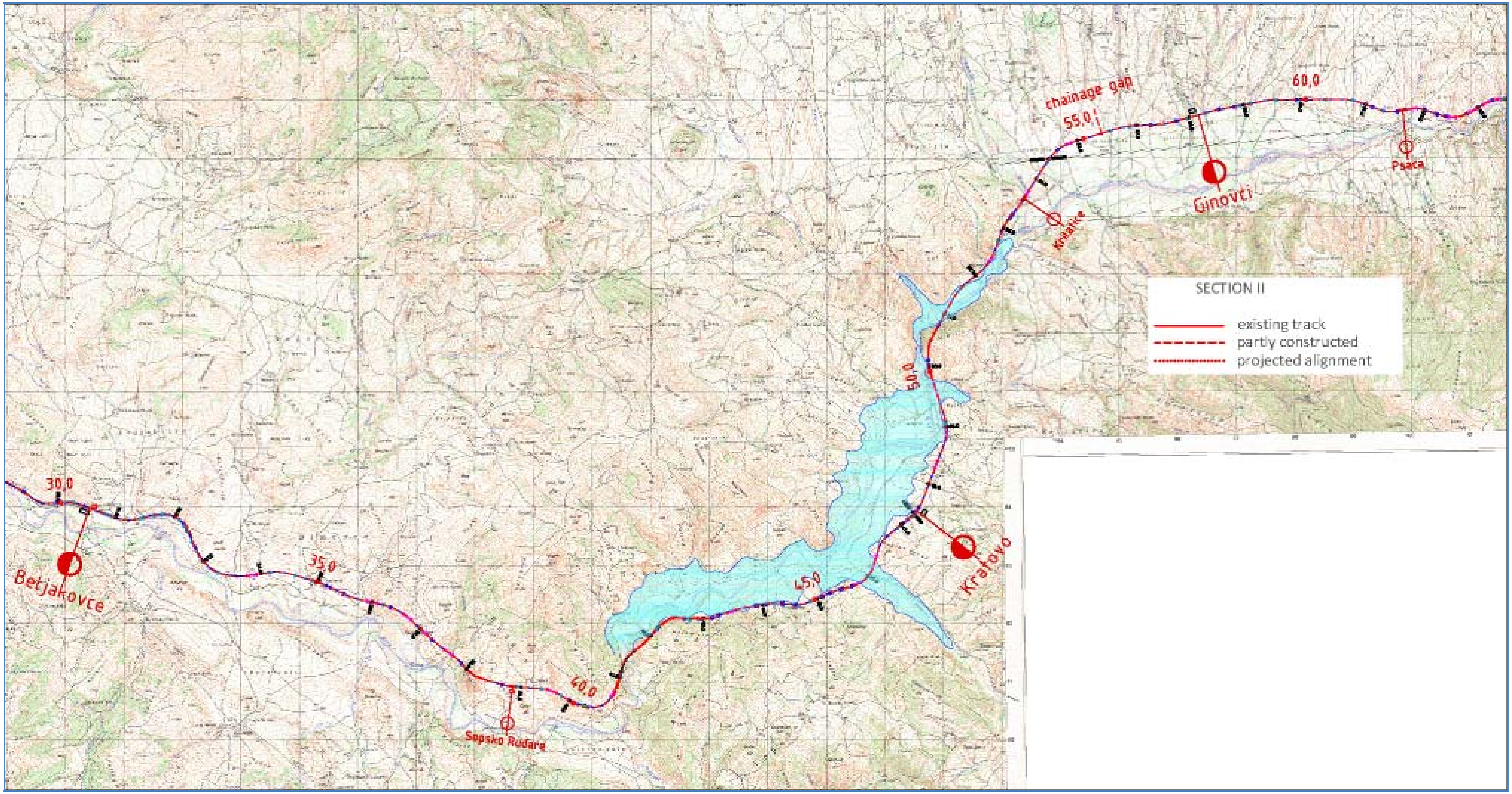


Figure 3-9 Layout of the Reference Alignment - Section 2

Section 3: Kriva Palanka to Bulgarian Border

Section 3 stretches from Kriva Palanka (at approximately K.P. 65) to the Bulgarian border. The projected alignment continues from K.P. 65 on the northern side of the Kriva valley. At K.P. 72.3 it reaches the town of Kriva Palanka, where a station will be located. Since the valley and the neighbouring hill sides of Kriva Palanka are densely covered with buildings, the line will cross the city by means of a 1,100 m-long tunnel in order to avoid major demolitions.

From the end of the tunnel up to K.P. 77, the line runs between the Kriva River and the planned future motorway. At K.P. 77, the river valley makes a 90° curve, shifting from the North-East to the South-East direction. The line follows this bending with a wide curve in order to gain length and subsequently height. Three kilometres further upstream, the line crosses to the South side of the valley. At K.P. 83 a horseshoe curve has been planned in order to gain length and climb up to the entrance of the existing border tunnel. The horseshoe curve is on the approach to the tunnel.

Macedonia and Bulgaria are to be connected with a tunnel 2,350 meters in length, from which 1,150 meters are in Macedonia and 1,200 meters in Bulgaria. The drilling works on the tunnel started in the 1940's. The length drilled from the Macedonian side is 250m. The tunnel entrance has partly collapsed at the Macedonian side. The first 250m of the tunnel are known to be in difficult and unstable soil with the rest of the tunnel being in more stable rock.

From Kriva Palanka to the Bulgarian border most of the railway alignment has a gradient ranging from 20 to 25 %. Therefore, freight trains will have to be pushed by a second locomotive. Sidings for this engine must be foreseen at Kriva Palanka and at the entrance of the border tunnel.

This section has 2 stations and 3 halts or stops as summarized below:

- Kriva Palanka station at K.P. 72.3 with 2 sidings and 3 tracks for maintenance and stabling;
- Zidilovo station at K.P. 81.8 with 2 sidings;
- T'liminci stop at K.P. 70.0;
- Drenja stop at K.P. 76.7; and
- Uzem stop at K.P. 83.4.

Works to be undertaken for Section 3 are summarized below:

- The execution and completion of earthworks and drainage;
- The construction of 47 bridges and 22 tunnels
- Design and construction of works for the reconstruction of the border tunnel;
- Construction of 23.5 km of main track and 4.3 km of station tracks;
- Installation of 14 turnouts; and
- Construction of a substation west of Kriva Palanka.

Figure 3-10 Layout of the Reference Alignment - Section 3 shows the Reference alignment for Section 3.

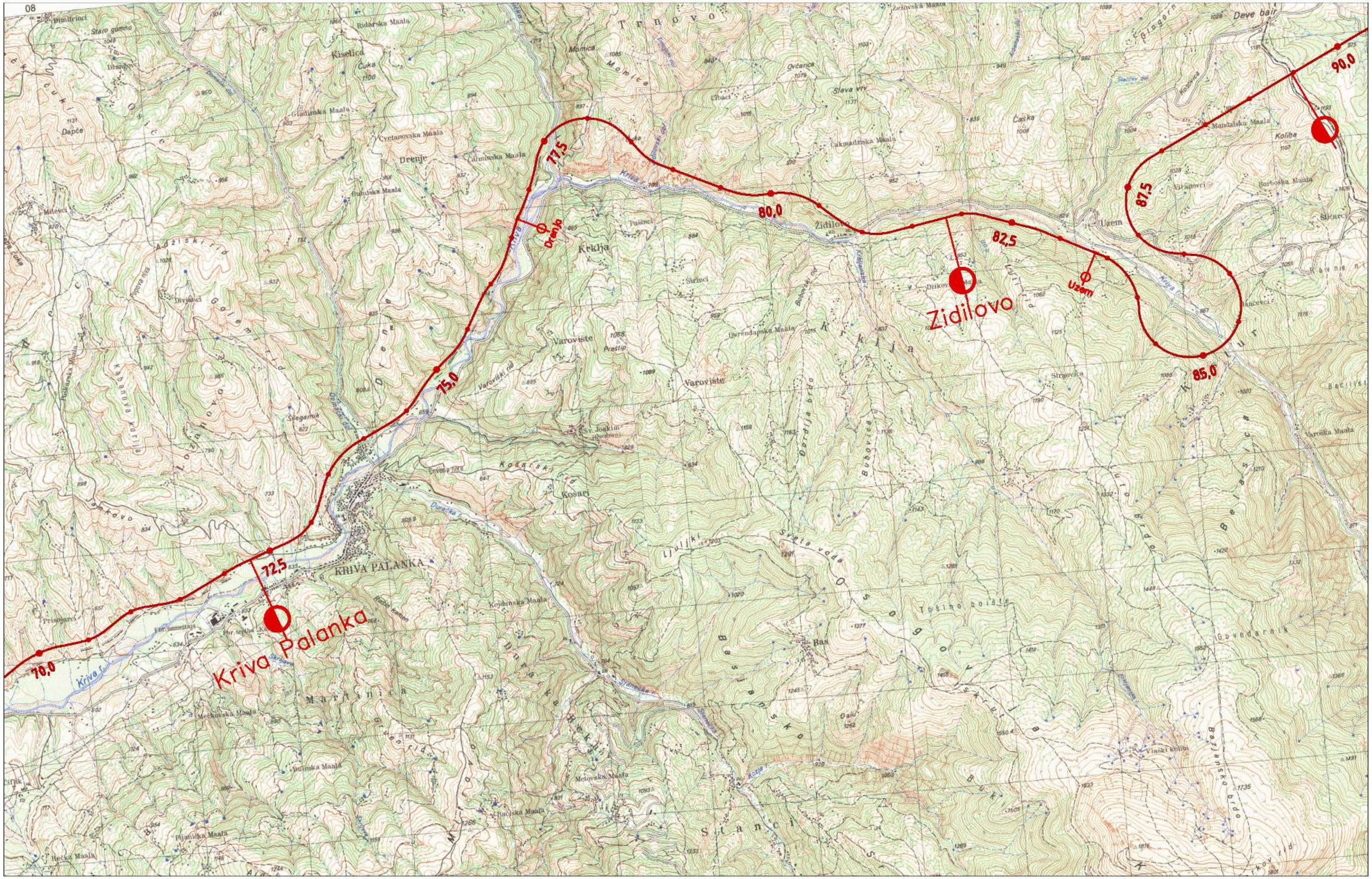


Figure 3-10 Layout of the Reference Alignment - Section 3

3.5.1.3 ALTERNATIVE ALIGNMENT

An Alternative alignment was studied and divided in three sections (1, 2 and 3) for comparative purposes.

The objective of the Alternative alignment was to increase the overall speed by enlarging the minimum radius of the horizontal curves and reducing the length of the line. The design parameters applied are the same as those for the Reference alignment, except for the design speed which is increased to a maximum of 160 km/h.

Section 1: Kumanovo to Beljakovce

Up to the station at Kumanovo Novo, the Alternative alignment is identical to the Reference alignment. From K.P. 7.5 to K.P. 12.5 there are several curves with a minimum radius of 500 m. Realignment with lateral shifts of 35 – 50 metres will eliminate these curves. From K.P. 15 17.5, the realignment needed is more significant; the elimination of the 500 m curves requires a shift of about 250 m. At this location, the proposed motorway would cross the railway, and the realignment could be combined with the construction of the motorway. At K.P. 23.5 the Alternative alignment leaves the Reference alignment and crosses the Pcinja River at a location 500 m downstream of the existing bridge.

The Reference alignment will be reached again at the halt of Klecevce. East of the halt (at K.P. 25.7) the first section of the Alternative ends.

The stations and halts are the same as for the Reference alignment, except for Dovezance stop (which is in the Reference alignment, beyond the point at which the alignments divert); only the chainage value is different, according to that of the Alternative alignment as summarized below:

- Kumanovo Novo station at K.P. 6.8, with 2 sidings;
- Supli Kamen station at K.P. 16.8, with 2 sidings and one loading track;
- Lopate stop at K.P. 2.8;
- Pero Cico stop at K.P. 9.1;
- Proevce stop at K.P. 12.2;
- Dobrosane stop at K.P. 14.0; and
- Klecevce stop at K.P. 24.8.

Figure 3-11 Layout of the Alternative Alignment - Section 1 shows the Alternative alignment for Section 1. This figure also shows the Reference alignment for an easier comparison.

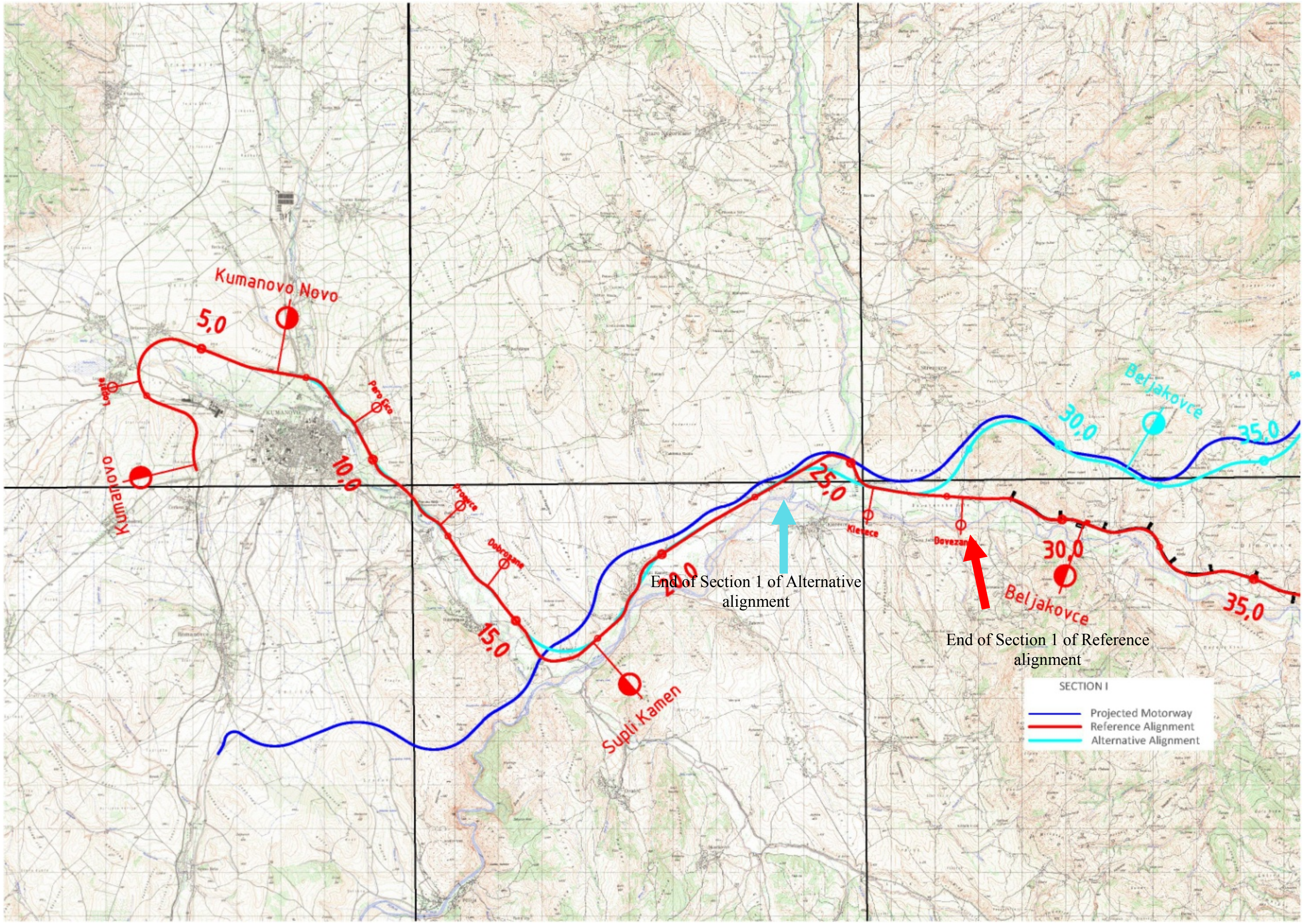


Figure 3-11 Layout of the Alternative Alignment - Section 1

Section 2: Beljakovce to Kriva Palanka

At K.P. 25.7 the Alternative alignment leaves again the Reference alignment and turns with the minimum radius for 160 km/h (1,100 m) to the North-East in order to follow the motorway corridor in the direction of Kriva Palanka. The planned motorway does not follow the river valley and takes a more direct way through the hills. In order to follow this corridor, the alternative has to climb with a gradient of up to 24 %. In the Alternative alignment, the location of the station of Beljakovce lies on K.P. 31.6, 1.5 km north and about 100 m higher than the location of the station in the Reference alignment.

The Alternative alignment follows the planned motorway corridor along the southern side. Some deep ravines have to be crossed by means of viaducts. At K.P. 37.5 the Alternative alignment crosses in a 3.2 km long tunnel a mountain ridge and crosses to the northern side of the planned motorway corridor.

The station Rankovci is at K.P. 45.6. Despite the station Ginovci being close to this station (6.4 km), the station is necessary to avoid a 20 km-long section without crossing tracks. The station Ginovci is at the same location as in the Reference alignment.

From Ginovci to the end of this section in K.P. 59.6 (K.P. 65 on the Reference alignment), the Alternative alignment runs between the planned motorway and the Reference alignment.

Section 2 of the Alternative alignment has 3 stations and 2 halts as summarized below:

- Beljakovce station at K.P. 31.6 with 2 sidings and one loading track;
- Rankovci station at K.P. 45.6 with 2 sidings;
- Ginovci station at K.P. 52.0 with 2 sidings, freight yard and several loading tracks;
- Rugince stop at K.P. 37.2; and
- Psaca stop at K.P. 55.5.

Figure 3-12 Layout of the Alternative Alignment - Section 2shows the Alternative alignment for Section 2. This figure also shows the Reference alignment for an easier comparison.

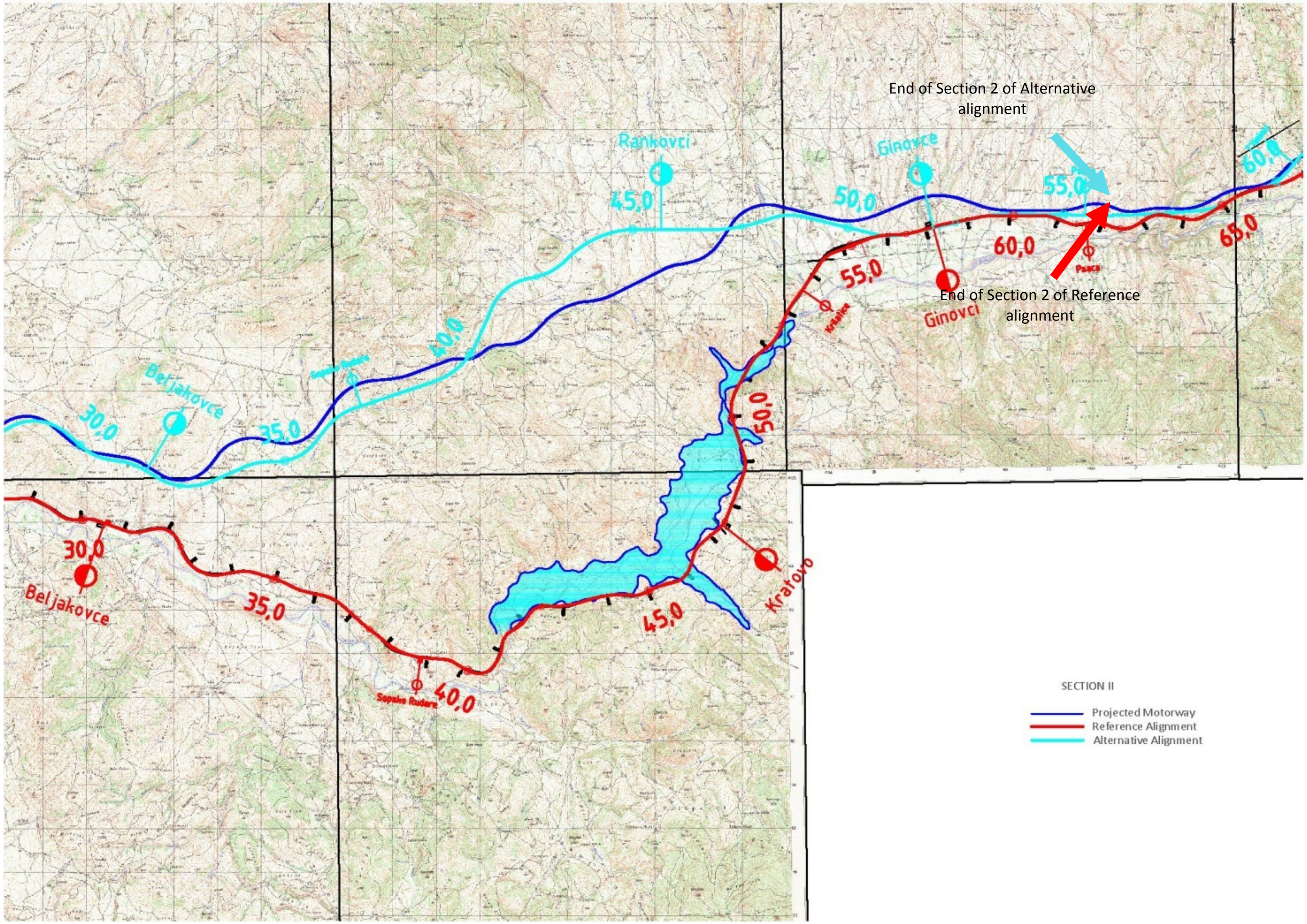


Figure 3-12 Layout of the Alternative Alignment - Section 2

Section 3: Kriva Palanka to Bulgarian Border

The Alternative alignment, at K.P. 59.6, crosses to the northern side of the planned motorway in order to arrive to Kriva Palanka at a higher level than in the Reference alignment and to avoid passing through the densely populated valley. The station of the Reference alignment is located at the western limit of the town and the line crosses the town in a tunnel. The proposed Alternative alignment runs north of the town and south of the planned motorway. The distance to the centre of Kriva Palanka is shorter than the one for the Reference alignment, but the station is also about 65 m higher above the town.

After passing the station, the alternative alignment changes again to the north side of the motorway. At K.P. 70, the motorway and the river are crossed and the line continues along the south side of the valley. With a moderate horseshoe tunnel (135°, R = 1100 m), the line turns first to the southeast and then to northeast and joins the Reference alignment at the entrance to the border tunnel. The station Zidilovo is located at K.P. 73.2 in front of the horseshoe tunnel.

Section 3 of the Alternative alignment has 2 stations and 3 stops as summarized below:

- Kriva Palanka station at K.P. 66.4 with 2 sidings and 3 tracks for maintenance and stabling;
- Zidilovo station at K.P. 73.2 with 2 sidings;
- T'liminci stop at K.P. 60.6;
- Drenja stop at K.P. 69.2; and
- Ouzem stop at K.P. 76.9.

The section has long stretches with steep gradients of up to 24 %. Because the previous section has similar gradients it is foreseen to operate the freight trains from Kumanovo with double-traction.

Figure 3-13 shows the Alternative alignment for Section 3. This figure also shows the Reference alignment for an easier comparison.

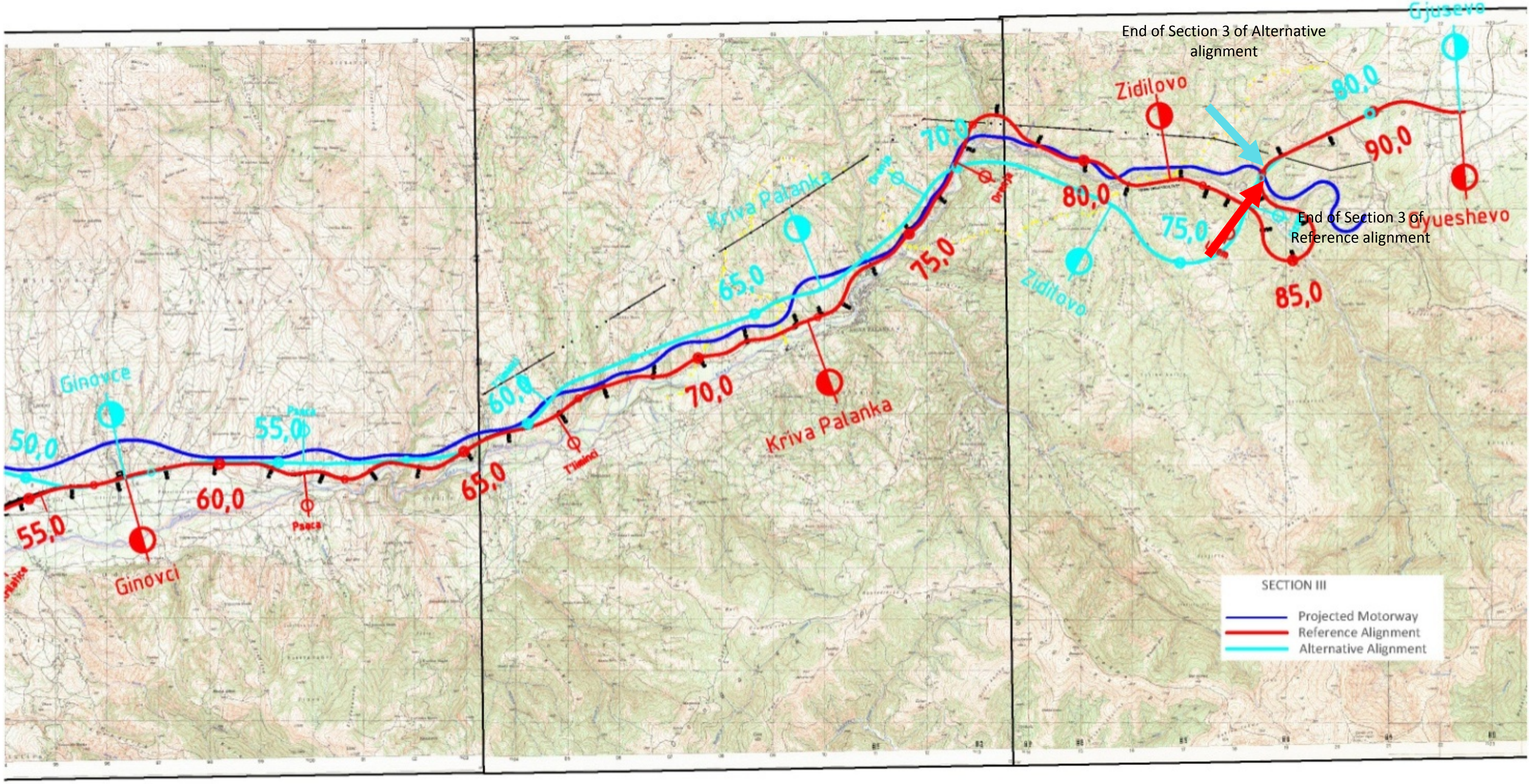


Figure 3-13 Layout of the Alternative Alignment - Section 3

3.5.2 SELECTION OF ALIGNMENT

3.5.2.1 ALIGNMENT SELECTION CRITERIA

In order to evaluate the two alignments (Reference and Alternative) a multi criteria analysis was used to prepare the report on the 'Selection of Preferred Alternative'[16]. This report explains the reasoning and analysis of each particular alignment, and recommends to the Ministry of Transport and Communications, as the Contracting Authority, an alternative for each of the sections to be completed.

The criteria are the measures of performance by which the Project's alternatives were judged. The main criteria chosen for the decision making process were selected taking into account the current state of work developed at this stage for the established "Reference" alignment and the experience obtained from previous projects. The chosen criteria for selection of the alignment were determined to be as follows:

- *Traffic Volume* – aiming to describe the influence of traffic forecast and traffic modelling (Attached Annex 1 – Part from Future Traffic Scheme);
- *Operation / Transit Time* – aiming to take into account the complexity of the techniques needed for train operation and influence on transit time;
- *Engineering Risk* –the potential risk for the completion of the railway project (e.g. cost overruns, project delay, safe construction and operation, and system integrity);
- *Indicative Construction Costs (CAPEX- Capital Expenses)* – taking into the account the estimation of the construction cost of both alignments;
- *OPEX – Operational Expenses* – taking into account the operating costs of the built railway line;
- *Preliminary Environmental Impact* – based on a review of existing data and data collected during the stakeholder consultations, and upon analysis of aerial and satellite images;
- *Preliminary Social Impact* - based on a review of existing data and data collected during the stakeholder consultations; and
- *Preliminary Public Consultation* - based on data collected during the stakeholder consultations for the scoping of the ESIA.

Of all mentioned criteria, a quantitative (monetary) estimation was defined only for the CAPEX criteria (for cost estimation) while for all the other criteria a qualitative description of the impact on each alternative was undertaken.

3.5.2.2 ANALYSIS OF PRELIMINARY ENVIRONMENTAL IMPACT OF ALTERNATIVES

In order to carry out the analysis of the preliminary environmental impact of the Reference alignment and the Alternative alignment, the following assumptions and considerations were made:

- In both cases it is foreseen the construction of single track railway line;
- The railway line will occupy a band with a width of 12 metres, including the tracks and the adjacent slopes of embankments or cuttings, which will be kept free of wild vegetation on a permanent basis;
- The roadbed and the tracks will seal the existing subsoil additionally; and
- In the tunnel sections, an area of a length of 40 metres and a width of 15 metres on each side of the tunnel has been presumed as the encroachment area.

For both alternatives, the following impacts were considered and assessed in this preliminary analysis:

[16] Selection of Preferred Alternative Report, Macedonian Railways: Feasibility Study for Corridor VIII - Eastern Section, Contract No: C21196/EBSF-2010-07-101, Ministry of Transport and Communications, Republic of Macedonia, 2011

- Biodiversity (Flora and Fauna): loss of habitat space due to occupation of the tracks and modification of biotopes in adjacent non-sealed areas, disturbance to wild animal populations, and killing of animals during construction and operation;
- Soil: erosion arising from construction activities and induced by built structures, loss of soil function as support for biodiversity, loss of permeability due to soil sealing underneath the tracks, and soil contamination due to drip losses of traction vehicles and use of herbicides during maintenance operations during the operational phase;
- Water: decrease of water recharge into subsoil due to soil sealing, water contamination due to the input of pollutants during construction (mainly suspended matter) and operation (from emissions of vehicles and herbicide use);
- Climate: microclimate changes due to destruction of vegetation cover;
- Air: impairment of air quality due to dust emissions and exhaust emissions from machinery and vehicles during construction activities, and emissions of particulate matter and exhaust emissions of motive power units during operation; and
- Landscape: impairment of landscape scenery due to the presence of the railway structures, particularly bridges and viaducts.

The overall impact on each environmental receptor was then assigned an impact intensity value, according to the following rating scale:

- High = 3
- Medium = 2
- Low = 1
- Zero/none = 0

Table 3-3 summarises the results of the preliminary environmental impact assessment for each Section of each alternative. A brief discussion of the rationale used to assess the impacts shown in this table is provided below.

The impact on biodiversity was considered to be of a lower intensity for Sections 1 and 2 of the Reference alignment with respect to the Alternative alignment (medium vs high in both sections). This is because although in both sections the construction works and the operation of the railway will affect the nearby flora and fauna, in Section 1 of the Alternative alignment, the realignment needed for obtaining the minimum curve radius set for this alternative is more significant than that required for the Reference alignment, where no realignment will be performed. Thus, new land will be occupied, which means the destruction of habitats.

As for Section 2, in the Reference alignment, a significant part of the construction work is already finished, and the most sensitive biotopes have already been altered, whereas in the Alternative alignment, as Section 2 will be constructed on undisturbed biotopes, the impact will be higher.

On the contrary, for Section 3, the impact on biodiversity was considered to be of a higher intensity in the Reference alignment with respect to the Alternative alignment (high vs medium, respectively). In this case, since no construction works have started for none of the alignments, undisturbed biotopes will need to be occupied in both cases. However, the Alternative alignment is significantly shorter than the Reference alignment (approximately 10 km shorter), particularly in the last stretch of the section, which contains the most sensitive biotopes.

The impact on soils was considered to be of a lower intensity for Sections 1 and 2 of the Reference alignment with respect to the Alternative alignment (low vs medium and medium vs high, respectively). Considering that soil affected during the operation of the railway will be similar for both alternatives, the main impact on soils will occur during construction due to the loss of function and the creation of erosion processes associated to earth movements. For the reasons mentioned above for biodiversity, earth movements will be much greater in Sections 1 and 2 of the Alternative alignment than in Sections 1 and 2 of the Reference alignment.

For Section 3, the impact on soil was considered to be high in both alternatives, mainly because of the steep topography of the area, which is common to both alternatives.

The impact on water was considered to be the same in both alternatives, medium for Sections 1 and 2, and high for Section 3, where both alignments may affect the more sensitive Kriva river headwaters.

The impact on air quality was considered to be the same (medium) for both alternatives and in all sections, as air emissions from construction works, particularly from machinery and vehicles, and from train traffic are expected to be similar in both alternatives.

The impact on climate was considered to be the same (low) in both alternatives and in all sections, as changes in microclimate are expected to be minimal.

The impact on the landscape was considered to be the same (high) in both alternatives and in all sections. This is because it has been considered that the main structures causing a landscape modification (bridges and viaducts) are about the same in both alternatives, are highly visible, and will remain during the operational phase.

The following can be concluded from the review of the preliminary environmental impacts of the alternatives:

- From Kumanovo to the vicinity of Kriva Palanca, K.P. 65.1 of the Reference alignment, the railway line is more or less established and a significant part of the construction work is already finished. Thus, the impacts concern an already altered environment, with less sensitive biotopes, which in the Alternative alignment need to be assessed as full impacts. Therefore, according to the preliminary assessment, the Reference alignment is recommended on Sections 1 and 2.
- The Alternative alignment on the Section 3 is significantly shorter than the Reference alignment and is recommended from the environmental point of view as substantially less areas of sensitive biotopes will be affected.

Environment	**Section 1 Kumanovo to Beljakovce**				**Section 2 Beljakovce to Kriva Palanka**				**Section 3 Kriva Palanka to Bulgarian Border**			
Alignment	Reference Alignment		Alternative Alignment		Reference Alignment		Alternative Alignment		Reference Alignment		Alternative Alignment	
Section	K.P. 0.4 - 31.2		K.P. 0.4 – 25.7		K.P. 31.2 - 65.1		K.P. 25.7 – 59.6		K.P. 65.1 - 88.1		K.P. 59.6 - 79.5	
		Rating		Rating		Rating		Rating		Rating		Rating
Impacts biodiversity	medium	2	high	3	medium	2	high	3	high	3	medium	2
Impacts soil	low	1	medium	2	medium	2	high	3	high	3	high	3
Impacts water	medium	2	medium	2	medium	2	medium	2	high	3	high	3
Impacts climate	low	1	low	1	low	1	Low	1	low	1	low	1
Impacts air	medium	2	medium	2	medium	2	medium	2	medium	2	medium	2
Impacts landscape	high	3	high	3	high	3	high	3	high	3	high	3
Mean value:		**1.8**		**2.2**		**2.0**		**2.3**		**2.5**		**2.3**
Recommendation	**Reference Alignment**				**Reference Alignment**				**Alternative Alignment**			

Table 3-3 Preliminary Environment Impact / Results and Recommendation

3.5.2.3 ANALYSIS OF PRELIMINARY SOCIAL IMPACT OF ALTERNATIVES

The preliminary assessment of the social impact of the Reference alignment and the Alternative alignment has been based on the analysis of the following social aspects:

- Resettlement of people/loss of land due to land expropriation;
- Travel times;
- Access to train stations/stops; and
- Quality of life (e.g. noise and vibration effects).

In addition, the public opinion on the preferred alternative collected from pubic consultations performed with regards to the railway project and the costs of expropriation and compensation were taken into account to make recommendations on the preferred alternative from a social impact point of view.

A comparative analysis of the relevant social aspects in each Section of the alternatives follows.

Section 1

The railway is already constructed, and therefore, land expropriation is not a major issue in this section for the Reference alignment. Along the Reference alignment, the land has been acquired along the first 65 km of the projected railway corridor, starting in Kumanovo and ending in Mozdivnjak, the first village within Kriva Palanka Municipality. Land strips of a varying width of 10-20 meters on both sides of the railway line were expropriated during the 1994-2004 period. Land owners have been compensated and most have built new houses away from the proposed railway line.

On the other hand, according to Article 59 of Law on the Railway System stipulated in the Official Gazette No. 48/2010, urban plans, state urban planning documentation and local urban planning documentation should envisage that no structures be constructed within a distance less than 10 meters from the end point of the railroad area. Presently there are six informal Roma houses at Pero Cico, which are as close as 6-7 meters of the railway line. This is an issue which needs to be solved for both alignments.

In the Alternative alignment the two softer curves at Supli Kamen and Klecevce will allow to get a higher speed, thus shortening the travel time. However, the realignment will require the demolition of one house and the resettlement of the householders. Loss of approximately 246.400 m^2 of agricultural land ending at Beljakovce will be required for the Alternative alignment.

This negative impact offsets the minor advantages that can be achieved by the improvement of the technical characteristics. Therefore, for Section 1, the social impact can be considered similar for both alternatives.

Section 2

As indicated above, the land for the Reference alignment has already been acquired along the first 65 km of the proposed railway corridor, in which Section 2 is included. On the contrary, the Alternative alignment will require that approximately 392.000 m^2 of land, most of it agricultural, is expropriated.

Moreover, with the Alternative alignment, Kratovo town, with 9,924 inhabitants will not have access to the train. This negative impact will not be significantly offset by providing train access to the much smaller settlements of Rugince (75 inhabitants) or Rankovce (1,200 inhabitants) located more than 5 km to the northwest and north of Kratovo, respectively. This would mean relatively long travel distances for a significant number of people, which will not be compensated with the advantages of the technically improved Alternative alignment.

Section 3

For Section 3, the main differences between the alternatives are:

- The tunnel of the Reference alignment to avoid the densely populated area of Kriva Palanka and minimize building demolitions; and

- The distance of the Alternative alignment to the town of Kriva Palanka, approximately 0.5 km north of the settlement.

The following table compares the impacts on social aspects for each alternative of Section 3:

Social aspect	Reference alignment	Alternative alignment
Expropriations/ resettlement	Approximately 25 houses need to be demolished and the families resettled.	Approximately 29 houses need to be demolished and the families resettled.
Expropriation/ loss of land	Permanent loss of 424.379 m^2 of land.	Permanent loss of 655.760m^2 of land.
	Noise and vibration from approximately 20 nightly freight trains that make a noise level of 110 dBA. This noise propagates in the surrounding areas reaching a noise level of 70-90 dBA in the vicinity of residences. Permitted noise during night time in bedrooms is 45 dBA according to Macedonia Law. Unless proper noise protection can be ensured for the residents who are living along the Reference Alignment in Kriva Palanka town, long-term negative impact in respect of annoyance due to vibration and noise from trains should be expected.	The Alternative alignment is located approximately 0.5 km away of the residences of Kriva Palanka. Noise and vibration levels from train traffic are not expected to cause annoyance to the residents.
Access to train		The Alternative alignment will be placed beyond Kriva Palanka town and residents will need to go 0.5 km farther to access the train station (with respect to the location of the train station in the Reference alignment).

Table 3-4 Preliminary Social Impact /Results and Recommendation

For Section 3, the Reference alignment with the tunnel avoids the densely populated area of Kriva Palanka and building demolitions. In Section 3, 25 houses will need to be demolished. The Alternative alignment will affect a higher number of families, 52 in total with negative impacts for the Kriva Palanka residents living in the neighbourhood of the railway line, who will be subject to higher noise levels. This is a noticeable difference between the two alternatives. Another major difference is the location of the station, which will be farther away from the town in the Alternative alignment. The greater distance of the station for Alternative alignment will create higher transport costs for citizens which will lower the attractiveness of rail transport.

With regards to public opinion on the preferred alternative, during the public consultations conducted in the municipalities of Kumanovo, Kratovo, Rankovce and Kriva Plank a on the 4th and 5th May 2011, questionnaires were distributed that included questions concerning the preference for the alignment. The results indicated that the population is divided on this issue, and especially the people living in Kratovo who prefer that the alignment passes through their area as originally planned with the Reference alignment.

The issue of alternative alignments has been a serious problem for the city of Kriva Palanka (in Section 3), where the alignment has changed several times. During the consultations undertaken during the first week of May 2011, the Mayor of Kriva Palanka expressed his opinion that, concerning the railway alignment in the area of Kriva Palanka, it would be preferable to stick to the alignment proposed by PERI. In fact, the Kriva Palanka City Master Plan is currently being updated in order to take into account the last proposal of alignment proposed and adopted by PERI, this is the Reference alignment. The plan is expected to be approved by the end of 2011 following the disclosure of the draft plan for the public consultation process.

With regards to land acquisition and compensation costs, the estimated figures amount to 6.3 million Euros for the Reference alignment (all corresponding to Section 3), and 5.2 million Euros for the Alternative alignment (of which 2.8 million Euros correspond to Section 3).

According to the discussion presented above, the following choice of alignments was recommended for each section from the viewpoint of the preliminary assessment of social impacts:

- Section 1: Reference Alignment;
- Section 2: Reference Alignment;
- Section 3: Alternative Alignment.

3.5.2.4 SUMMARY OF MULTI-CRITERIA ANALYSIS OF ALTERNATIVES

Based on the judgment criteria and alternatives to be evaluated, a multi-criteria evaluation matrix was constructed with the purpose of conducting a multi-criteria analysis using the compensation method. The compensation method is a well-known way of comparing alternatives and consists of attributing a weight to each criterion and then calculating a global score for each alternative, in the form of a weighted arithmetic average of the scores attributed to that alternative for the different criteria.

The summary of the results of the multi-criteria analysis of the alternatives are presented in the following table. One plus stands for one point. For each criterion and railway section, only the score of the alternative having the highest score is shown.

Based on the table below, the multi-criteria analysis provided a framework in which decision-making on the selection of the alignment was undertaken**.** From the multi-criteria analysis, the Reference alignment was envisaged to be the best alignment for all 3 sections. The recommendation arising from the multi-criteria analysis was therefore the Reference alignment as the preferred alternative.

The recommendation of this preferred alternative is based on a comprehensive analysis of existing data and designs. Regarding the works to complete the railway line, the Reference alignment is better in this regard for the two first sections: from Kumanovo to Kriva Palanka. For Sections 1 and 2, the Reference alignment has to be recommended from the environmental point view, since the railway line is more or less established and a significant part of the construction work is already finished. Thus, the impacts mainly concern less sensitive biotopes. Although the Alternative alignment on Section 3 is significantly shorter than the Reference alignment and was therefore recommended from the environmental point of view as a substantially lesser area of sensitive biotopes would be affected.

From the point of view of the social impact, one of the main negative aspects of the Reference alignment will be noise and vibration in Kriva Palanka. However, from the aspect of infrastructure works the Reference Alignment is preferable for Section 3.

Taking all this into account, the multi-criteria analysis recommended taking forward the Reference Alignment as the preferred alignment for all 3 sections. The Ministry of Transport and Communication forwarded this recommendation to the Government of the Republic of Macedonia who made the final decision regarding the route alignment.

Criteria	Section 1		Section 2		Section 3	
	Alignment	Score	Alignment	Score	Alignment	Score
Traffic volume	No influence					
Operation / Transit time	Reference	+	Alternative	++	Alternative	++
Engineering risk	Reference	+	Reference	+	Reference	++
Indicative construction costs CAPEX	Reference	+++	Reference	+++	Reference	+++
OPEX	Reference	+++	Reference	+++	Reference	+++
Preliminary Environmental Impact	Reference	++	Reference	+++	Alternative	+++
Preliminary Social Impact	Reference	++	Reference	+	Alternative	+++
Preliminary Public Consultation	Reference	++	Reference	++	Reference	+++
Overall	**Alternative**	0	**Alternative**	2	**Alternative**	8
	Reference	14	**Reference**	13	**Reference**	11

Table 3-5 Summary of the Multi-Criteria analysis

3.6 SELECTED ALIGNMENT (THE PROJECT)

The Government of the Republic of Macedonia in Decision No. 51-3556/1 dated 19.07.2011 followed the recommendation arising from the multi-criteria analysis, officially selecting the “Reference” alignment (shown in *Figure 3-14* Selected Alignment*)*, which is the object of this ESIA.

Annex 2 contains the Decision from the Government of the Republic of Macedonia for the selected alignment.

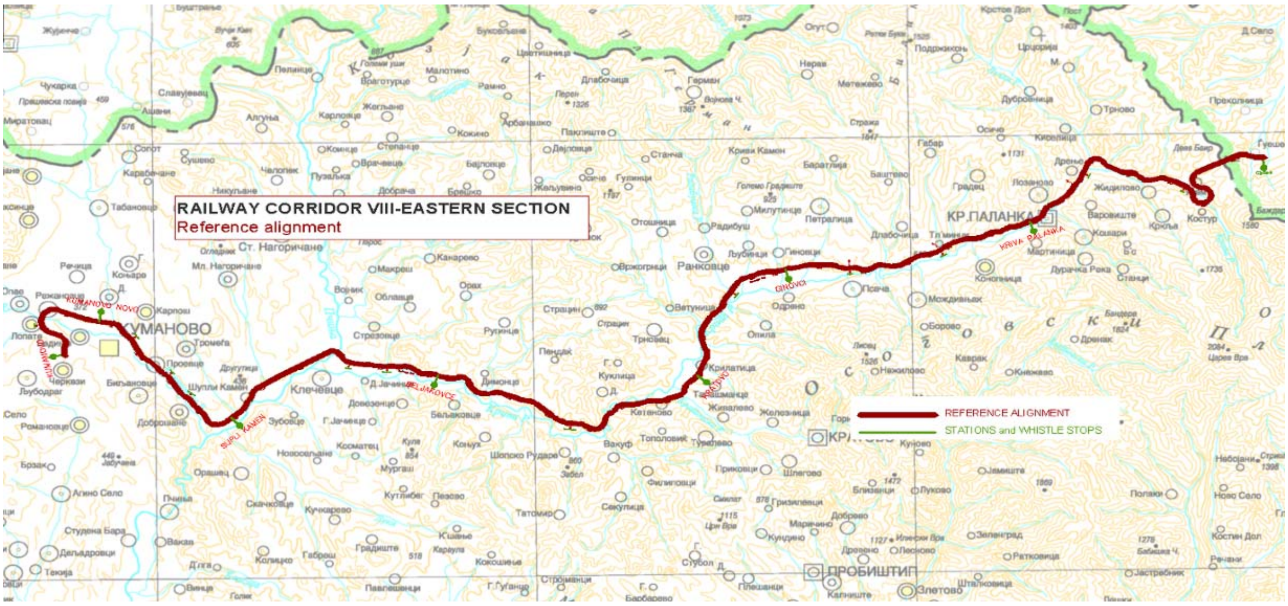


Figure 3-14 Selected Alignment

The technical specification of the selected alignment for each section is summarized in the following table:

Selected 'Reference' Alignment				
	Section1	**Section 2**	**Section 3**	**Total alignment**
	Kumanovo – Beljakovce (Existing line)	Beljakovce – Kriva Palanka (Line under construction)	Kriva Palanka – Bulgarian Border	
Length	30.8 km	34.0 km	23.4 km	**88.2 km**
Design speed	100 km/h	100 km/h	100 km/h	
Minimum curve radius	500 m	500 m	500 m	
Maximum gradient	15 %	15 %	24 %	
Electrification	25KV/50Hz	25KV/50Hz	25KV/50Hz	
Number of stations	3	2	2	**7**
Halts	6	3	3	**12**
Maximum Distance between Stations	13.4 km	16.9 km	14.1 km	
Minimum Distance between Stations	6.6 km			
Signalling System	Electronic Interlocking System			
Capacity	Approx. 64 trains per day			
Maximum weight of trains (single Locomotive)	Approx. 800 tons			
Maximum weight of trains (double Locomotive)	Approx.1500 tons			
Theoretic Travel Time per Passenger Train (Stop in every station)	approx. 30 min	approx. 35 min	approx. 20 min	**approx. 90 min.** (including crossing stop)
Theoretic Travel Time per International Passenger Train (1-stop train)	approx. 20 min	approx. 26 min.	approx. 13 min.	**approx. 59 min.**
Theoretic Travel Time per Cargo Train (non-stop)	approx. 27 min	approx. 31 min	approx. 17 min	**approx. 85 min.** (including crossing stop)

Table 3-6 Technical Specification of Selected Alternative

3.7 TECHNICAL DESCRIPTION OF CURRENT RAILWAY INFRASTRUCTURE

Section 1: Kumanovo – Beljakovce

From K.P. 0.400 to K.P. 2.667 of the railway line, no works were undertaken during the reconstruction activities that took place in the period 1994-2004. The existing track is made of wooden sleepers. In order to have the same technical parameters along the entire corridor, it is necessary to rehabilitate the substructure and superstructure of the railway along this stretch.

From K.P. 2.667 to K.P. 23.600 of the railway, reconstruction was performed on the substructure previously with new concrete sleepers being installed and the used rails re-installed. In this part of the railway, rail fittings and 600 metres of rails are missing.

In the stretch from K.P. 25.600 to K.P. 30.836, substructures are constructed and objects are finished, but most of the cuts and embankments are not finished.

Table 3-7 and *Table 3-8* below provide inventories of the existing objects (bridges and crossings) in the current railway structures together with an overview of their technical features, their conservation condition, and the need for rehabilitation. More details are presented in the report "*Development of Preferred Alternative*" submitted to the Ministry of Transport and Communications as part of the Feasibility Study of Project "Railway Corridor VIII-Eastern Section".

Object No.	Total length (m)	Width	Chainage (km)	Type of object	Inspection Info
1	8.6m	6.5m	2+780	Steel Bridge	Load capacity needs to be checked, reconstruction required
2	2x19.5m	6.5m	3+133	RC Bridge	Load capacity needs to be checked, reconstruction required
3	5m	6.5m	3+432	RC Box culvert	Need to be reconstructed
4	No info	No info	6+927	RC Overpass	It has the required height for electrification
5	No info	No info	6+978	RC Overpass	It has the required height for electrification
6	14m	No info	7+206	RC arch Underpass	Load capacity needs to be checked, reconstruction required
7	16m	6.5m	7+316	RC arch Bridge	Load capacity needs to be checked, reconstruction required
8	14m	No info	8+001	RC arch Underpass	Load capacity needs to be checked, reconstruction required
9	12m	6.5m	9+026	RC arch Underpass	Load capacity needs to be checked, reconstruction required
10	No info	No info	10+860	RC Overpass	It has the required height for electrification

Table 3-7 Inventory of Existing Bridges for Section 1

Object No.	Chainage (km)	Type of object	Inspection Info
1	2+876	Overpass (Lopate)	Need to build Overpass
2	3+507	Overpass (Rezanovce)	Need to build Overpass
3	4+080	Road level crossing	To be removed Need to connect with road which crosses on K.P. 3+507
4	6+500	Road level crossing	To be removed and provide new solution for Brickyard access
5	7+500	Illegal level crossing	To be removed and provide new solution
6	9+042	Underpass (PeroČičo)	Need to be check load capacity and should be reconstructed (with access to settlement)
7	10+773	Road level cross (Proevce)	To be removed Needs to be relocated on existing roads
8	12+170	Road level cross (Dobresane)	To be removed To build deviation on road and cross with new Overpass on K.P. 11+970
9	13+607	Road level crossing	To be removed Need to be relocated on K.P. 14+960
10	14+357	Road level crossing	To be removed Need to be relocated on K.P. 14+960
11	14+960	Underpass	Technical documentation and design to be done
12	16+357	Underpass or Overpass	Technical documentation and design to be done
13	17+796	Road level crossing (ŠupliKamen)	Technical documentation for removal and relocate with Overpass on K.P. 18+450
14	19+089	Underpass	Technical documentation and design to be done
15	20+048	Underpass	Technical documentation and design to be done
16	22+285	Road level crossing	To be replaced with deviation on road and Underpass on K.P. 22+630
17	22+630	Underpass	
18	24+768	Bridge	New Bridge through Pcinja River
19	25+197	Underpass	
20	25+573	Road level crossing	To be replaced with deviation on road and Underpass on K.P. 25+197
21	27+863	Road level crossing	To be replaced with deviation on road and Underpass on K.P. 28+065

Object No.	Chainage (km)	Type of object	Inspection Info
22	28+065	Underpass	

Table 3-8 Inventory of Existing Road Level Crossings for Section 1

Section 2. Beljakovce – Kriva Palanka

The construction of most of the viaducts, tunnels and other structural objects of the railway line from Beljakovce up to 5.5 km West of Kriva Palanka, was already started before 2004 when construction of the railway stopped. Consequently, most of these structures were left in different stages of completion.

The design documents were modified at different locations during the construction phase. Subsequently the chainage indicated on the documents does no longer match with the geometric line length. In order to adjust the recalculation of the alignment to the design documents several chainage gaps were introduced as indicated below:

Location	K.P. on design documents		Difference [m]	Real K.P. from Kumanovo
West of Beljakovce Station	28+979.81	29+000.00	20.19	28+979.81
West of Ginovci Station	55+500.00	56+438.20	938.20	55+479.81

Table 3-9 Chainage Gaps

From the survey carried out to assess the condition and characteristics of the constructed railway structures, it has been estimated that around one third of the works were completed. *Table 3-10* and *Table 3-11* show the inventories of Section 2 existing bridges (viaducts and underpasses) and tunnels, together with an overview of their technical features.

Object No.	Total length (m)	Chainage (K.P.)	Type of object	Inspection Info	Level of Completion (%)
1	160	33+855	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 90%
2	200	35+996	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 65% Superstructure0%
3	175	36+630	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 65% Superstructure 0%
4	100	37+095	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure60%
5	165	37+604	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 50%
6	175	39+560	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 0%
7	50	40+014	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 0%
8	75	40+680	RC Viaduct		Substructure 0% Superstructure 0%
9	389	41+350	Steel Bridge		Substructure 0% Superstructure0%
10	50	42+020	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 5% Superstructure 0%
11	25	42+194	RC Viaduct		Substructure 0% Superstructure0%
12	25	42+707	RC Viaduct		Substructure 0% Superstructure0%

Object No.	Total length (m)	Chainage (K.P.)	Type of object	Inspection Info	Level of Completion (%)
13	25	43+480	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 5% Superstructure 0%
14	105	43+679	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 0%
15	468	46+068	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure65%
16	100	48+280	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
17	100	48+803	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 50%
18	330	49+540	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 0%
19	180	51+090	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 0%
20	60	52+420	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
21	40	53+688	RC Bridge	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
22	10	54+400	RC Viaduct		Substructure 0% Superstructure 0%
23	10	54+790	RC Viaduct		Substructure 0% Superstructure 0%
24	8	57+820	Underpass		Substructure95% Superstructure95%
25	125	61+804	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
26	100	62+505	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
27	75	62+505	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
28	75	63+119	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
29	35	63+390	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure 35%
30	125	63+710	RC Bridge	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure65%
31	75	64+607	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
32	75	65+198	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
33	150	65+537	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%
34	100	65+954	RC Viaduct	Elaborated in: Annex 3 Site inspection	Substructure 100% Superstructure90%

Table 3-10 Inventory of existing bridges for Section 2

Object No.	Total length (m)	Chainage (K.P.)	Inspection Info	Level of Completion (%)	
1	503	37+927		1) Entrance/exit approach cutting are done with concrete injection and anchors	3) Bearing plate (tie-plate) is 50% done
2	169	40+758	Elaborated in: Annex 3 Site inspection	1) Entrance/exit approach cutting is made with concrete inject and anchors	3) Bearing plate (tie-plate) is 100% done
3	364	41+607	Elaborated in: Annex 3 Site inspection	95%	

Object No.	Total length (m)	Chainage (K.P.)	Inspection Info	Level of Completion (%)	
4	341	42+250	Elaborated in: Annex 3 Site inspection	1) Entrance/exit approach cutting is done with concrete inject and anchors	3) Bearing plate (tie-plate) is 100% done
5	256	42+779	Elaborated in: Annex 3 Site inspection	1) Entrance/exit approach cutting is done with concrete inject and anchors	3) Bearing plate is not done.
6	150.5	45+418		0%	
7	188	49+802	Elaborated in: Annex 3 Site inspection	1) Exit approach cutting with concrete inject and anchors	3) Bearing plate has not been started
8	592	50+171	Elaborated in: Annex 3 Site inspection	1) Entrance approach cutting is done, concrete inject and anchors	3) Bearing plate has not been started
9	123	52+948		0%	
10	64	62+677	Elaborated in: Annex 3 Site inspection	1) Entrance/exit approach cutting is partly done	3) Bearing plate is 50% done
11	73	63+552	Elaborated in: Annex 3 Site inspection	1) Entrance/exit approach cutting is done with concrete injection and anchors	3) Bearing plate (tie-plate) is 50% done
12	248	63+807	Elaborated in: Annex 3 Site inspection	1) Exit approach cutting has concrete inject with anchors	3) Bearing plate (tie-plate) is not done
13	172	64+154		0%	
14	146	64+364		0%	

Table 3-11 Inventory of existing tunnels for Section 2

3.8 LAND USE & LAND TAKE

3.8.1 LAND USE ALONG ROUTE

Section 1: Kumanovo - Beljakovce

The railway line within Section 1 from Kumanovo to Beljakovce follows the courses of the rivers Kumanovska and Pcinja. The relief of this region is a smooth to wavy terrain. The ground level elevations vary between 290 and 404 m above sea level. The maximum altitude is 404 m (Golem rid).

The characteristic types of land use are urban settlements and to a lower extent rural settlements, agricultural lands, farming, orchards, vineyards, grasslands and meadows. The fraction of non-productive or less intensively used areas compared to the other sections of the railway is relatively small. Non-productive forms of land structures are rivers with marshland, willow groves and shrubs, and scattered isolated trees. The farming areas consist of small parcels of land.

Section 2: Beljakovce – Kriva Palanka

Within Section 2 the railway line corridor follows, for the most part, the valley of the Kriva river. In this middle part of the corridor, the valley morphology alternates open areas with deep cutting canyon areas with steep slopes. The maximum altitudes are around 670 m. The land use is mostly pasture and to a smaller extent orchards, vineyards and farming. There is a large plantation of fruit trees near Ginovci, but it is abandoned.

Northwest of Ginovci the wooden areas are increasing. Most of the wooden areas that appear along this section are of an anthropogenic origin and are not subject to silvicultural management, except for the private usage of firewood.

Because this region is very sparsely populated, no intensive forms of land use exist.

Section 3. Kriva Palanka – Bulgarian border

In the first part of this section up to the town of Kriva Palanka, the topography corresponds with a wide open valley with sides flaring out. The maximum altitudes lay around 800 m. Running past the town of Kriva Palanka, and up to the Bulgarian border, the railway corridor enters a mountainous region with maximum altitudes of 1,125 m.

At the beginning of this section, the land uses correspond mainly to hill pastures and woods, mostly conifer plantations. There are also areas with agricultural land use and orchards, especially in the lower areas of the valley near the river.

In the middle part of Section 3, the railway corridor crosses the town of Kriva Palanka, where the dominant land use is residential. Most of the crossing, however, will be underground, through a tunnel.

In the last part of Section 3, in the higher mountainous locations, more natural deciduous woodlands appear and dominate, such as oak and beech forests. Agricultural land can be found along the riversides of the Kriva river, on the former marshlands. Above the floodplain, on the hillsides, unmanaged grasslands and hill pastures alternate with forests. Near the Bulgarian border, the land use is forestry, and in former times there was also mining.

3.8.2 LAND TAKE

With regards to the permanent land take for the construction of the new railway line, with this Project being a public interest project (according to Law on Railway System (Official Gazette. No. 48/2010)), the urban plans, state urban planning documentation or local urban planning documentation shall envisage that structures may not be constructed at a distance not less than 10 metres from the end point of the railroad area. Since the least width of the “railroad area” is 1.0 meter on both sides of the earth body of the railroad, the permanent land take along both sides of the railway line will necessarily be 11 metres. For Section 1 and Section 2, the legal procedure for permanent land take is completed. For Section 3 this procedure needs to be done prior the start of construction works.

During construction works temporary land take will be required from the requirements for construction compounds and work sites along or close to the rail route, and space for storage of plant, materials and locating site offices. Contractors’ may temporarily require land for other facilities such as Borrow Pits & Landfills, Concrete Batching Plants, Aggregate Crushing Facilities, Haulage Routes, Labour & Workforce Numbers, Facilities & Accommodation, Construction Laydown Areas & Contractor Facilities.

The locations of the construction compounds are yet to be decided. This shall follow legal requirements and the agreements to be reached with the affected landowners. During the construction works undertaken between 1994-2004 many of these facilities were constructed and most of them still exist on the site and can be reutilized.

3.8.2.1 DESCRIPTION OF PAST AND CURRENT LAND AQUISITION & EXPROPRIATION ACTIVITIES

Land has been acquired for the first 65 km of the proposed railway starting from Kumanovo and ending at the first settlement, Mozdivnjak, within the Kriva Palanka Municipality. A strip of land of a varying width of 10-20 meters on both sides of the rail alignment was expropriated during the period 1994-2004. Land owners were compensated and most have built new houses away from the projected railway line.

In Section 1, the railway line was designed during Bulgarian occupation and Yugoslavian railways constructed the line based on that design, undertaking the necessary expropriation. In Section 2, a “Cut-off date” was defined (date of the agreement signed by PERI and affected person/owner) and the expropriation was done prior to the start of construction works. Since 1995 no new building permits along the proposed railway line has been issued. A short Resettlement Action Plan will be prepared for Section 1 and Section 2.

For Section 3, the expropriation study was prepared in 2010 by Macedonian Railways Infrastructure. Approximately 25 houses will need to be demolished and agricultural land expropriated within the Municipality of Kriva Palanka, total number of houses that will be affected in town of Kriva Palanka is 19. Additionally 1 house will be affected in the settlement of Gradec and 5 houses in the settlement of Uzem.

The new station in Kriva Palanka is expected to be located behind the petrol station. The access to the station entrance will pass through the garden of one house and through another house which will need to be demolished (2 houses affected). The Project will also pass through the gardens of another three houses and will be located as close as two meters from one of these houses. Starting on the west side of the town, the railway line will run for 900 meters and then go over a bridge of 40 meters of length. Then the railway line will go in a tunnel of 100 meters and then run again in the open before going through a 960 meter tunnel. The line will then run through a bridge of 130 meters and over a bridge of 130 meters (approximately 14 houses will be affected). It is expected that the land expropriation procedures for Section 3 will be completed prior to the signature of the construction works contract.

3.8.2.2 LAND TAKE (AFFECTED LAND & STRUCTURES)

The following permanent and temporary land take per Section is required by the Project:

	Section 1	Section 2	Section 3
Permanent Land Take for Project (m^2)			
Total surface	0	0	**424,379**
Agricultural land	0	0	**225,380**
1.Grazing	0	0	160,616
2. Field	0	0	24,095
3. Vineyard	0	0	81
4. Orchard	0	0	
5. Residential (e.g. gardens, yards)	0	0	20,805
Forest	0	0	**185,800**
Commercial	0	0	0
Previous roads, gullies	0	0	**13,199**
Affected Structures			
No. Structures	0	0	
No. Residential Houses	0	0	25
Houses/ground floor m^2	0	0	1,050
Estimate of Temporary Land Take for Project during construction			
Total surface m^2	19,000	103,200	424,678

Table 3-12 Land Take per Section

In addition to the 25 houses that will need to be demolished, 424,379 m^2 of land will need to be expropriated, of which most is agricultural. A small portion of this land, 20,805 m^2 are gardens. Most of the gardens belong to the affected houses but also to other houses which are not affected by expropriation. The houses to be demolished are all two-storey and have an average size of ground floor of 52.5 m^2. Permanent land take will directly affect around 465 owners (families). Taking into consideration family members in total from land and property take around 1960 people could be affected.

The houses which need to be demolished and the land to be expropriated are all located within the Municipality of Kriva Palanka. The settlements where these houses and land are located are shown in *Table 3-13*

Settlements in Section 3 (K.P. 66 to the border)	Land in m^2	Houses/ground floor in m^2	Number of houses
Tlminci	33,760		
Gradec	70,041	35	1
Lozanovo	10,349		
Kriva Palanka	68,602	801	19
Drenje	24,943		
Trnovo	3,289		
Kiselica	18,451		
Zidilovo	29,440		
Krklja	64,711		
Kostur	3,590		
Uzem	97,203	214	5
Total	**424,379**	**1,050**	**25**

Table 3-13 Summary of Expropriation Needs (as of 25th June 2010 carried out by PERI)

The estimation for temporary land take required during construction works for all three sections is 546,878m^2. The calculation of this estimate considers: haulage/access roads, site installations, borrow pits, aggregate crushing facilities, concrete batching plants, landfills and accommodation facilities.

3.9 INVESTMENT DELIVERY PHASES

The Project is to be delivered in two main phases of investment, which are referred to within the ESIA as Stage 1 and Stage 2[17]:

Stage 1: Comprises the rehabilitation of the Kumanovo-Beljakovce section (Section 1) without electrification and with signalling and telecommunication equipment. The envisaged construction period is from 2013 to the end of 2014. The operational period is expected to be from the end of 2014 to 2018, comprising diesel traction, local passenger services, and no freight services.

Stage 2: Comprises the rehabilitation and construction of the Beljakovce-Deve Bair section (Sections 2 and 3) and the electrification of the entire eastern section of Corridor VIII: Kumanovo-Deve Bair (including Section 1). The envisaged construction period is between 2015 and 2018 with the commencement of railway operations by the end of 2018. Electric traction will be delivered during this phase from Kumanovo up to Deve Bair on the Macedonian side of the Bulgarian border.

The chart below *(Figure 3-15)* shows the time frame of delivery phases for different project activities for Sections 1, 2 and 3.

[17] Stage 2 now covers the previous Project preparation Stages 2 and 3.

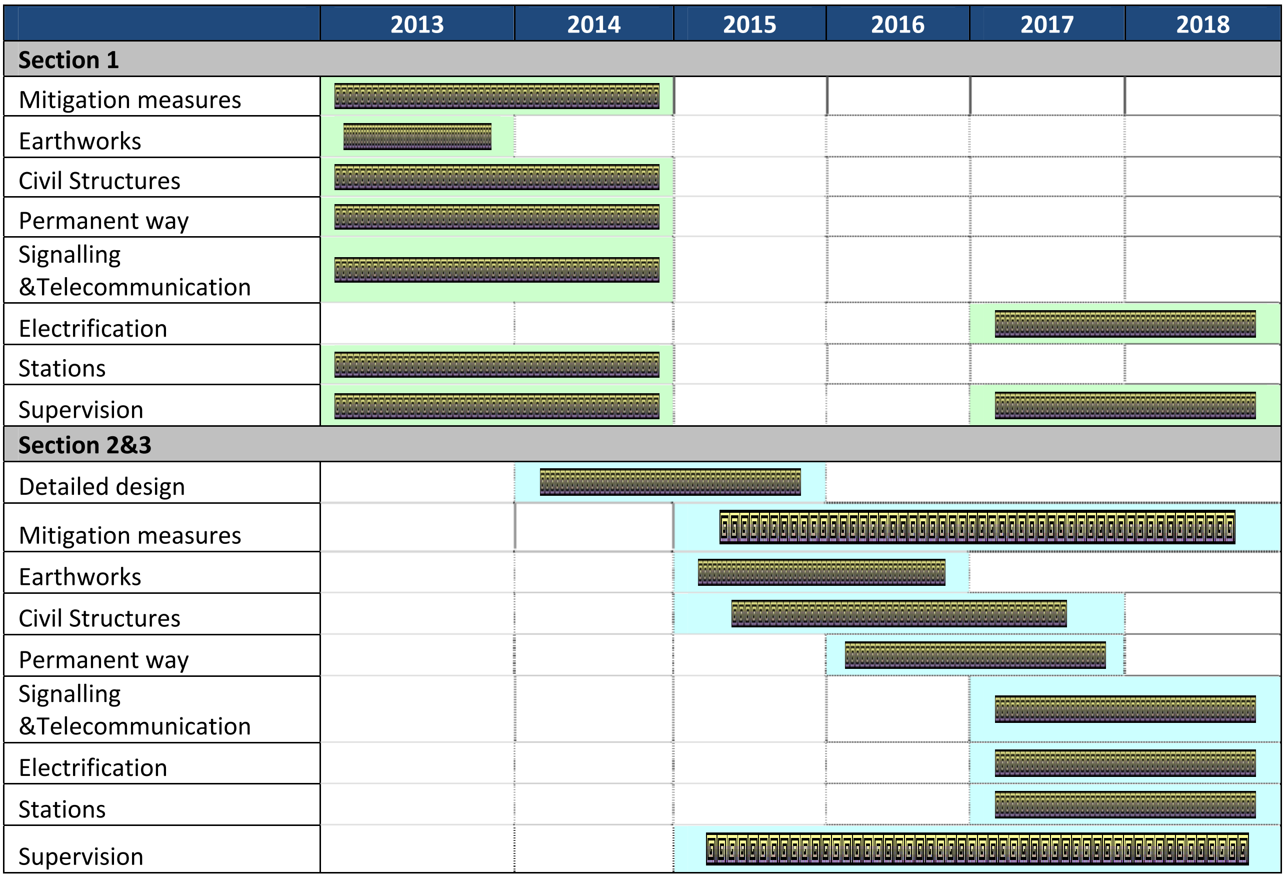


Figure 3-15 Project Delivery Programme

3.10 TECHNICAL DESCRIPTION OF PROPOSED CONSTRUCTION WORKS FOR THE PROJECT

3.10.1 CONSTRUCTION ACTIVITIES & WORKS

Reconstruction works for Section 1, and reconstruction and construction works for Section 2 will be required. For Section 3, since there are no works undertaken previously, full construction will be required.

Construction activities will bring different outdoor machinery and equipment that are required for the construction process. The following activities will be undertaken during the construction phase:

- Clearance of existing land, vegetation and buildings;
- Pre-construction investigations e.g. boreholes, soil testing;
- Construction works (earth works, works on civil structures, superstructure);
- Temporary sites used for construction works or housing of construction workers;
- Above ground buildings, structures or earthworks, including linear structures, cut and fill or excavations;
- Underground works including mining or tunnelling;
- Facilities for storage of goods or materials;
- Facilities for treatment or disposal of solid wastes or liquid effluents;
- Facilities for long term housing of operational workers;

- New road traffic (access roads) during construction or operation;
- Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements;
- Impoundment, realignment or other changes to the hydrology of watercourses or aquifers, rivers, stream crossings when building bridges;
- Cutting of living spaces (habitat fragmentation);
- Transport of personnel or materials for construction, operation or decommissioning;
- Usage of natural resources such as land, water, materials or energy;
- Resettlement of people or demolition of households facilities;
- Production of solid wastes during construction;
- Usage, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment; and
- Works on signalization and telecommunication.

3.10.2 CONSTRUCTION WORKS TO BE UNDERTAKEN PER SECTION

*Table 3-14 Overview of the Construction Works per Section*provides an overview of the construction works that will be required per Section followed by a short description of these works.

Section 1 (Kumanovo – Beljakovce)	Section 2 (Beljakovce – Kriva Palanka)	Section 3 (Kriva Palanka – Bulgarian border)
The first 30,764 km of the line was previously operational. This section requires rehabilitation. The rehabilitation work which is deemed necessary includes the following construction works: • stations: Kumanovo Novo at K.P. 6.8 with 2 sidings; ŠupliKamen at K.P. 17.4 with 2 sidings and one loading track; Beljakovce at K.P. 30.5 with 2 sidings and one loading track; • 6 halts: Lopate at K.P. 2.8; PeroČičo at K.P. 9.1; Proevce at K.P. 12.2; Dobrošane at K.P. 14.0; Klecevce at K.P. 25.8. Dovezance at K.P. 27.863 At K.P.2.3 there is a siding to a pipe mill. The proposed works for Section 1 include: The rails of the upgraded track section needs to be completely renewed, the track will be re-ballasted and realigned; At Šupli Kamen station, the track will be dismantled and renewed;	In this section, around one third of all construction works have been completed. The following reconstruction and construction works are required: • 2 stations: Kratovo at K.P. 47.4 with 3 sidings, freight yard and several loading tracks; Ginovci at K.P.58.1 with 3 sidings, freight yard and several loading tracks; • 3 halts: SopskoRudare at K.P.38.9; Krilatice at K.P.53.4; Psaca at K.P.61.7. The proposed works for Section 2 include: The execution and completion of earthworks and drainage; The construction of 11 bridges; Design check for the requirements UIC-B gauge and construction of 4 tunnels; The design and construction of a long span bridge in front of Vakuf Dam; Completion of 25 bridges; according to the construction stage the works include: Completion of substructure; Completion of superstructure; Finishing of structure with insulation,	In this section no works have been undertaken. The following construction works are required: • 2 stations: KrivaPalanka at K.P. 72.3 with 2 sidings and 3 tracks for maintenance and stabling; Zidilovo at K.P. 81.8 with 2 sidings; • 3 halts: T'liminci at K.P.70.0; Drenja at K.P.76.7; Ouzem at K.P.83.4. The proposed works for Section 3 include: The execution of earthworks and drainage; The construction of 47 bridges; The construction of 22 tunnels; Design and execution of works for the reconstruction of the border tunnel; Execution of 23.5 km main track and 4.3 km station tracks; Installation of 14 turnouts; The construction of a substation west of Kriva Palanka.

Section 1 (Kumanovo – Beljakovce)	Section 2 (Beljakovce – Kriva Palanka)	Section 3 (Kriva Palanka – Bulgarian border)
The existing bottleneck at the northern end of Kumanovo station will be eliminated by connecting the line directly to station; At Pero Čičo settlement where existing buildings are close to the railway track, a safety/anti-noise wall will protect the neighbourhood against the rail traffic; The existing reinforced concrete bridges will be refurbished including the following works: Uncover the construction; Clean the surfaces and remove all lose concrete; Repair cracks and surface; Repair of abutments and bearings; Renew insulation and drainage; Renew transition between earthworks and bridge; Renew parapet and install cable ducts and handrails. The existing road overpasses will be equipped with electric shock protection and earth conductor; A slab track steel bridge at Lopate will be replaced by a bridge with ballasted track; The destroyed railway bridge over the Pcinja River will be replaced by a new construction located upstream of the existing one; The existing 18 level crossings in this section will be substituted by 12 over/underpasses.	parapets, drainage, handrails, etc; Design check for the requirements UIC-B gauge and completion of construction for 10 tunnels, works include: Space proofing for UIC-B gauge; Completion of excavation, anchoring and primary lining; Execution of drainage and tunnel invert; Final lining and finishing; Execution of 33.3 km main track and 7.05 km station tracks; Installation of 28 turnouts; Construction of a substation near Beljakovce.	

Table 3-14 Overview of the Construction Works per Section

Raw & Construction Materials & Sources

Construction and raw materials will be required mainly for following construction activities:

Earthworks	Civil structures	Permanent way	Stations	Signalling and telecommunication
Cut and fill, excavation, embankments, sub-ballast and drainage works, cleaning and reprofiling of existing slopes. Geo-grids and geo-textiles are also required for the earthworks	Set up of viaduct foundations, columns, deck, tunnel excavation, anchoring, lining and finishing, crossings above the motorway, dismantling of old Bridge on River Pcinja in Section 1.	Rail replacing and re-ballasting and dismantling of track, protective layers and frost-layers (sub-ballast) underneath the ballast bed are part of the permanent way (trackwork).	Building the platforms, access roads, passenger buildings, warehouses, parking places and utility service.	Installation of optic fibres, tools, spare parts and telecommunication systems, electrification on station tracks and substation

Table 3-15 Construction Activities

New materials will be required for the construction of the permanent way for the main tracks and station tracks, platform stations, access roads, civil structures, setting the signalization and telecommunication lines and utility services. Soil required for earthworks must meet the requirements of *Soil classification based on grain size (DIN 18196).*

The already excavated soil and rocks will be re-used as construction material.

The ballast will consist of crushed natural stone. The grain (granulometry) size will run from 22.4 mm up to 63 mm and ensures a stability and elasticity of track during passage of trains due to the grain size distribution, grain diameter and sharp edges.

Geo-textile may be applied where the grading curve of two adjacent soil layers do not comply the filter criteria. Geo-grids may be used for rehabilitation of existing line sections with insufficient sub-soil. For new built lines it is suggested to replace the non-compliant soil with appropriate material.

It is assumed that for Sections 2 and 3, 70 % of the excavation is to be made in rock and that 65 % of the excavated soil will be used on the embankments, according to Birkner standards for disposal of earth masses, in accordance with the detailed design.

Concrete required for works on civil structures will generally be made using alkali Portland cement (with less than 0.6% sodium equivalents). Detailed characteristics of concrete to be used will be given in the technical documentation of the main design.

Concrete sleepers will be produced from concrete that is produced with appropriate cement and unpolluted aggregates. For turnouts, either wooden or concrete sleepers may be used. Concrete turnout sleepers are very heavy. Wooden sleepers are easier to handle but require more maintenance. A lot of sleepers are already in stock or installed in one part of Section 1.

There are no design documents for signalling and telecommunications. However, future installations have to be:

- Compatible with the existing installations on line Skopje – Tabanovci (Corridor X);
- Compatible with of planned Bulgarian section of the line; and
- In line with requirements of ERMTS.

More details on materials required for the Project will be defined during the further development of the design.

Borrow Pits & Landfills

Section 1

The previously operational part of railway track on Section 1 needs rehabilitation and reconstruction. There is a need of replacement of the old wooden sleepers near the settlement of Supli Kamen; several bridges reconstruction, overpasses and underpasses will need to be reconstructed and constructed; fence and cuts and embankments will need to be constructed along the track from K.P. 0.000 to K.P. 30.502. Some parts of the track need to be just reconstructed, some need to be completely rebuilt and some need demolition. There is no excavation work needed for Section 1 and no excavated surplus is expected to be transported, re-used or disposed of in the inert landfill. The mixed construction waste that will be generated will be re-used.

In section 1, one (1) municipal landfill, that of Kumanovo Municipality is found.

In the municipality of Kumanovo, the Public utility enterprise “Cistota I zelenilo” provides the service of collection, transportation and final disposal of waste to the municipal landfill, using 20 vehicles for this purpose. With these vehicles they manage to lift up to 26071 t/year of municipal solid waste.

The municipal landfill is located at the site known as "Krasta", which is 7 km away from the city of Kumanovo, near the village of Pcinja. It covers an area of11.686 ha and has a capacity of 1.832.000 m^3, of which only 1.168.000 $m^3$are used. It has been categorized as having a medium environmental risk.

There are also illegal dumpsites in other districts, namely those in Proevce and Dobroshane.

There is no an organized system for primary selection of the recyclable waste. The unemployed persons, mainly Roma population, collect the recyclable PET bottles and paper and sell this material to the waste management companies or companies dedicated to recycling.

Section 2

During construction works on Section 2, already excavated soil and rocks will be re-used as a construction material. In Section 2 there is a balance of the excavated and re-used soil and rocks as a construction material and no exceeding quantity of excavated soil or rock is expected. In Section 2 there is no need for disposal of any surplus inert material (waste). All excavated soil and rocks (inert waste) in Section 2 will be re-used.

In Section 2, two (2) municipal landfills have been located: Rankovce and Kratovo

Rankovce Municipality

In the territory of the Municipality of Rankovce, the community service is provided by the Public utility enterprise “Chist Den”, which collects 616t/year of community waste. The Rankovce municipal landfill is located 3 km West of Rankovce, near the village of Vetunica. At the landfill the amounts of waste disposed of are not recorded, but according to estimates from the Public utility enterprise, the total quantity of waste deposited is estimated in 500 m^3.

The municipal landfill in Rankovce was not included in the list of ranked municipal landfills shown in following figure.

Illegal dumpsites in Rankovce Municipality have been identified at the following locations: PotrchinDol, in Petralica, JabuchinDol in Ginovci, and Rankovackariver.

Kratovo Municipality

In the municipality of Kratovo, waste management is provided by the Private utility enterprise ”Silkom”, which owns two vehicles and manages to lift up 1365 t/year of solid waste The location of the landfill in the Kratovo municipality area is "MeckinDol", near the railway alignment, 3 km West of Kratovo. The landfill covers an area of 45,000 m^2 and it is estimated that the total quantity of waste deposited is 52 000 m^3. It has been categorized as having a medium environmental risk.

Section 3

In this section, already excavated soil and rocks will be re-used as a construction material. There is going to be waste generated from the demolition of houses/buildings/objects. In Section 3 there will be a surplus of soil and rocks that will need to be disposed of in inert landfills. The total quantity of around 1,300,000 m^3 of inert waste (soil/rock) is estimated which will need to be finally disposed of in inert landfills specially designed for this purpose. There will be no need for borrow pits in this section.

It is estimated that for Section 2 and Section 3, 70 % of the excavation is to be made in rock and that 65% of the excavation soil will be used on embankment.

In section 3, one (1) municipal landfill, that of Kriva Palanka Municipality, is located.

The Public utility enterprise “Komunalec”, located in Kriva Palanka, manages the solid municipal waste in this municipality, collecting 4265 t/year of waste. The landfill is located in Konopica village, near the regional road to Bulgaria M2, nearby the river Kriva Reka. It accepts, on an annual basis, around 85 000 $m^3$of solid waste, or 3000 tons in weight. It has been categorized as having a high environmental risk.

With regards to the fate of inert or construction waste generated during construction, processing or craft activities, it usually ends up disposed of at the very same generating point or in public spaces, and in the best case in the municipal landfill in the absence of a landfill for construction debris in the North eastern region.

The locations of the municipal landfills and illegal dumps are shown in following figure, where their distance to the railway alignment can also be observed. For any new landfills which will be established for the Project that have not be fully assessed additional ESIAs and/or consents will be prepared when details are available, if required.

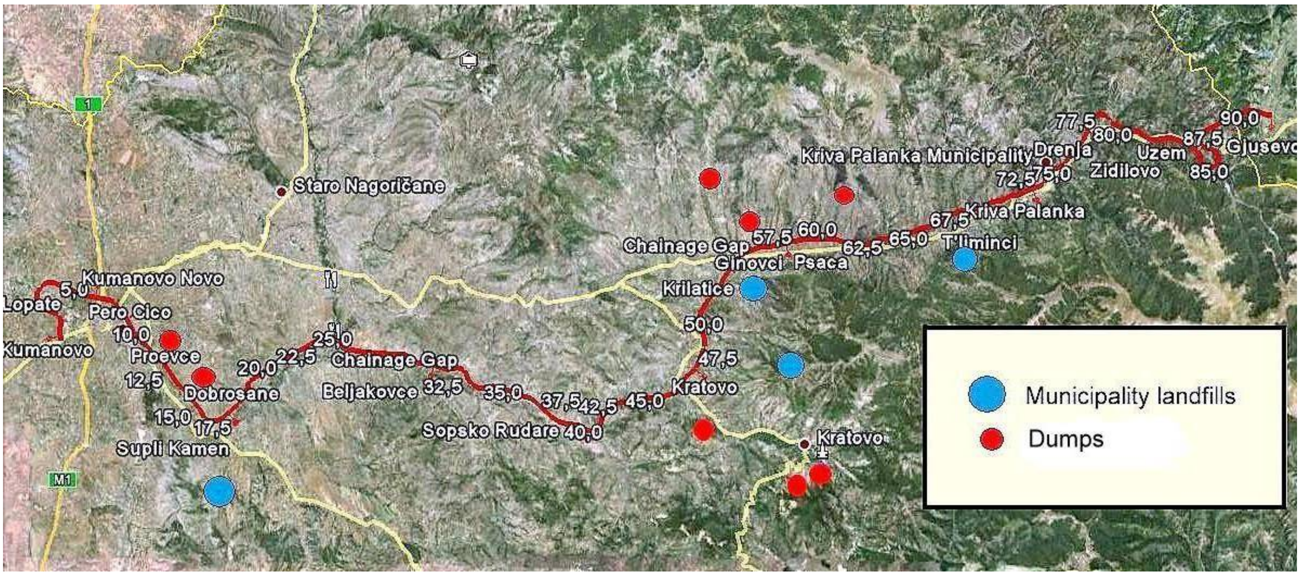


Figure 3-16 Municipal Landfills and Illegal Dumps along the Railway Corridor in the North - East Region

Management of construction waste during the 1994-2004 railway construction period

In the period 1994-2004, during the previous railway construction works, the inert waste generated was collected and taken to inert waste sites that were identified together with the municipalities. The following data were obtained by the relevant persons from the PERI who were directly involved in the project activities in that period.

There is no knowledge of any potentially contaminated materials locations along the railway alignment.

A brief description of these inert waste disposal sites as well as of the borrow pits that were used during that period is provided for each section of the railway alignment.

Section 1

In section 1 there is 1 borrow pit, which is shown in *Figure 3-17* and its characteristics described in **Error! Reference source not found.**table below.

	Existing	Section	km	Status
1	Borrowing pit (Supli Kamen)	1	**16**	Soil or embankments

Table 3-16 Borrow Pit in Section 1 of the Railway Alignment

Section 2

In section 2 there are 8 landfills and 1 borrow pit, which are shown in *Figure 3-18* and their characteristics described in the following table.

Some of them are not completely filled and therefore they still have capacity to receive the construction waste that will be generated during the new construction works of sections 1, 2 or 3 of the railway.

	Existing	Section	km	Status
2	Landfill	2	**44**	Humus landfill for an excess of material
3	Small landfill (at the exit of tunnel 5a)	2	**45**	Humus landfill that will be used for disposing of construction material
4	Landfill - Groove (Ketenovo)	2	**46**	Landfill covered in humus
5	Small landfill	2	**46.700**	Landfill of humus, part made of platform with dug out sediments, no excess of material until 48 km

	Existing	Section	km	Status
6	Landfill	2	**49**	Landfill located after the forest and is levelled with humus.
7	Landfill between twotunnels(6 и 6a)	2	**50**	Humus landfill, the material of the tunnel is disposed beside the river, rocks for the embankment will be brought from 6a (50 – 70 000m^3)
8	Landfill (after tunnel 6a)	2	**51**	Landfill of humus
9	Borrowing pit	2	**53**	For construction material - sand and gravel
10	The biggest landfill	2	**65**	Has not been worked on the surface, there is room for disposal, and if it is not used it will be forested.

Table 3-17 Landfill and Borrow Pits in Section 2 of the Railway Alignment

Section 3

In section 3 there are 2 landfills, which are shown in *Figure 3-19* and their characteristics described in the following table.

Existing	Section	km	Status
Landfills at the tunnel (4 – 4a)	3	**67**	Renewal of the excess on the slopes, there are trees on the landfills
Landfill (on the lower side, before bridge 7)	3	**69**	no data obtained on the status of the landfill

Table 3-18 Landfill in Section 3 of the railway alignment

Because the construction works carried out in the 199-2004 period stopped without a management plan for the next activities and implementation of mitigation measures to protect the environment, currently there are a few dumps along the alignment and near the river Kriva Reka, where the inert waste has been simply thrown away.

Figure below illustrates one of the few dumps that exist along the railway route. It is the result of construction activities of the railway in the 1994-2004 period.

The proposed project will not include the rehabilitation/rectifying issues related to these dumps from the previous construction of the railway.

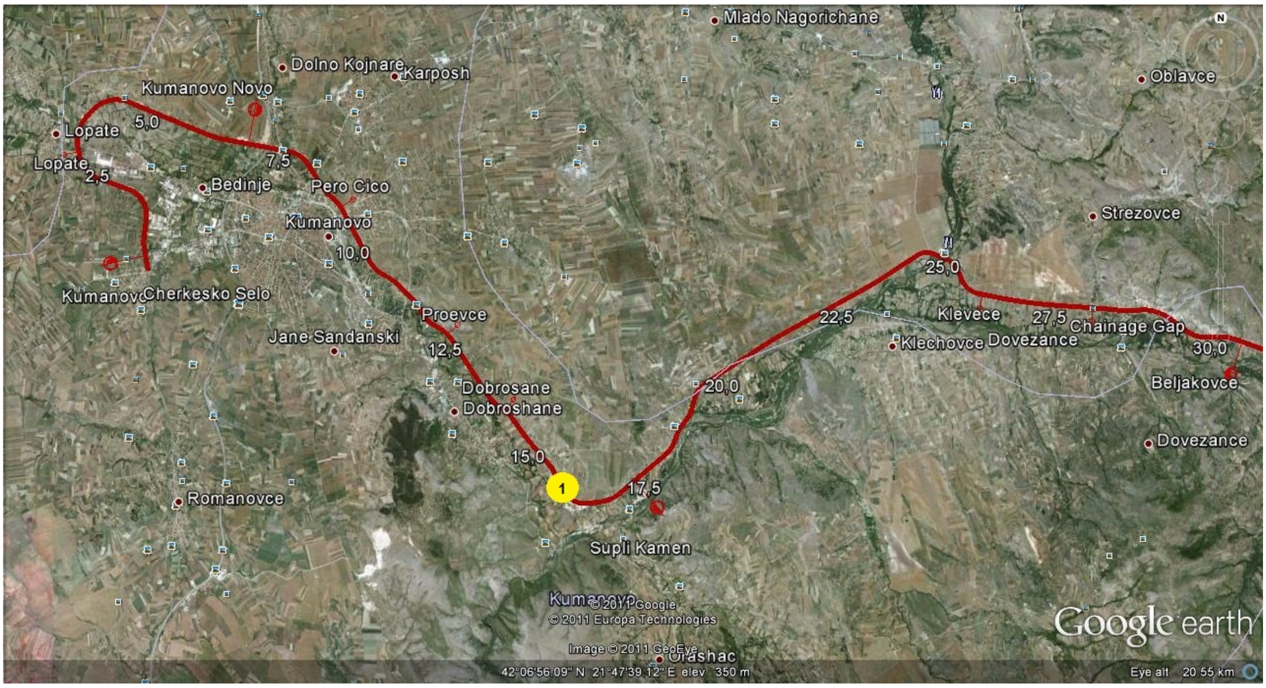


Figure 3-17 Existing Landfills in Section 1

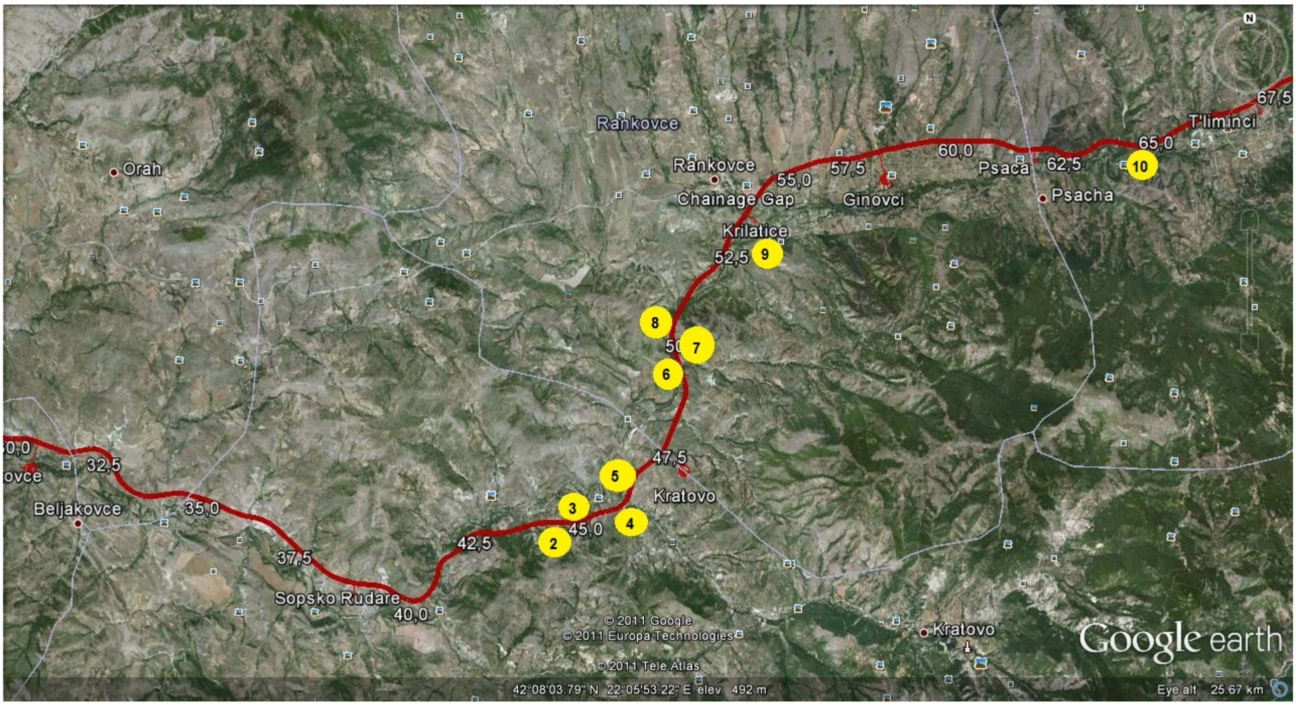


Figure 3-18 Existing Landfills in Section 2

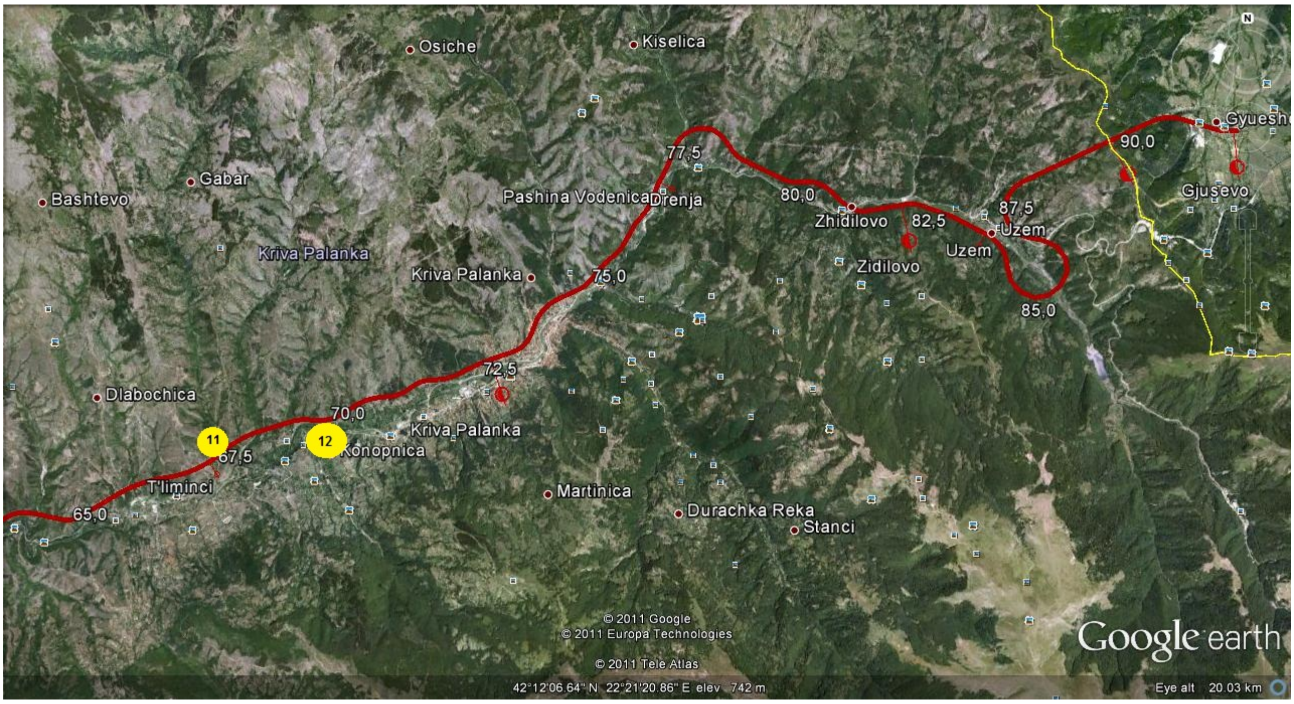


Figure 3-19 Existing Landfills in Section 3

Concrete Batching Plants

Concrete batching plants produce ready mixed concrete. This is made to a set recipe, and then would be delivered to the workplace/worksite. Transit mixers are used for transportation. The Contractor/s wil decide whether to use stationary or mobile concrete batching plants. From an environmental point of view, stationary plants are more favourable. During the construction period 1994-2004 (K.P. 30 to K.P.65), two concrete-aggregate plants were used per each ten kilometres. Some of these site installations were stationary and they are still on site and can be reactivated if necessary. Maps showing the locations of Concrete Batching Plants in each section are presented in *Figure 3-20, Figure 3-21* and *Figure 3-22.*

Locations previously used could be considered for this Project. During further stages of the Project the exact locations of concrete batching plants will be defined and necessary consents sought. Concrete batching plants will be located in areas where they will not pose a hazard to the environment or the wellbeing of the local communities. Batching plants will be sited on land that is not prone to flood. Current and future proximity of sensitive land uses will also be considered.

The estimation of the temporary land take for the needs of concrete batching plants is 6,000 m^2 for Section 2 and 6,000 m^2 for Section 3. In total 12 concrete plants (maximum 1,000 m^2 land take for each plant) will be required it is currently estimated. Due to the vicinity of the city of Kumanovo, there is no need for additional concrete batching plants in Section 1.

Aggregate Crushing Facilities

Sand, gravel, and crushed stone are the main types of natural aggregate and they are essential resources for use in construction. Along with Portland cement and water, they are an essential ingredient in concrete making.

There are no existing aggregate crushing facilities in the railway corridor. The closest aggregate crushing facilities are located in Banjani Skopje, Zebrenjak Kumanovo, Markovi Susi Skopje and Katlanovo Skopje. The area’s geology, land ownership, land use, and transportation infrastructure are factors that affect aggregate supply. Although potential sources of sand, gravel, and crushed stone are widespread and large, land-use choices, economic considerations, and environmental concerns may limit their availability. Contractor/s will decide from which aggregate crushing facilities they will obtain aggregates.

Operations associated with aggregate extraction and processing are the principal causes of environmental concerns about sand, gravel, and crushed stone production, including increased dust, noise and vibrations, increased truck traffic near aggregate operations, visually and physically disturbed landscapes and habitats or affected surface or groundwater. However, effects such as dust, noise, and vibrations are typical of nearly any construction project. These impacts commonly can be controlled, mitigated, or kept at tolerable levels and restricted to the immediate vicinity of an aggregate operation by using available technology.

Haulage Routes

The establishment of haulage routes will be required along the railway line. The required width of the haulage road will be 3.5 m with locations for passing. For Section 1 and Section 2 the previously established haulage roads could be reused. For Section 3 new haulage roads will need to be established.

In Section 1 a haulage road is only needed for the reconstruction site of the Pcinja River Bridge. The estimated temporary land take for this section is 13,000 m^2. For the other two sections, haulage roads are need for accessing the construction sites of bridges. At long tunnels the access to the portals must also be considered. The estimated temporary land take for haulage roads for Section 2 is 21,500 m^2 and for Section 3 15,200 m^2.

Measures to reduce the impact of haulage roads on local residents, local business and traffic will be addressed in the CTMP (Construction Haulage Management Plan) to be developed during the further stages of the Project.

The construction of access and haul roads necessary for the proper execution of the work under the contract will be at the Contractor’s expense. A construction with suitable grades and widths is expected; sharp curves, blind corners, and dangerous cross traffic will be avoided. The necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic will be provided. The method of dust control, although optional, will be to be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and haulage roads will be subject to approval by the Contracting

Officer. Lighting will need to be adequate to ensure full and clear visibility for the full width of haulage road and work areas during any night work operations.

Labour & Workforce Numbers, Facilities & Accommodation

Labour & Workforce Numbers

During the previous construction period between 1994-2004 the workforce was around 1,200-1,300 personnel for the two sections, Section 1 and 2. The same estimate of workforce is anticipated ed for the construction works to be carried out in the three sections of this railway Project, taking into account that the modernization of construction machinery should contribute to a decrease in the need of workforce.

Employment on the site will vary depending on the stage of construction and programme of works scheduled by the Contractor/s. For Section 1 it can be estimated that around 300 workforce will be recruited, for Section 2 400 and for Section 3 around 500.

Facilities & Accomodation

It is expected that the Contractor's approach will be to recruit a significant size of the workforce locally through subcontractors. Small camps may be required for temporary accommodation of specialist workers. The location of these camps will be on sites out of the city. This will be done in order to prevent potential adverse impacts on the local community.

During the previous period of the construction of the railway (1994-2004), 4 camps for workers were established. In 2004 when construction works stopped, two companies (Mavrovo and Beton) withdrew their camps. Another company, Palagonia, due to the company situation, abandoned their camp with a capacity for 300 workers; the camp is still the property of this company and could potentially be reutilized after prior refurbishment in accordance with EBRD requirements.

The condition of another camp created by the company Granit is good enough to allow the reactivation of this camp potentially. This camp is located at the beginning of the road to Kratovo (1 km from the intersection Kumanovo-Kriva Palanka towards Kratovo). The camp has a capacity of 250 workers, 10 sheds (barracks), electricity, hot water, restaurant (cantina), and health service. Within the camp, there are sheds for miners (for the workers that worked in the tunnels previously). This camp could be activated by the same company that owns it or could be also rented to another company. Any new camps will not be constructed in protected/sensitive areas and any auxiliary facilities as far as possible would not be located in areas containing sensitive habitats/vegetation. Any such facilities to be located within sensitive area would need to be fully justified. In the vicinity of sensitive habitats construction sites will be clearly delineated so as to avoid damage in non-working areas.

Besides these camps, along the alignment, there are some other small camps used during construction period 1994-2004, which are property of construction companies. The possibility of reutilizing these camps for this Project could also be considered.

Figure 3-20, Figure 3-21 and *Figure 3-22Figure* 3-22 Location of Previous Workers Camp and Concrete Batching Plant in Section 3below show maps for each section with the locations of the previous worker camps marked.

All facilities for accommodation of workers will be designed and operated in accordance with the provisions of the IFC & EBRD Workers Accommodation Guidance[18]. This guidance document provides guidance and benchmarking standards over the range of topics related to the provision and management of worker's accommodation, covering following topics:

[18] http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/$FILE/workers_accomodation.pdf

- General living facilities (including topics such as drainage, heating, ventilation, lighting, water, sanitation, waste disposal);
- Room/dormitory facilities (including bed arrangements and storage facilities);
- Sanitary and showering facilities;
- Canteen, cooking and laundry facilities;
- Food safety and nutritional standards;
- Medical facilities, doctors;
- Leisure, social and telecommunication facilities;
- Management of the accommodation;
- Community relations and consultation;
- Fees and charges for the facilities and services;
- Health and Safety on site;
- Accommodation and local community security;
- Workers' rights, rules and regulations; and
- Workers' consultation and grievance mechanism.

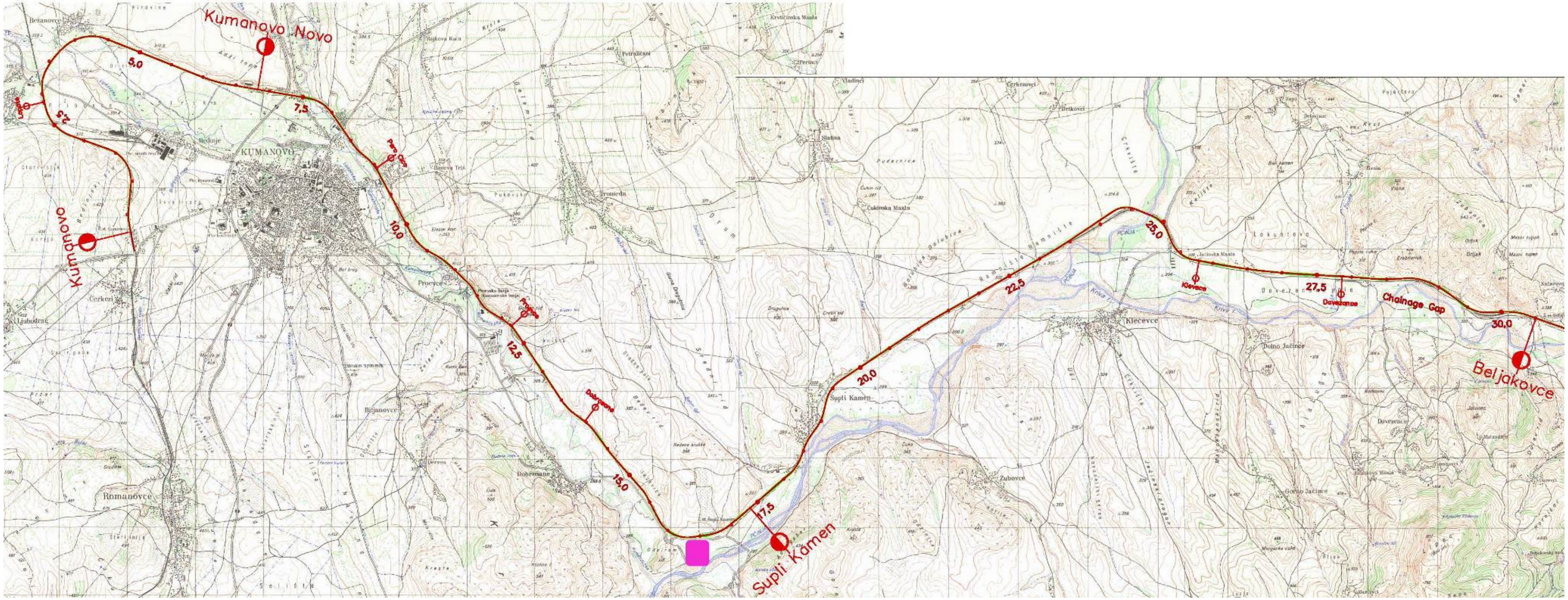


Figure 3-20 Location of Previous Concrete Batching Plant in Section 1

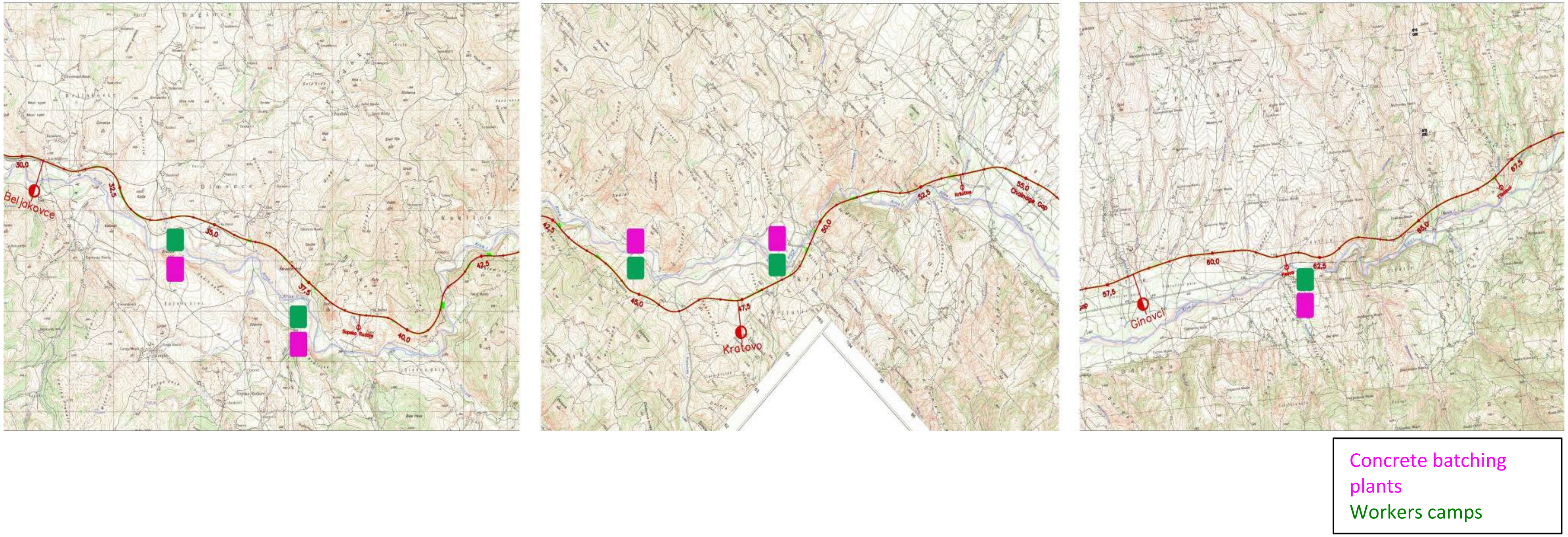
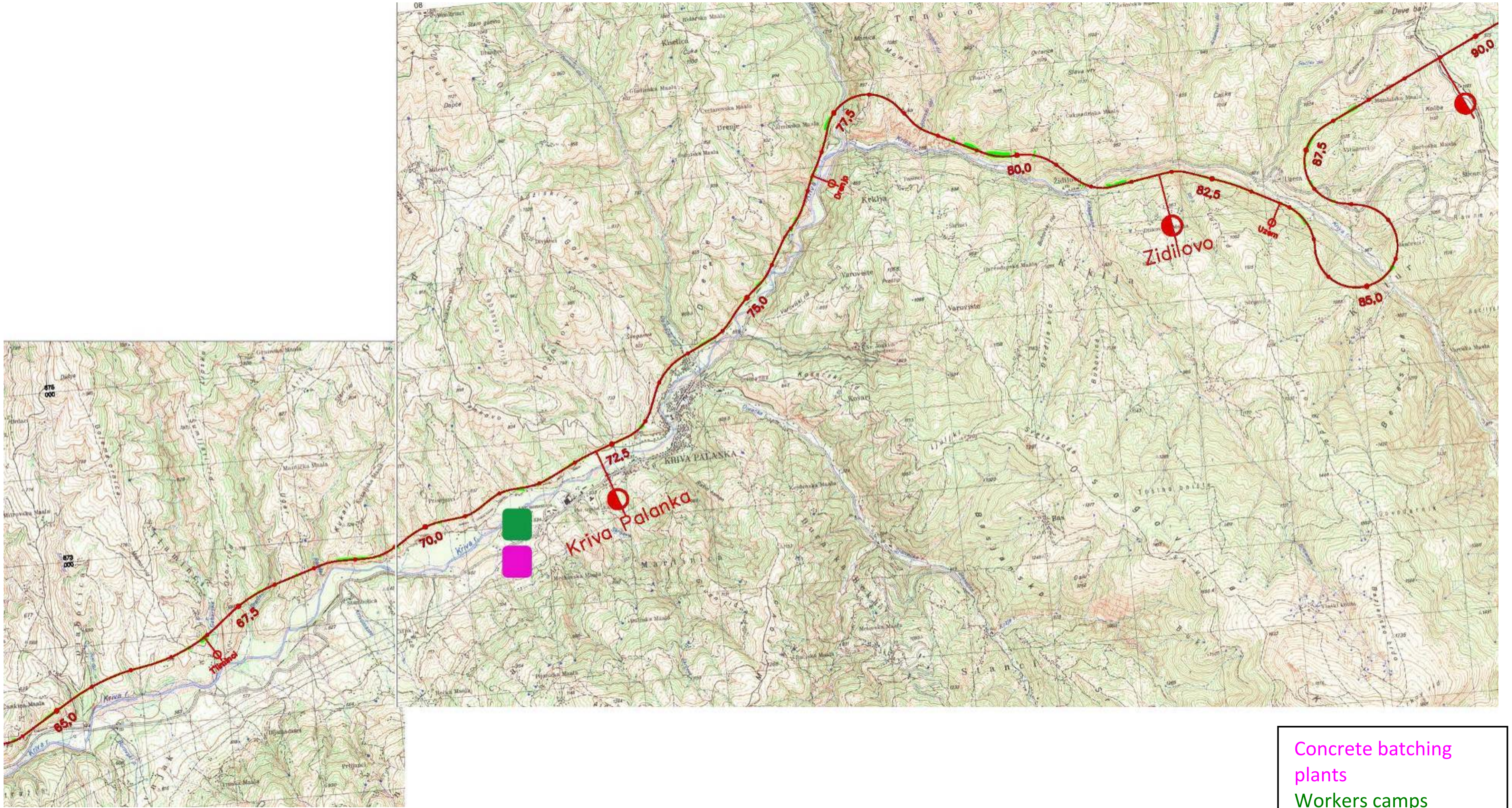


Figure 3-21 Location of Previous Workers Camps and Concrete Batching Plants in Section 2



Concrete batching plants
Workers camps

Figure 3-22 Location of Previous Workers Camp and Concrete Batching Plant in Section 3

Prior to building any workers' accommodation, a comprehensive assessment of the local housing market is to be conducted by PERI in cooperation with the municipalities for identifying the different types of housing available in the surrounding communities.

The key principles of note regarding the provision of worker's construction compounds which will be considered in the development of accommodation for the Project are summarized below:

- Workers' must enjoy their fundamental human rights and freedom of association in particular, workers' accommodation arrangements should not restrict workers' rights and freedoms.
- Housing standards must include special attention to minimum space allocated per person, supply of safe water in the workers' dwelling in such quantities, adequate sewage and garbage disposal systems and appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects.
- For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems must be provided. Both natural and artificial lighting must be provided and maintained in living facilities.
- A separate bed for each worker must be provided. The practice of "hot bedding" should be avoided. The minimum space between beds should be 1 metre. Double deck bunks are not advisable for fire safety.
- Canteen, cooking and laundry facilities must be built in adequate and easy to clean materials. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition. If workers wish to cook their own meals, kitchen space will be provided separate from sleeping areas.
- There must be management plans and policies especially in the areas of overall operation of the facility, health and safety (with emergency responses), local community and security.
- A security plan including clear measures to protect workers against theft and attack is implemented. Security staff must be checked tonsure that they have not been implicated in any previous crimes or abuses.
- Processes and grievance mechanisms for workers' to articulate their grievances must be provided and clearly explained to workers. Such mechanisms must be in accordance with PR2.
- Community representatives must be provided with an easy means to voice their opinions and to lodge complaints to the management. There must be a transparent and efficient process for dealing with community grievances.

Construction Laydown Areas & Contractor Facilities

Trackwork

For the construction of the track temporary stock yards will be required for ballast, sleepers and rails. Generally, these yards will be established inside the limits of existing or planned stations. For Section 1 it is proposed to use the stations of Kumanovo and Supli Kamen; and for Section 2 the stations of Beljakovce, Kratovo and Ginovci. For Section 3 the stations of Ginovci and Zidilovo may be used. Due to topographical and urban constraints, it is not recommended to use the Kriva Palanka station. West of Kriva Palanka, a stock yard may be established on an area of temporary land take of 15,000 m^2.

Structures

The temporary land take needed for the site facilities for bridges and tunnels depends on local site conditions, construction method and the Contractor. Space will be needed for the following elements:

- Site offices, staff rooms, workshops, storage, etc.
- Concrete batching plant (750 – 1,000 m^2);
- Installation site with crane for beams etc. (> 1,200 m^2); and
- Circulation area, stabling and parking.

Depending on the importance of the structures, the area required is estimated for a bridge to be between 6,500 to 15,000 m^2 and for a tunnel 10,000 to 35,000 m^2. Small structures, such as culverts and retaining walls, may use the site facilities/installations of adjacent structures.

Contractor Facilities

Usually, contractor facilities are located near the accommodation for workers. During the construction works in 1994-2004 of Sections 1 and 2, the office facilities were located with the camps.

Construction project trailers as storage or office space, with or without utilities, could be located outside the worker camps.

Prior to the start of construction works, the Contractor shall submit a site plan showing the locations and dimensions of temporary facilities, including layouts and details, equipment and material storage areas (onsite and offsite), and access and haul roads, avenues of ingress/egress to the fenced area and details of the fence installation, locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker's parking areas.

The minimum working conditions and systems that will need to be provided within the Contractor facilities are listed below:

- Safe premises - surfaces, structures and installations should be easy to clean and maintain, and not allow for the accumulation of hazardous compounds. Buildings should be structurally safe, provide appropriate protection against the climate, and have acceptable light and noise conditions;
- Safe machinery and materials;
- Safe systems of work;
- Information, instruction, training and supervision;
- A suitable working environment and facilities (that means the workplace should be equipped with lavatories and showers, potable water supply, clean eating area);
- Access to first aid;
- The frequency of monitoring shall increase in case of receipt of a complaint from the workers on inadequate workplace conditions through operation of the grievance mechanisms for workers;
- The workplace should be designed to prevent the start of fires through the implementation of fire codes applicable to industrial settings. Other essential measures in terms of fire precautions include:
- Equipping facilities with fire detectors, alarm systems, and fire fighting equipment. The equipment should be maintained in good working order and be readily accessible. It should be adequate for the dimensions and use of the premises, equipment installed, physical and chemical properties of substances present, and the maximum number of people present;
- Provision of manual fire fighting equipment that is easily accessible and simple to use; and
- The frequency of monitoring shall increase in case of receipt of a complaint concerning worker accidents.

3.10.3 CONSTRUCTION OF RAILWAY ELEMENTS

Earthworks

Earthworks consist of cut and fills, embankments and rock slopes. Drainage, prepared sub-soil, geo-grids and geo-textiles also form part of the earthworks. Protective layers and frost-layers (sub-ballast) underneath the ballast bed are part of the permanent way (trackwork).

The dimensions and slope inclination for the preliminary design for the Project refers to the standard cross-section of the Macedonian Railways. The standard layout of the earthworks in fill and cut are shown below in *Figure 3-23* for embankments and *Figure 3-24* for rock cuts. The dimensions are based on the standards and experience of the Macedonian Railways.

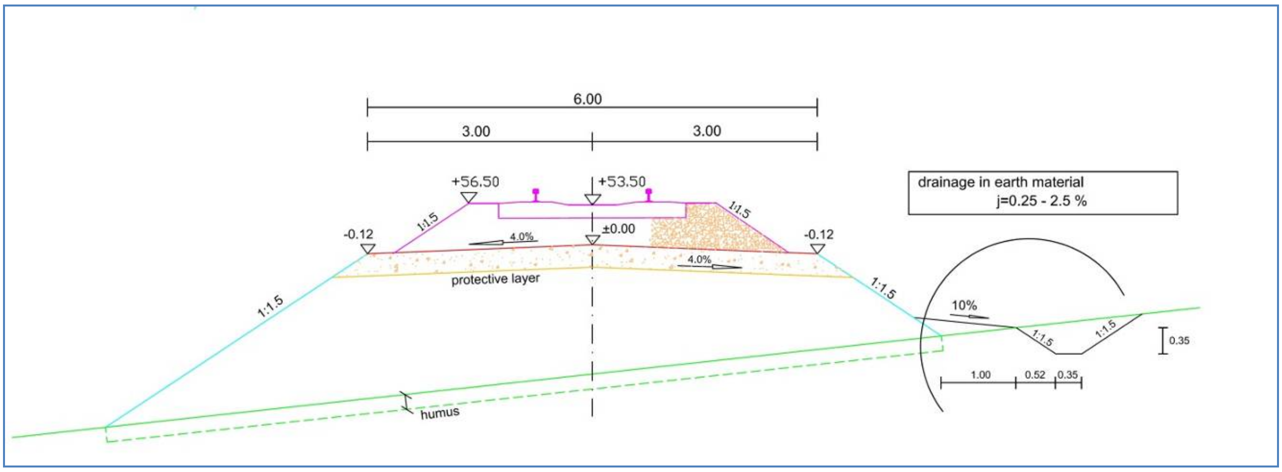


Figure 3-23 Cross Section of Embankment (cohesive soil)

The slope of the sub-ballast should be one sided (analogous to the sub-ballast profile in cut) with regard to the mechanical ballast cleaning.

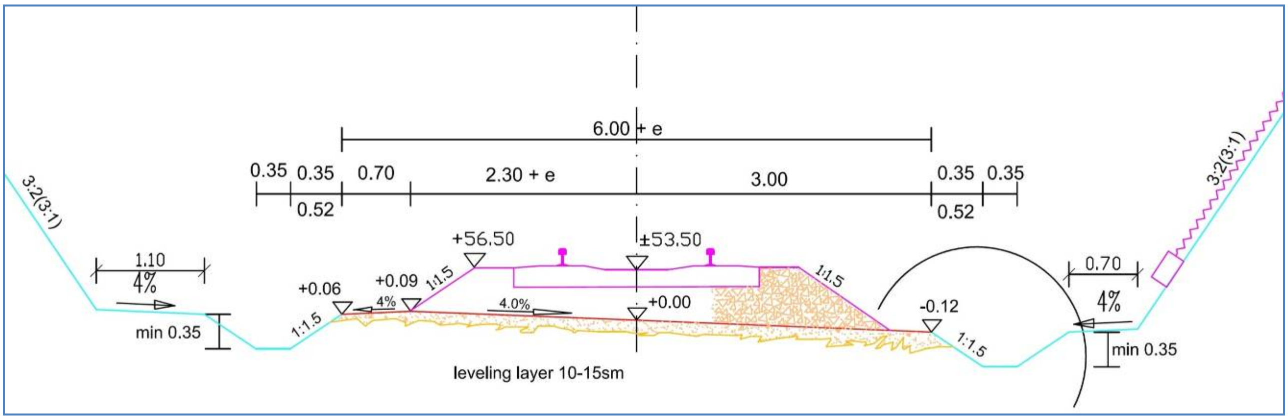


Figure 3-24 Cross Section in Cut (in rock mass)

However, in order to provide a walkway at both sides as required under European standards (i.e. see below *Figure 3-25* showing standard of Deutsche Bahn, Germany)., the width of the railway would be enlarged to 6.60 m

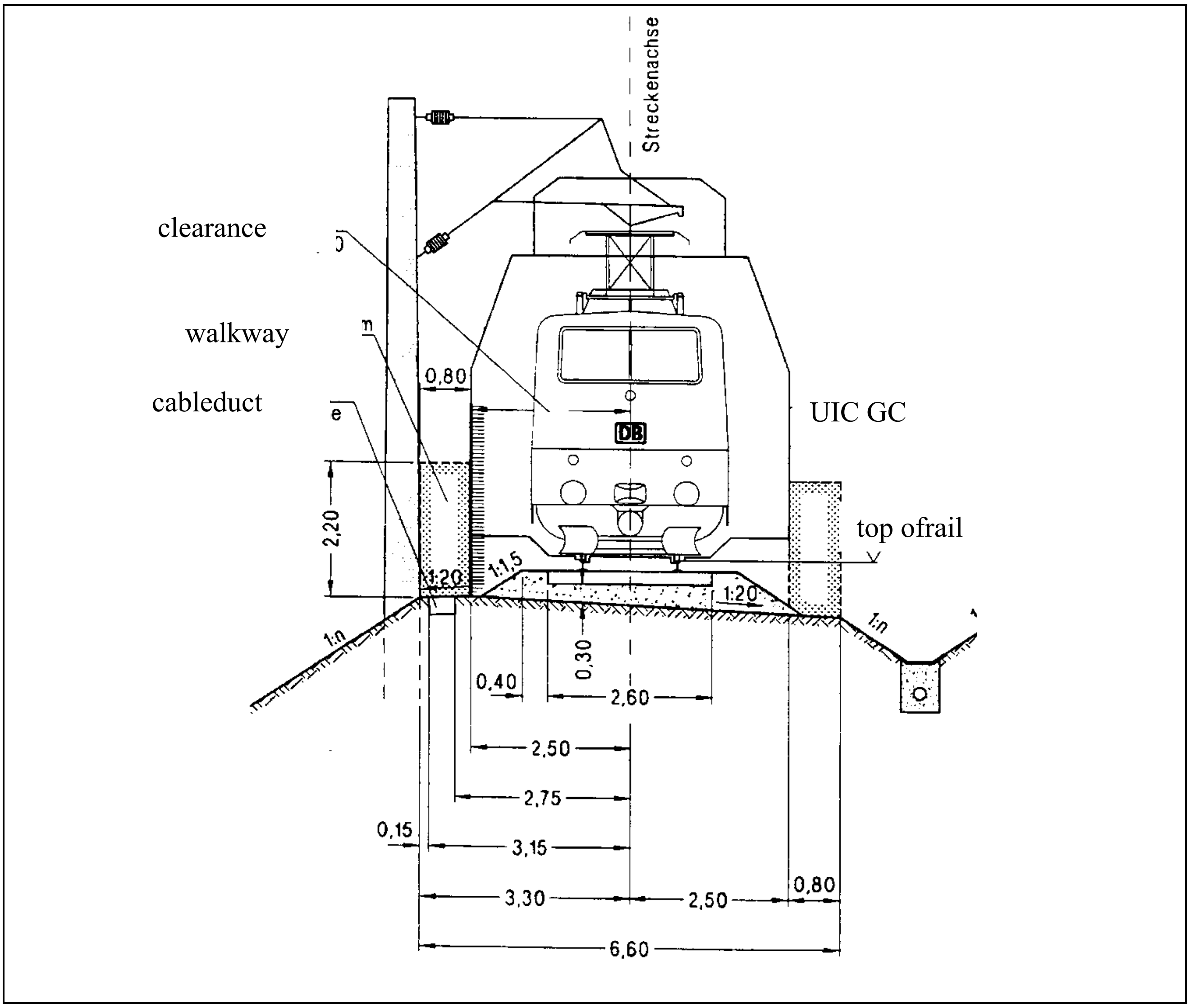


Figure 3-25 Example of Cross Section used in Germany (Deutsche Bahn)

In order to provide the required bearing capacity and stability, these standard design parameters will be checked and adjusted according to the results of the geotechnical investigations in the next design phase.

The embankment and backfill of abutments will be constructed from appropriate materials. Cohesive and non-cohesive materials will not be mixed. For proper drain off, the layers will have an inclination of 2.5 % to the outside. The sub-soil surface of cut shall also be inclined to the outside. Cavities will have to be filled with asphalt or other appropriate material where necessary.

In the following sketches *(Figure 3-26, Figure 3-27* and *Figure 3-28)* the requirements for the construction of earthworks as recommended by Ril836 (DB Guideline) are shown, which will be followed as appropriate for the Project. These figures should be read in conjunction with *Table 3-19* Soil Classification Based on Grain Size (acc. DIN 18196).

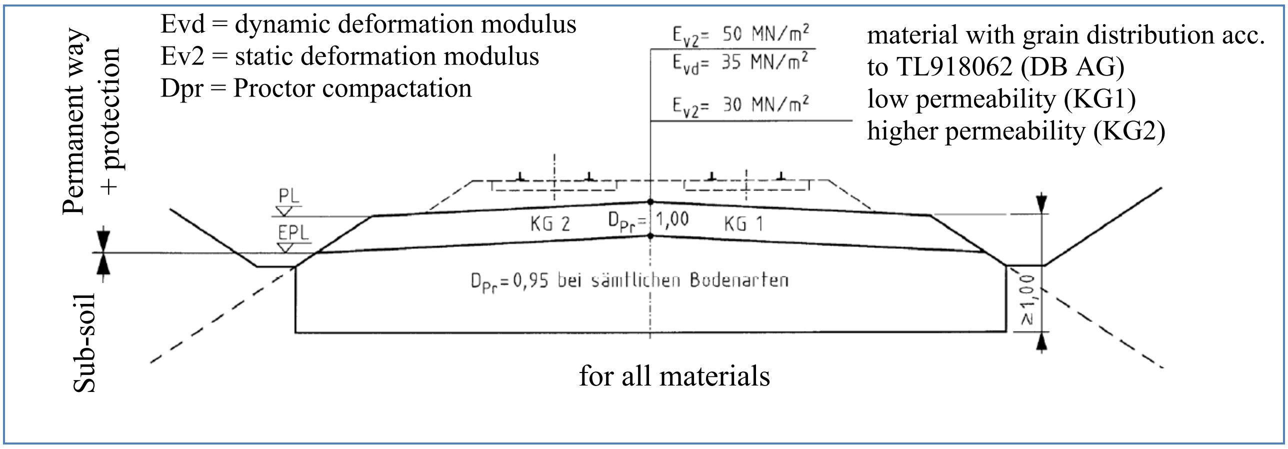


Figure 3-26 Standard Construction of Sub-Structure for Rehabilitation of Existing Lines (Cut and Fill, Line Category R120)

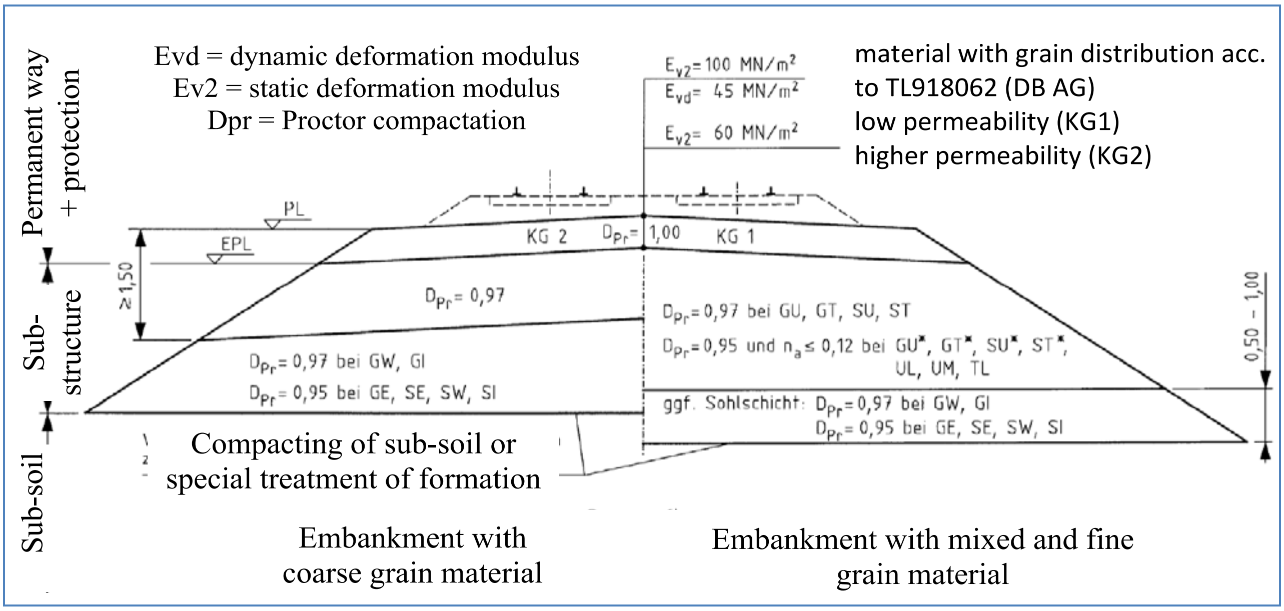


Figure 3-27 Standard Construction of Sub-Structure for new Lines (Fill, Line Category R120)

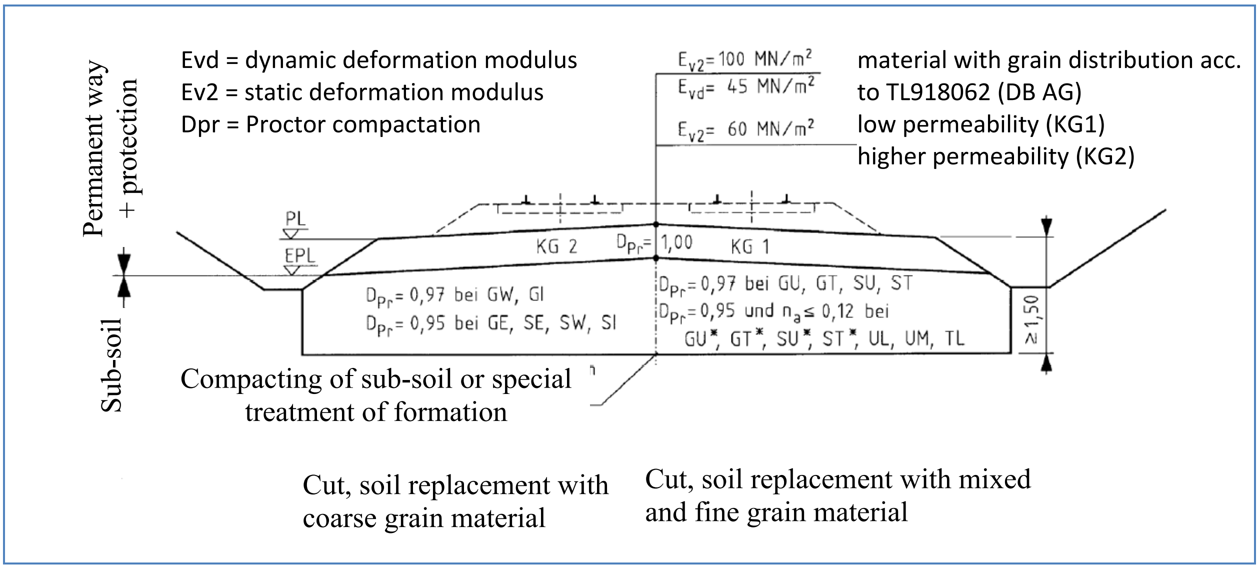


Figure 3-28 Standard Construction of Sub-Structure for New Lines (Cut, Line Category R120)

Soil group	Grain percentage ≤ 0.06 mm	Grain percentage > 2.0 mm	Soil	Sub-division	Symbol
coarse grain soil	≤ 5	> 40	gravel		GE
coarse grain soil	≤ 5	> 40	gravel		GW
coarse grain soil	≤ 5	> 40	gravel		GI
coarse grain soil	≤ 5	≤ 40	sand		SE
coarse grain soil	≤ 5	≤ 40	sand		SW
coarse grain soil	≤ 5	≤ 40	sand		SI
mixed grain soil	5 to 40	> 40	gravel-silt	5 to 15 % ≤ 0,06 mm	GU
mixed grain soil	5 to 40	> 40	gravel-silt	15 to 40 % ≤ 0,06 mm	GŪ*
mixed grain soil	5 to 40	> 40	gravel-clay	5 to 15 % ≤ 0,06 mm	GT
mixed grain soil	5 to 40	> 40	gravel-clay	15 to 40 % ≤ 0,06 mm	GŤ*
mixed grain soil	5 to 40	≤ 40	sand-silt	5 to 15 % ≤ 0,06 mm	SU
mixed grain soil	5 to 40	≤ 40	sand-silt	15 to 40 % ≤ 0,06 mm	SŪ*
mixed grain soil	5 to 40	≤ 40	sand-clay	5 to 15 % ≤ 0,06 mm	ST
mixed grain soil	5 to 40	≤ 40	sand-clay	15 to 40 % ≤ 0,06 mm	SŤ*
fine grained soil	> 40	–	silt	Low compressibility WL<35	UL
fine grained soil	> 40	–	silt	Medium compressibility (WL 35 to 50)	UM
fine grained soil	> 40	–	clay	Low compressibility WL<35	TL
fine grained soil	> 40	–	clay	Medium compressibility (WL 35 to 50)	TM
fine grained soil	> 40	–	clay	High compressibility (WL>50)	TA

Table 3-19 Soil Classification Based on Grain Size (acc. DIN 18196)

Standard values for slopes, as used by the Consultant during the design, are indicated in the following table.

Fill			Cut		
Soil	Height	Inclination	Soil	Height	Inclination
GW, GI	0 m – 12 m	1:1.5	GW, GI	0 m – 12 m	1:1.5
GE, SW, SI	0 m – 12 m	1:1.7	GE, SW, SI	0 m – 12 m	1:1.7
SE	0 m – 12 m	1:2.0	SE	0 m – 12 m	1:2.0
GU, GU*			GU, GU*		
GT, GT*	0 m – 6 m	1:1.6	GT, GT*	0 m – 6 m	1:1.6
SU, SU*	6 m – 9 m	1:1.8	SU, SU*	6 m – 9 m	1:1.8
ST, ST*	9 m – 12 m	1:2.0	ST, ST*	9 m – 12 m	1:2.0
			UL		
			TL		

Table 3-20 Inclination of Slope – Guidance Value to be Verified by Geotechnical Analyses

The inclination of rock slopes has to be defined by geotechnical investigations and according to the:

- Rock structure (fabric);
- Resistance against weathering;
- Existence of mountain water;
- Stability;
- Slope protection.

Berms or benches will be used for stability and maintenance at heights of more than 12 m. A catchment zone for lose and fallen rocks will be provided at the base of the slope.

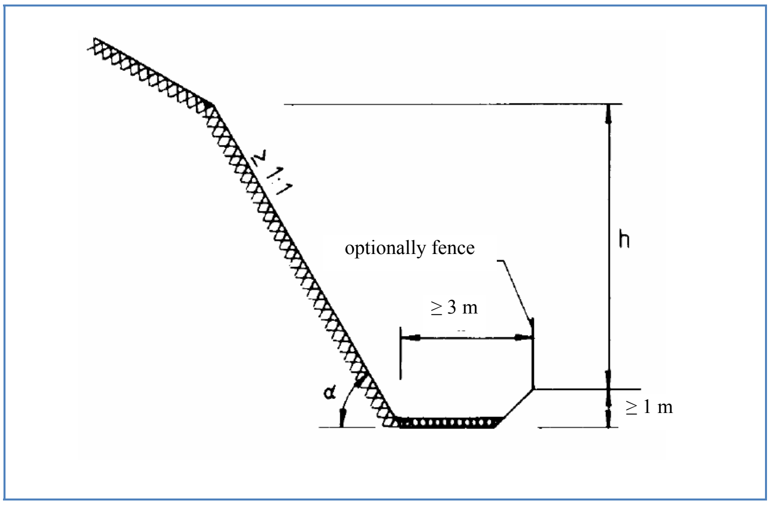


Figure 3-29 Catchment Zone

Geo-textile may be applied where the grading curve of two adjacent soil layers do not comply the filter criteria. Geo-grids may be used for rehabilitation of existing line sections with insufficient sub-soil. For new build lines it is suggested to replace the non-compliant soil with appropriate material.

Bridges

The existing design for bridges provides at least a width between track centre and handrail consisting of 2.20 m to the ballast edge and 0.80 m for the walkways. If UIC-C gauge is to be applied, an additional 0.30 m should be foreseen. The typical bridge section used for the Project is shown in *Figure 3-30.*

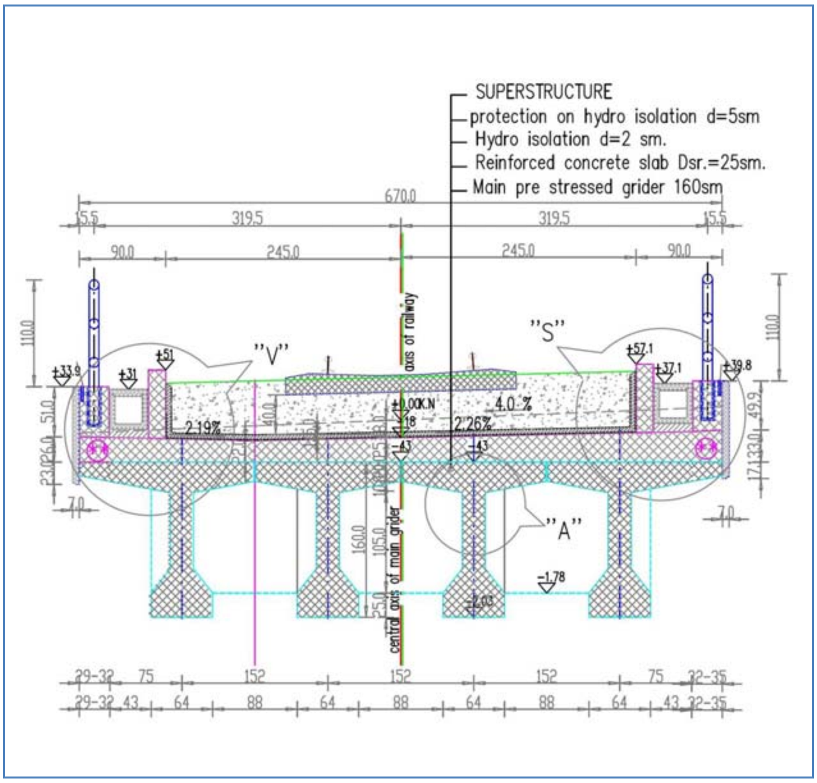


Figure 3-30 Typical Bridge Cross Section

Specific case of Vakuf Bridge

At K.P.41+350, the Vakuf Bridge will cross the Kriva River Valley at a very high level: about 60 meters above the river. This bridge is designed to accommodate the requirements of another project for a project of a dam which is planned just upstream of this bridge. This bridge was not designed in the 1990's scheme. At this stage only indications on the length of the structure exist with the preliminary sketch map and profile of the bridge being presented below. According to the topography of the valley, the bridge is proposed with a main arched span of a length of 327 m. It is proposed to build the bridge on steel and the total length will be 389 m.

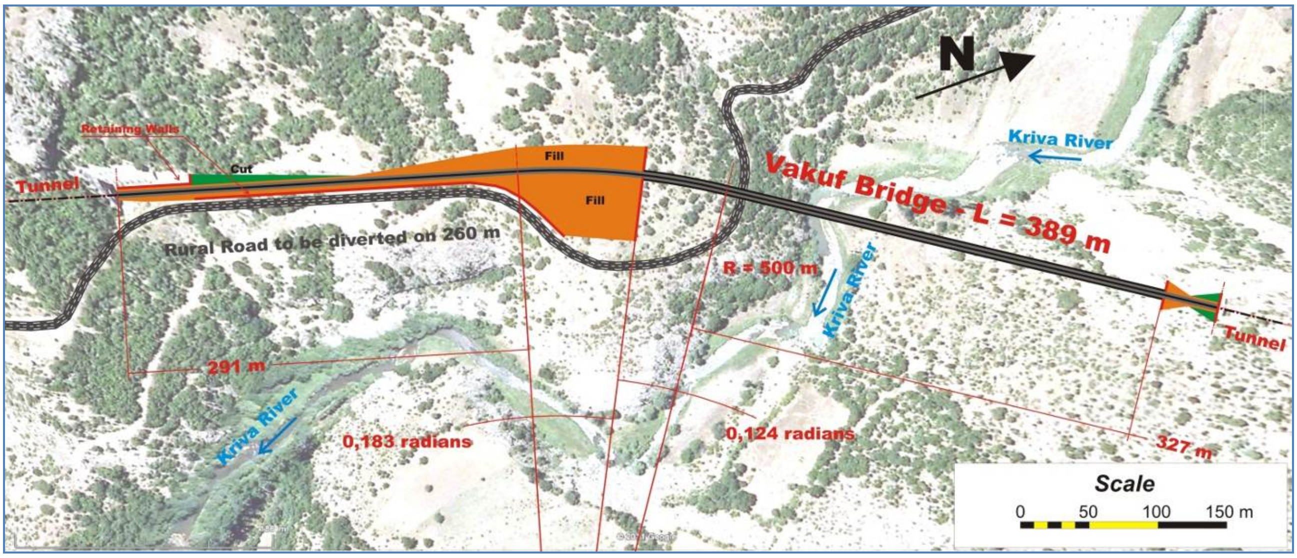


Figure 3-31 Vakuf Bridge Sketch Map

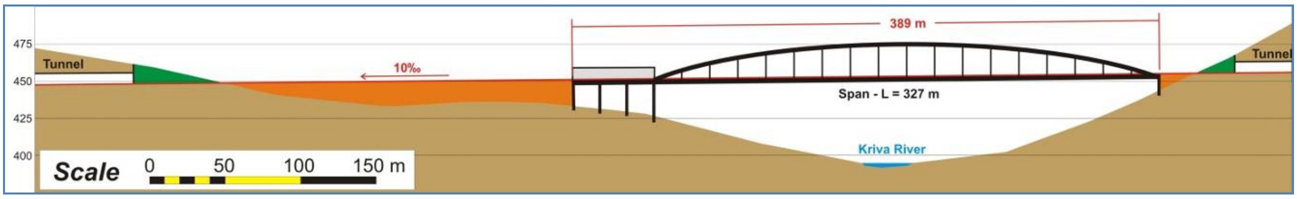


Figure 3-32 Vakuf Bridge Profile

Tunnels

Overview of the tunnels in Section 2 (constructed) and Section 3 (designed), with length and location is presented below.

Object No.	Total length	Axis chainage (K.P.)
Section 2		
1	503	37+927
2	169	40+758
3	364	41+607
4	341	42+250
5	256	42+779
6	150.5	45+418
7	188	49+802
8	592	50+171
9	123	52+948
10	64	62+677
11	73	63+552

Object No.	Total length	Axis chainage (K.P.)
12	248	63+807
13	172	64+154
14	146	64+364
Section 3		
1	213	67+346
2	128	68+078
3	187	68+363
4	99	68+631
5	117	69+996
6	118	71+697
8	103	72+809
9	966	73+403
10	195	75+047
11	145	75+617
12	155	75+782.5
13	100	76+200
14	148	77+166
15	1045	78+275.5
16	240	79+040
17	200	80+075
18	640	80+520
19	68.32	81+713
20	50	81+925
21	74	81+987
22	1,400	84+478
23	1,300	86+035
24	200	87+150
25	1,150	88+898

Table 3-21 Overview of Tunnels

The tunnel cross-section will be defined with regard to the space requirements of:

- Clearance UIC GC;
- Overhead catenary system and related installation (circuit breaker, tensioning devices);
- Power supply feeding lines;
- Electrical clearance;
- Height and width of permanent way;
- Escape walkways;
- Space signalling and telecommunication equipment;
- Cable ducts;
- Construction space including temporary scaffold and additional reinforcement of lining; and
- Aerodynamic clearance.

The tunnels will have one sided inclination of more than 2.5 % which will help facilitate the drainage, with the main reasons being so that immobilised trains can be rolled out of the tunnel and the tunnel will be aerated by natural ventilation (chimney effect).

The characteristics of the bedrock and the chemical consistence of the mountain water will be defined.

Geodetic control measurements of the tunnel, the surface and adjacent construction will have to be executed prior to the works, during construction and continuously during the life cycle of the tunnel.

New tunnels would be completely sealed against mountain water. "Umbrella" sealing may be sufficient if only seepage water occurs.

All metallic parts and the reinforcement of the tunnel must be connected to the railway earthing system. The overhead catenary system and feeding line might be switched off for the entire tunnel.

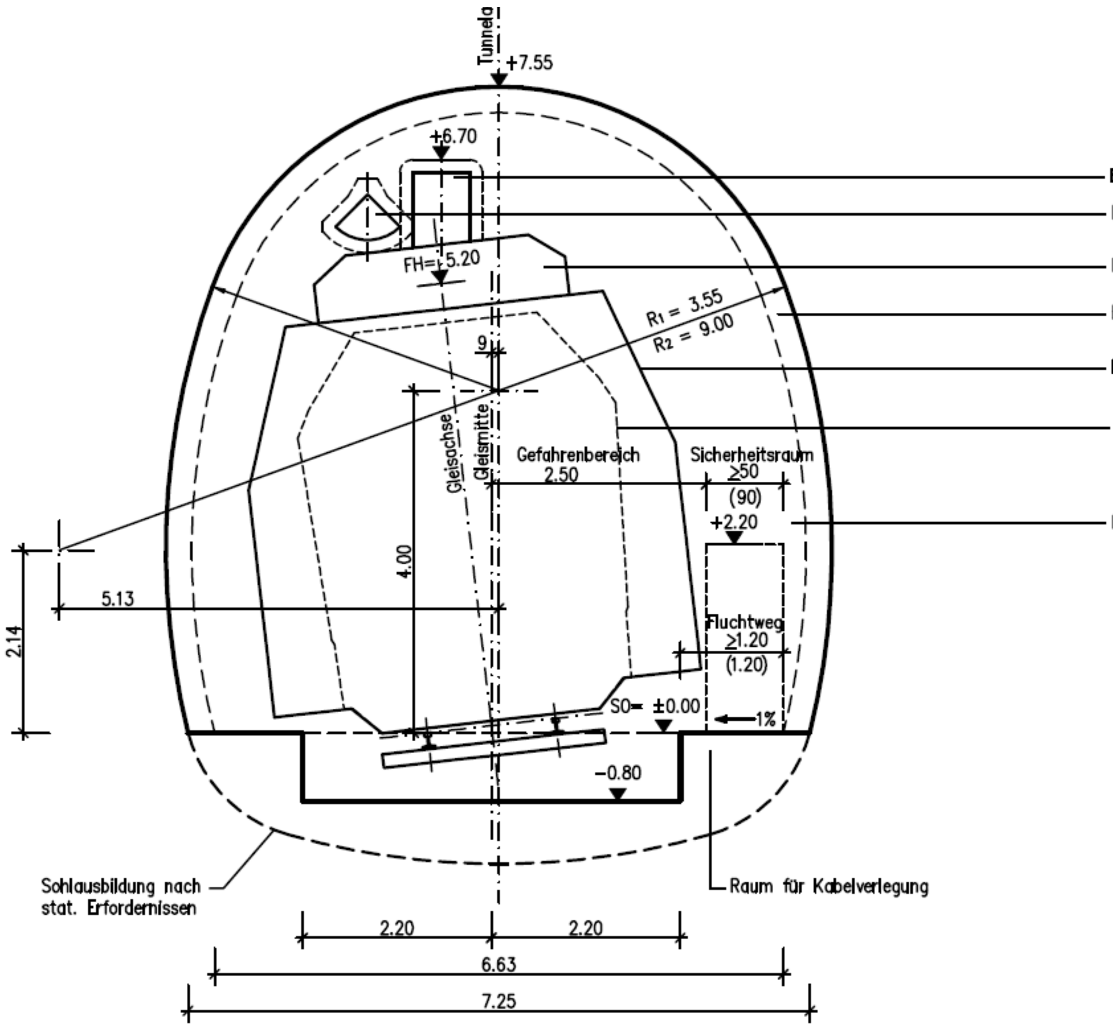


Figure 3-33 Example for Single Track Tunnel Section (Ril 853, Guideline of the DB AG)

Ril 853 is a Guideline of the German Railways for Design, Construct and Maintain Railway Tunnels ("Eisenbahntunnel planen, bauen und unterhalten"), the currently valid version is from 01.03.2002. The standard cross section is an example for the next design phase which shows the necessary installations and space requirements of a railway tunnel. All tunnels at open line are single track tunnels. The tunnels in the stations Kriva Palanka and Zidilovo are double track tunnel. A second bore (twin bore tunnel) is not foreseen.

Because of the enclosed site, tunnel safety is an important aspect especially for tunnels with passenger traffic. Incidents in tunnels may be classified as:

- Hot incidents (fire, explosion, emission of toxic smoke or gas);
- Cold incidents (derailment, collision);
- Prolonged stop.

The safety (adequate equipment) in tunnels will be considered in the further design phase. The existing tunnel design has escape niches. A continuous lateral walkway according to the requirements of TSI SRT (Safety in Railway Tunnels, Directive 2008/163/EC) has to be provided for the new tunnels with length of more than 100 meters. The design of the tunnels shall take into account the need for provision of facilities to allow the self-rescue and evacuation of train passengers and staff, and allow the rescue services to rescue people in the event of an incident in a tunnel. The tunnel design shall take account of the following criteria:

- Lateral and/or vertical emergency exits to the surface (tunnel length > 1,000 m):
  - these exits shall be provided at least every 1,000 m;
  - the minimum dimensions of lateral and or vertical emergency exits to the surface shall be 1.50 m wide and 2.25 m high;
  - the minimum dimensions of the doors opening shall be 1.40 m wide and 2.00 m high;
  - all exits shall be equipped with lighting and signs;
- Cross-passages to the other tube (tunnel length > 500 m):
  - cross-passages between adjacent independent tunnels enable the adjacent tunnel to be employed as a safe area; they must be equipped with lights and signs;
  - minimum dimensions of the cross-passage are 2.25 m height × 1.50 m width;
  - the minimum dimensions of the doors are 2.00 m height and 1.40 m width;
  - cross passages in conformity with these requirements shall be provided at least every 500 m;
- Escape walkways (tunnel length > 500 m):
  - walkways shall be constructed in a single track tunnel on at least one side of the track and in a double track tunnel on both sides of the tunnel;
  - in wider tunnels with more than two tracks access to a walkway shall be possible from each track;
  - the width of the walkway shall be a minimum of 0.75 m;
  - the minimum vertical clearance above the walkway shall be 2.25 m;
  - the minimum level of the walkway shall be within the height of the rail;
  - local constrictions caused by obstacles in the escape area shall be avoided;
  - the presence of obstacles shall not reduce the minimum width to less than 0.7 m, and the length of the obstacle shall not exceed 2 m;
  - handrails shall be installed approximately 1 m above walkway providing a route to a safe area;
  - handrails shall be placed outside the required minimum clearance of the walkway;
  - handrails shall be angled at 30° to 40° to the longitudinal axis of the tunnel at the entrance to and exit from an obstacle;
- Emergency lighting on escape routes (tunnel length > 500 m):
  - emergency lighting shall be provided to guide passengers and staff to a safe area in the event of emergency;
  - illumination by means other than electricity is acceptable, provided that it fulfils the intended function;
- illumination is required as follows:
- single-track tube: one side (same as walkway);
- double-track tube: both sides; position of lights: above walkway, as low as possible, not to interfere with the free space for the passage of persons, or built-in into handrails;
  - the luminance shall be at least 1 lux at walkway level; the autonomy and reliability must be guaranteed for emergency or other requirements to ensure availability for at least 90 minutes;

  - if the emergency light is switched off under normal operating conditions, it shall be possible to switch it on by both of the following means: manually from inside the tunnel at intervals of 250 m; by the tunnel operator using remote control;
- Escape signage (tunnel length > 100 m):
  - the escape signage indicates the emergency exits, the distance and the direction to a safe area; all signs shall be designed according to the requirements of Directive 92/58/EC of 24 June 1992 concerning the provision of health and/or safety signs at work and to ISO 3864-1; escape signs shall be installed on the sidewalls;
  - the maximum distance between escape signs shall be 50 m; signs shall be provided in the tunnel to indicate the position of emergency equipment, where such equipment is present;
- Emergency communication:
  - radio communication between the train and the control centre shall be provided in each tunnel with GSM-R;
  - there is no need for additional communication systems such as emergency telephones;
  - radio continuity shall be provided for permitting the rescue services to communicate with their on-site command facilities;
  - the system shall allow the rescue services to use their own communication equipment;
- Access for rescue services:
  - rescue services shall be able to enter the tunnel in the case of an incident, via the tunnel portals and/or appropriate emergency exits;
  - these access routes shall be at least 2.25 m wide and 2.25 m high;
  - the IM (Infrastructure Railway Manager) shall describe in the emergency plan those facilities dedicated as access routes;
  - if road accessibility is required in the emergency plan, it should be as close as possible to the planned rescue area;
  - alternative means of access shall be described in the emergency plan;
- Rescue areas outside tunnels:
  - rescue areas of minimum 500 m^2 shall be provided near the tunnel at the access roads;
  - existing roads can be considered as rescue areas;
  - if road access is not reasonably practicable, alternative solutions shall be provided in consultation with the rescue services.
- Water supply:
  - it shall be provided at access points to the tunnel in consultation with the rescue services;
  - the capacity shall be minimum 800 litres per minute for two hours;
  - the water source can be a hydrant or any water supply of minimum 100 m3 such as a basin, river or other means;
  - the method for bringing the water to the site of the incident shall be described in the emergency plan.
- Overhead line or conductor rail earthing:
  - it shall be provided at tunnel access points and close to the separation points between sections;
  - these shall be either fitted manually or remote controlled fixed installations;
  - communication and lighting means necessary for earthing operations shall be provided;
- The electricity power distribution system in the tunnel:
  - it shall be suitable for rescue services' equipment in accordance with the emergency plan for the tunnel;

- some national rescue services groups may be self-sufficient in relation to power supply; in this case, the option of not providing power supply facilities for the use of such groups may be appropriate;
- such a decision, however, must be described in the emergency plan.

- Requirements for electrical cables in tunnels:
  - in case of fire, exposed cables shall have the characteristics of low flammability, low fire spread, low toxicity and low smoke density;
  - these requirements are fulfilled by compatibility of the cables with EN 50267-2-1(1998), EN 50267-2-2 (1998) and EN 50268-2 (1999).
- Reliability of electrical installations:
  - electrical installations relevant for safety (Fire detection, emergency lighting, emergency communication and any other system identified by the Infrastructure Manager or contracting entity as vital to the safety of passengers in the tunnel shall be protected against damage arising from mechanical impact, heat or fire;
  - the distribution system shall be designed to enable the system to tolerate unavoidable damage by (for example) energizing alternative links;
  - the electrical supply shall be capable of full operation in the event of the loss of any one major element;
  - emergency lights and communication systems shall be provided with 90 minutes backup.
- Hot axle box detectors:
  - line-side hot axle box detection or predictive equipments shall be installed on networks with tunnels at strategic positions so that there is a high probability of detecting a hot axle box before the train enters a tunnel and that a defective train can be stopped ahead of the tunnel;
  - the IM (Infrastructure Railway Manager) shall designate line-side hot axle box detectors and their location in the Infrastructure Register; the RU (railway undertaking) shall include information about these in the Route Book.

Permanent Way

The permanent way has to provide a track system where rail vehicles are guided in a safe way by means of wheel flanges. The loads of rolling stock have to be carried through the ballast layer into the sub-structure.

According to the common practice, the track will be executed as “Continuous Welded Rail” (CWR). In special cases, where considerable settlements are expected, there is possibility for secondary station tracks - jointed track to be applied. The chosen components have to provide sufficient strength with regard to the additional loads from CWR.

The permanent way components are summarized below:

- rails;
- rail fastenings;
- sleeper;
- ballast;
- protection layer (sub-ballast).

<u>Rail</u>

The rail (rail head) serves as running surface and guidance for the vehicle wheels. In addition, the rail has to feature the following characteristics:

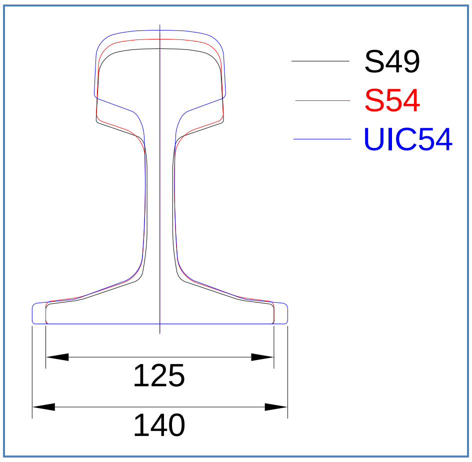
- sufficient bearing and bending strength;

- good distribution of loads;
- high resistance to wear and tear;
- good welding characteristics (for continuous welded rail).

The section modulus should comply with the expected horizontal and vertical loads. The "TSI 'Infrastructure' subsystem for conventional rail" (Directive 2008/57/EC) requires a minimum Jx of 1,600 cm4.

The standard layout of the permanent way for Project is designed to sustain a planned axle load of 25 tonnes and the forces of continuous welded rails. Nowadays, standard rails are UIC54 or UIC60 rails. Due to their higher stiffness, these rails distribute the load on more sleepers and reduce the forces to the sub-soil. This results in better track alignment and less maintenance. A lot of sleepers, which are designed for S49 rails, are already in stock. The rails UIC54 and UIC60 have a different base width and are not compatible with S49.

It is proposed that for the main tracks the original foreseen rail S49 will be replaced by S54. The S54 rail provides more reserves for wear with regard to the minimum Jx of 1,600 cm4. Because of the same base-width, the rail S54 can be used with the sleepers already placed or in stock. The different types of rail are shown in *Figure 3-34.*



Section Properties			
	S49	S54	UIC54
Jx	1819 cm^4	2073 cm^4	2127 cm^4
Wx	240 cm^3	262 cm^3	279 cm^3

Figure 3-34 Comparison of Different Types of Rails

Sleepers

The sleepers have to fulfil the following functions:

- establish and maintain track gauge;
- distribute and transmit vertical and horizontal forces to the ballast bed;
- hold the rail in its horizontal and vertical position;
- maintain the track gauge;
- sufficient compressive strength and bending strength.

The Macedonian Railways has already concrete mono-bloc sleepers for the Project in stock. Compared with steel or wooden sleepers, the concrete sleepers have the following advantages:

- high resistance to lateral displacement;
- high resistance to weathering;
- lower maintenance of fastenings;
- possibility of local production.

If the concrete sleeper is produced with appropriate cement and unpolluted aggregates, it should have a long design life. For turnouts, either wooden or concrete sleepers may be used. Concrete turnout sleepers are very heavy. Wooden sleepers are easier to handle but require more maintenance.

Ballast

The function of the ballast bed is:

- to distribute the sleeper pressure to the sub-structure;
- to resist longitudinal and lateral sleeper displacements;
- to establish the projected track position by tamping and lining.

The ballast consists of crushed natural stone (basalt, diabase, granite). The grain (granulometry) size runs from 22.4 mm up to 63 mm and ensures the stability and elasticity of the track during passage of trains due to the grain size distribution, grain diameter and sharp edges.

The ballast provides the necessary position stability of tracks and turnouts for longitudinal and lateral movements caused by the friction between grain and sleeper. The space between ballast grains determines the drainage of the permanent way by water permeability. These requirements have to be proven by tests for:

- resistance to impact;
- abrasion resistance;
- weathering resistance.

The minimum ballast thickness under the sleeper edge (measured at the lower rail) is 30 cm for main tracks and 20 cm for station tracks. The minimum width at the sleeper head is 40 cm. The inclination of the shoulders is 1:1.5.

Protection layer

The protection layer (sub-ballast) has the following functions:

- base layer for load distribution and a high shear resistance;
- prevention from mixture of ballast with sub-structure materials
- low water permeability for lateral drainage of rain water.

The characteristics of the material are:

- high resistance to weathering;
- high grain strength;
- high compaction ability;
- specific variability in the amount of different grain sizes.

According to the following table (see *Figure 3-35*) from Ril 836 Code of practice for earthworks (DB) the thickness of the protective layer required is 40-60 cm for new lines and 20-30 cm for rehabilitated lines. These values have to be verified with geotechnical investigations.

line type v [km/h]			formation [MN/m²]		protective layer				earth formation [MN/m²]	
			E_{v2}	E_{vd}	D_{Pr}	standard thickness [cm] frost area I	II	III	E_{v2}	E_{vd}
new track	*HGV* (300)	Ballast	120	50	1,0	70	70	70	80	40
new track	*HGV* (300)	Slab	120	50	1,0	40	40	40	60	35
new track	passenger traffic, *upgraded lines* mixed traffic, *upgraded lines* (230)	Ballast	120	50	1,0	50	60	70	60	40
new track	passenger traffic, *upgraded lines* mixed traffic, *upgraded lines* (230)	Slab	120	50	1,0	40	40	40	60	35
new track	passenger traffic(160) mixed traffic (160) goods traffic (120) commuter traffic (120)	Ballast	100	45	1,0	40	50	60	45	35
new track	commuter traffic (80) goods traffic (50)	Ballast	80	40	1,0	30	40	50	45	30
improved track	*HGV* (300)	Ballast	120	50	1,0	70	70	70	80	40
improved track	*HGV* (300)	Slab	120	50	1,0	40	40	40	60	35
improved track	passenger traffic, upgraded lines mixed traffic, *upgraded lines* (230)	Ballast	80	40	1,0	30	40	50	45	30
improved track	passenger traffic, upgraded lines mixed traffic, *upgraded lines* (230)	Slab	100	45	1,0	40	40	40	45	30
improved track	passenger traffic (160) mixed traffic (160) goods traffic (120) commuter traffic (120)	Ballast	50	35	1,0	20	25	30	30	25
improved track	commuter traffic (80) goods traffic (50)	Ballast	40	30	0,97	20	20	20	20	25

Ballast … ballast track
Slab … slab track
E_{v2} … modulus of static deformation
E_{vd} … modulus of dynamic deformation
D_{Pr} … Proctor density

Figure 3-35 Requirements for substructure on earth formation (Ril 836, DB AG)

3.11 TECHNICAL DESCRIPTION OF OPERATIONAL RAILWAY ELEMENTS

3.11.1 SIGNALLING & TELECOMMUNICATION

There are currently no detailed design documents for signalling and telecommunications. However the Project signaling and telecommunication installations will have to be:

- Compatible with the existing installations on line Skopje – Tabanovci (Corridor X);
- Compatible with of planned Bulgarian section of the line; and
- In line with requirements of ERMTS.

The Project has to consider the needs of safety and the necessary performance that will be achieved by the application of:

- Individual Interlocking Systems with Centralized Traffic Control (CTC) for operation;
- Automatic block between all junctions and stations of the line;
- Track monitoring system in the stations and on the line; and
- Automatic Train Protection System.

For strengthening of operations, thus reducing human errors and guaranteeing smoother operations, it is advisable to have interlocking systems which can be controlled and monitored centrally.

Automatic block tracking and sectioning between stations will increase the capacity of the line considerably. Installation of a signalling system with Track Vacancy on the entire line is the prerequisite for centralizing and for fail-safe train operation. Track vacancy installation axle counter systems should be applied exclusively because the comparison with track-circuits results in lower costs for the investment and the maintenance.

A system for Automatic Train Protection (ATP) will be provided to prevent accidents caused by overshooting signals at caution and danger. It is also used for controlling the speed of trains at sections with temporary and permanent speed restrictions.

Centralized Traffic Control (CTC) System

A common centralized traffic control system with trackside signals includes:

- Colour light signals;
- Electrical point machines;
- Axle counters or trackside circuits; and
- Blocks between sidings.

The signalling installations are remote controlled by a dispatcher with a computer in association with an optional Illuminated Track Indication Board. Axle counters, for cost reasons, are recommended to detect track occupancy between sidings. The remote operation and control of the signalling will be carried out from workstations at the Centralized Traffic Control (CTC). CTC is commonly used on busy railroad lines. It allows trains to be routed to optimize performance of the overall railroad system.

Train movements on CTC segments of track are controlled by dispatchers who have information on the position of all the trains in their segments and infrastructure information such as the position of switches. Dispatchers give train operators instructions and control train routing in real time by remotely controlling signal systems and track infrastructure and by talking directly with train operators by radio.

Introduction of a CTC system increases railroad capacity by increasing the degree of system control; for example, a single-track railroad with sidings and CTC has up to 70% of the capacity of a double-track ABS railroad. A CTC system allows the dispatcher to safely direct overtakes of trains traveling in the same direction and meets of trains traveling in opposite directions on one-track railroads by enabling the dispatcher to place a train in a siding or on an additional mainline track.

General Function of the CTC

The CTC which is proposed for the project shall have the following functions:

- Dispatching of all trains;
- Remote control and monitoring of all signalling installations on the network (Computer-based Interlocking (CBI), signals);
- Automatic route setting;
- Timetable management;
- Line overview;
- Time line graph;
- Event recording;
- Service and diagnostics (S&D); and
- Defect detectors monitoring.

Interlocking and Block System

With CTC it is recommended, for economic reasons, that interlocking and block function be Automatic Interlocking based on Personal Computer technology. All sidings shall be controlled by Computer-based Interlocking (CBI) system installations. The command/control of power units in connection with field equipment fail/safe relay technology is proposed. All CBI shall be controlled remotely from a Centralized Train Control. No local workstations are required, but the system shall have the ability to add some in the future.

The CBI will meet the following requirements:

- High safety level;
- Easy extendable and upgradeable in case of modification of the track layout and/ or in case of increasing traffic density; and
- Transmission of safety related information shall be safe according to requirements equal or equivalent to EN 50159-2.

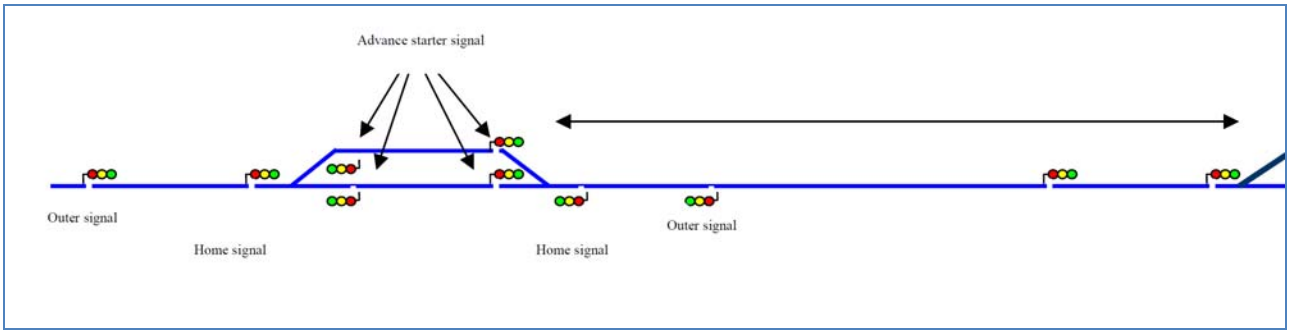


Figure 3-36 Interlocking and Block System

The block system will be integrated in the signalling computerized system. The computer will be based on PC technology and have sufficient vital input/output boards to accommodate possible future applications and modifications i.e. addition of a new siding. The CBI will control the trackside elements and monitor their status. It will set, lock, release routes according to common interlocking principles. The CBI will:

- check and evaluate the command received from the CTC according to the signalling logic conditions;
- execute, if possible the command;
- interlock the trackside equipment;
- transmit all relevant status information of trackside element to the CTC; and
- exchange block information with neighboured CBI.

The CBI shall ensure a fail-safe block working. A block section must be only entered by a train if the block section is not occupied. Only one train must enter a non-occupied block section. The signal shall be automatically placed to “stop” as soon as it is passed by the train.

Automatic Route Setting (ARS)

The ARS system automatically controls all stations by setting routes according to information provided from an electronic timetable and the train follow-up system. The CTC operator is released from scheduled route setting procedures in order to enable him to concentrate on his/her dispatching task. Route orders are transmitted from the ARS system to the relevant CBI.

The route order received from the CBI is carried out as soon as the train in question initiates a defined approach indication. The ARS system stores the route order until the route setting process has been finished. When a route cannot be set, the route order will be cyclically repeated. ARS shall not prevent any manual route setting.

<u>Route Setting</u>

Route setting will be initiated by defining entry and destination and the type of route desired. On sidings, the route on the main line will be programmed as the main route whereas the alternative route will be distinguished by individual controls.

<u>Automatic Route Release</u>

Each route section shall be released automatically after the elements of the route section (points, track sections) have been sequentially occupied and cleared by the train.

<u>Manual Route Cancellation</u>

Manual cancellation shall be possible from the CTC workstation. If the entry signal is in “clear” position, manual cancellation must be carried out with a delayed route release. The delay shall guarantee that there is no train approaching or that the train is stopped in front of the entry signal when the route is being cancelled.

<u>Other Manual Controls</u>

Setting a signal to stop: it shall be possible to set any signal or all signals at the same time, in case of emergency, to “stop” position without any condition at any time. It shall be possible to reset to “clear” a signal (or all signals) manually set to “stop”, provided that the route conditions still permit it.

Setting a signal to Calling-on aspect: Home signal will have “on sight aspect” when the track section in front of the signal may be occupied and when the calling-on function for that signal is activated by the dispatcher.

Point operation (any unblocked, unlocked and not occupied point) will be operable individually.

Individual point blocking/unblocking: it shall be possible to block and unblock a point individually in order to prevent any train passing the point.

Route destination blocking/unblocking: it shall be possible to prevent route setting to a potential destination as long as it is not destination of an already set route. Unblocking must also be possible.

Timetable Management

Electronic timetables (train schedules) will be provided and displayed at the CTC workstations. Staff will be able to change timetable data temporarily or permanently. The staff shall be able to input a new timetable, to input additional trains and to cancel trains. Information from the timetable management system will be given to:

- the train follow-up system, in order to assign train numbers and to indicate timetable deviations to each train; and
- the ARS in order to set routes for trains in a timely manner.

Line Overview

The line overview shall display a schematic track layout of the whole line, including the sidings, train numbers, and signals concerned. Yard tracks will not be included in the line overview. As a minimum, the following information shall be visible:

- sidings name;
- routes set and route setting in process;
- location and status of signals;
- track section status (occupied or not);
- train numbers of the train which occupies the track section;
- timetable deviations;
- position of the points;
- temporary blocked line (information entered by the controller).

Time Line Graph

The system will be able to generate and display a Time-Line graph (time-distance diagram) supporting the operator in his dispatching task (management of encountering in sidings). The time-line graph will be the representation of train movements in a co-ordained system. A basic grid will show:

- on the horizontal axis: the time scale subdivided into minutes.
- on the vertical axis: the line scale subdivided into the relevant sidings and station and block sections.
- the time-line graph will calculate the location of the train in the future and help the controller to manage the encountering. Train numbers and timetable deviation will be displayed.
- expected timetable deviation, taking into account the expected stopping time at stations and sidings will be calculated.

Event Recording

The system will provide an event recording application with electronic storage. It will record and store at least the following information:

- train movements and timetable deviations of the day; and
- safety critical relief controls.

Service and Diagnostics (S&D)

In order to facilitate remote fault localization of all track-side signalling sub-systems and CTC systems by maintenance staff, a Service and Diagnostic (S&D) application will be provided. The S&D computer of the

CTC will analyze, link and evaluate indications such as status, faults, and event indications. An interface to an S&D tool should be provided at all CBI. Faults will be displayed on lists.

Points and Point Machines

All points used by passenger trains must be fitted with electrically controlled point machines. The position of each tongue must be monitored by electrical point detectors (tongue rail detectors). In case the tongues have not reached a normal position, due to an obstacle, or the point was trail, this has to detected and indicated. The distance between the closed tongue and the stock rail must be less than 4 mm. The minimum stroke of the tongues shall be 160 mm.

The point machine shall automatically switch off the power if the point machine does not reach the final position within a time to be defined. The point machine must contain a clutch becoming effective when the throw force of the machine is insufficient to overcome an obstacle. Manual operation of the point machines shall also be possible by using a crank handle. A key or any other mechanism must disconnect the power source whilst an authorized member of the staff is carrying out manual operation.

Electrical Key Lock Units

Local operated points (in junction with yard) must be interlocked if they are part of the route or assure flank protection of a route. In that case, the points must be locked in the position required by means of a point lock. The key released from that lock shall be transferred to an electrical key lock unit in the field or at another place accessible for operations staff. The key must be locked and continuously monitored by the CBI until the route is released. The locked position of the electrical key lock unit shall remain locked until the point is requested in the other position for another train route.

Power Supply

The signalling system shall be fed locally or remotely by a PS system fed by two sources independently of each other:

- an uninterruptible power supply (UPS) shall ensure a continuous feeding of the signalling sub-systems without any interruption; if the Tolerances of the primary PS exceed the maximum or minimum values, then the UPS must switch over to secondary PS immediately; a UPS by-pass shall be installed in order to by-pass the UPS during maintenance work or when the UPS fails;
- the capacity of the battery shall be sufficient to carry the total load for all signalling subsystems for at least 3 hours; in sidings, the power supply including UPS and battery will be integrated into the pre-fabricated hut for the CBI.

ATP Description

Automatic cab signalling provides information to the train operator but does not require the operator to act upon the information. Train control systems take control of the train if the operator does not take appropriate actions after receiving signal information. The simplest type of train control is an automatic train stop (ATS) system. These operate with the same wayside-to-train signals (continuous or intermittent) as automatic cab signalling systems, but also have an interface with the train braking system.

An ATS system stops the train automatically if the operator does not take the appropriate actions when the train encounters a restrictive signal. A higher level of control is provided by automatic train control (ATC), which not only stops a train but also controls its speed. An ATC system receives maximum speed information from trackside and communicates that information to an on-board computer, which converts the information for display on the operator's panel. If the operator does not take appropriate action, the system automatically reduces train speed or stops the train. Today on Europeans railways, beacons and loops are the more common transmission medium used.

Criteria for ATS or ATC Implementation

In Europe, trains running above100 km/h are usually equipped with an ATS system. It is activated and applies the brakes when the train passes a signal showing a stop aspect. ATC is generally required in Europe when train speeds are greater than 150 km/h.

Automatic cab signals provide warning when the maximum speed on an upcoming track segment is less than the train is presently operating. ATS and ATC provide automatic enforcement if the engineer fails to respond properly to these speed warnings.

ATC Functions

When implemented, ATC shall supervise train movements according to fail safe principle in order to minimize hazardous effects in case of train driver failures. The ATC system must incorporate a train protection system and must ensure that:

- a train does not exceed the limits of the route set and proven for it;
- a train does not exceed the speed permitted on any part of the route.

  The ATC system shall provide cab signalling and will repeat the information given by the trackside signal. It shall, at least:

- provide the onboard ATC system with the IM and the maximum speed limit (line speed limit, permanent speed restriction and temporary speed restriction);
- protect against exceeding of speed limits and passing a stop signal by initiation of emergency brake in case of non-compliance with restriction given to the driver.
- provide a high safety level;
- be able to handle track modification and maximum speed change.

System Configuration

The evaluation of signalling system considers only ATC systems currently in commercial service, where safety has been demonstrated during operational service. As a consequence only ATC with transponders loops or coded track are possible. For cost reasons and considering the speed of the train (less than 160 km/h) and the headways, it is recommended to implement an ATC with transponders.

This ATC is less expensive and requires less maintenance. ATC systems using transponders have already been implemented on various railway lines. These systems are based on the spot transmission of safety-related data from the wayside to on board using trackside equipment. The trackside equipment consists of two main components:

- the encoder (LEU – Line-side Encoder Unit);
- transponders.

  The encoder receives information from existing signals or the interlocking system. It then uses the transponders to send the appropriate messages to the train. The information transmitted to the train is:

- variable (movement authority, static speed profile, and distance between transponders) in which case the transponders are called switchable and are connected to the LEUs;
- fixed (gradient profile, track conditions, etc.) in which case the transponders are called fixed and are not linked to the LEUs.

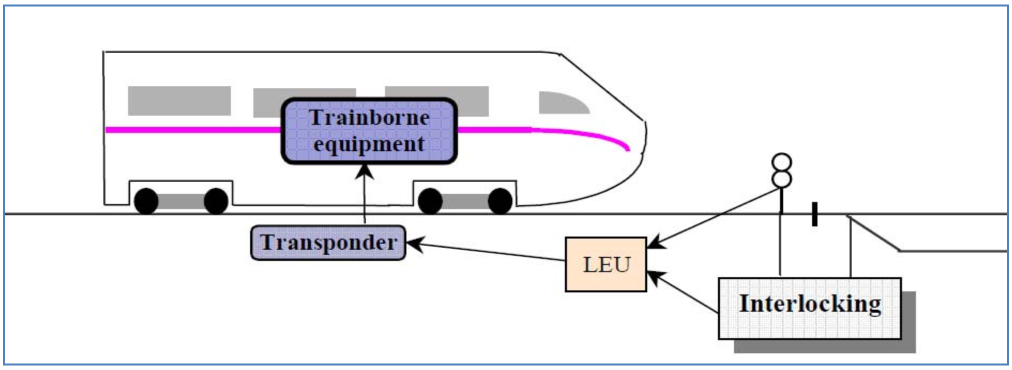


Figure 3-37 General Arrangement of an ATC Using Transponders

The system to be implemented will provide the complete range of functions needed for the efficient operation of the railway and include:

- cab signaling;
- continuous speed monitoring;
- automatic brake application;
- self diagnostics.

Cab Signaling

The primary function of the cab display is to continuously give the driver all the information needed when running under the supervision of the ATC system.

Speed and Target Monitoring

The car-borne equipment will include a continuous speed and target monitoring function which applies the brakes automatically in case the driver does not observe the instructions. The speed information displayed to the driver follows an optimal braking curve to the target as opposed to conventional systems, where the line-side information is based on the worst braking characteristics.

The speed monitoring function implemented in the car-borne equipment will be based on a “distance-to-go” principle. The train, knowing its position along the track, receives information from the transponder on the distance remaining to the next restriction.

The car-borne equipment is provided with the specific parameters of the train (maximum speed, braking rate, length, etc.) and computes the braking curves which the driver must respect to stop the train at the correct point. Since this is an on-board function, the system is very flexible.

The trackside equipment does not need to calculate speed curves or braking distances for all types of vehicles. This allows for the optimization of the traffic and minimizes the headway needed for the higher performance vehicles.

Warning and Automatic Brake Application

Even if transmission is intermittent, the actual train speed shall be supervised continuously versus its current position in respect to all restrictive values provided by the trackside equipment and the train borne unit (train data characteristics). A warning must be given to the driver to enable him to react and avoid intervention from the train borne unit at least 5 seconds before the intervention of the full service brake.

The full service is initiated in order to stop the train at the end of movement authority. If the full service brake fails, the train-borne equipment must apply the emergency brake to bring the train at a standstill before the danger point. The on-board equipment monitors the speed of the train on the basis of two different brakes:

- the service brake used by the driver for normal braking actions which is the brake that produces the maximum deceleration rate; it is not required to be guaranteed fail-safe;
- the emergency brake which is applied only in the special case when the service brake initiated by the system does not work properly; this brake is required to be fail-safe.

The on-board equipment calculates the static speed profile; this is a speed vs. distance step function. This profile is treated as the speed profile with the permitted speed displayed to the river. When a train is operating above the static speed profile the system both warns the driver and intervenes.

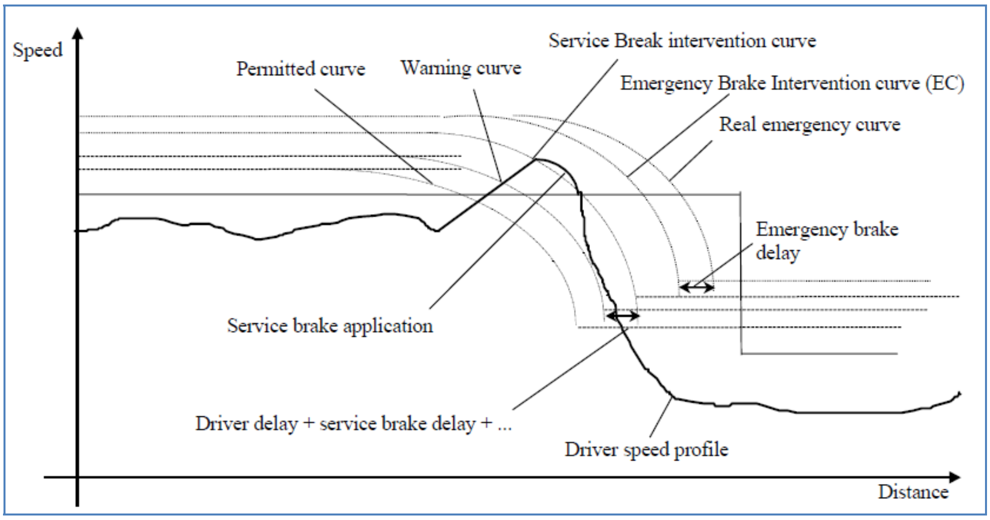


Figure 3-38 Speed Profile

On the basis of the most restrictive static speed profile calculated by the EVC (the on board failsafe computer) and the train braking characteristics, the curves that are used to monitor and control the train can be calculated. There are several different curves, the most important being the:

- emergency brake Intervention curve;
- service brake Intervention curve; and
- permitted curve.

The emergency and service brake intervention curves are used to trigger braking actions and to ensure that the train complies with the speed restrictions. If the train exceeds one of these two curves, the brake is automatically applied. The other curves are used for advising the driver, and have no direct effect on the brakes of the train.

Only the emergency brake intervention curve requires safe processing. If the driver does not react to the service brake curve, then the service brake will be automatically be applied. If the service brake fails when called, or if the driver's speed profile crosses the emergency-braking curve, the emergency brake intervention is automatically applied. The trackside part of the ATP system shall provide the on board part with the gradient of the track. The gradient is used in the braking curve calculation performed by the on board system.

Train-Borne Equipment

The car-borne equipment includes:

- a failsafe on-board computer that performs the safety functions; it calculates the permitted train speed based on infrastructure data and train data, and monitors the speed relative to this permitted speed;

- a driver-machine interface that consists of a modern touch screen providing the capacity to display speed, speed limit, target distance, and allows the driver to perform data entry;
- a speed and distance unit that determines train speed, which is used to determine train location;
- one train recorder unit; and
- a transponder antenna that receives and decodes messages.

Wayside Equipment

The “information point” is the equipment connected to the signal that is required to send ATC information to the train. It is composed of 2 or 3 transponders and the interface that connects these transponders to the signal.

Static Speed Restrictions

At least the following categories of static speed restrictions will be taken into consideration:

- maximum permanent speed of the line;
- temporary speed restriction;
- maximum line speed as a function of the axle load;
- maximum train speed;
- depending on the type of speed restriction, it may be necessary to ensure that the full length of the train has passed a static speed restriction before a speed increase will be allowed.

Wayside Detectors

The line will be equipped with wayside detectors that monitor passing trains for defects. Monitored defects may require immediate action or may require future maintenance. The wayside detectors will provide information directly to the train, to wayside signal systems, or to remote systems (e.g., dispatch or other systems). The following types of devices will be installed:

- hot box detectors;
- wheel impact loaded detectors;
- dragging equipment detectors.

Hot Box Detectors

The hot box detector scans the trains for overheated wheel bearings before they advance to a dangerous state. Undetected, overheated wheel bearings can become molten and cause a wheel/axle separation and a possible derailment. Scanners, bolted to the outside of each rail, are gated (turned) on as a train approaches them.

The scanners look upward to the journal, which houses the bearings, and read the infrared energy emitted by the journal and reference it to two points, the body of the car and the journal on the other end of the axle. If a journal temperature exceeds the assigned threshold, the information is sent identifying the hot box.

Wheel Impact Load Detectors

Wheel impact load detectors measure excessive wheel forces on the rail. They can be integrated into a hot box detector or work as standalone equipment. Flawed wheels, especially on heavy axle load trains, can easily damage the rail and the roadbed.

Dragging Equipment Detectors

A dragging equipment detector consists of a series of metal paddles on both sides of and between the rails. The paddles, when struck by dragging equipment, rotate a shaft which opens a contact and sends a signal to the wayside equipment and alerts the office and/or the radio system. This system detects the presence of broken, misplaced or hanging mechanical parts that have dropped below a predetermined clearance line above and between rails or adjacent to and outside of the rails.

Communication Links

The communication link between detectors and trains can be handled in many different ways, depending on the detector type, the host railroad and site-specific conditions.

Other types of train defect detectors may use a similar method, or may simply trip an alarm that sets the signal system to stop the train. In other cases the detector may transmit the information to a central monitoring point for support of maintenance decisions. These detectors will be implemented in the locomotives that will be equipped with a common communication interface to provide the information from the detectors to the drivers.

A system that transmits a voice message over the train radio channel to the crew, describing either an "all clear" status or the specific nature and location of the defect will also be installed. Results will also be sent simultaneously to the dispatcher.

Location of these Detectors

Usually the hot box detectors and the dragging equipment detectors are installed at the same location, sharing the same bungalow that houses all the electronic and communication systems. These detectors shall be installed few kilometres far from a siding so that a train could stop in a siding in case a default is detected. They shall be spaced not more than 20 km apart. One wheel impact load detector shall be installed at the exit of each yard.

Level Crossings

With designing phase all level crossings will be redesigned into under or overpasses.

Telecommunication Equipment

In order to optimize the operation, an integrated telecommunication system will be required. As a minimum, this system should provide for the following:

- voice communications between the dispatcher and the trains;
- voice communications between any two locations of the railway; and
- data transmission between all main railway locations.

For train operation, the dispatcher (or dispatchers) should be able to communicate at all times with any train or track equipment located within the area controlled by that dispatcher. For management and maintenance purposes, any location of the railroad should be reached by phone from any other location. A local area network should link together all the main locations of the railway for data transmission, including the offices. The telecommunication system should comprise the following, as a minimum:

- a backbone for carrying voice and data information throughout the railway;
- a VHF radio system for the communications between the trains and the dispatcher;
- a private telephone network covering the entire railway network;
- a local area network covering the main locations of the railroad;
- Public Address facilities for passenger information in main stations; and

- TV cameras and monitors for the video surveillance of the main stations and strategic locations.

Backbone

Bearing in mind all the existing and foreseeable needs, including those relating to train control and signalling, different solutions, including microwave and fibre optic transmission systems, will be investigated for the backbone telecommunication system. The most adapted solutions for short, medium and long term needs will then be determined. The backbone comprises of:

- a transmission medium, microwave or fibre optic cable;
- digital transmission equipment; and
- access facilities to the backbone at various locations.

A preliminary design fulfilling present needs with provision for foreseeable future needs will be developed and the cost of the basic system will be estimated.

VHF Radio System

A digital VHF Radio System shall be provided for two-way communications between:

- the dispatcher and the trains running on the railway lines;
- the dispatcher and the track and maintenance vehicles and the dispatcher;
- the dispatcher and the inspectors and foremen equipped with portable radios;
- the inspectors and foremen and the train and track equipment operators under the dispatcher's supervision;

A subsystem using a different channel shall provide for communications between the yardmaster and the trains and vehicles moving in the yard areas. The VHF Radio System shall be composed of:

- a number of base stations conveniently located along the railway lines, every 40 km along the line, on average;
- a control console (or consoles) with all the related equipment (microphone, speaker, etc.) for the dispatcher (or dispatchers);
- mobile radio sets on board of the trains and track equipments with all the related accessories (microphone, speaker, control panel, etc.);
- portable radio sets for the inspectors and maintenance crew foremen.

For passenger trains, provisions in the radio system will be made to allow the dispatcher to deliver messages directly to the passengers when required. The base stations shall be located inasmuch as possible in the stations or in proximity of the sidings (in appropriate shelters) in order to be accessible from the railroad and to minimize maintenance intervention time and costs. The towers supporting the antennas will be located as close as possible to the base stations for the same reasons.

Video Surveillance

All the stations and strategic locations of the railroad will be constantly monitored by appropriately located video cameras and monitors. The pictures provided by the cameras will be displayed on monitors located in the stationmaster's office. These pictures will also be displayed on monitors located in the dispatcher's office. All the cameras will be remotely controlled both by the stationmaster and the dispatcher. The dispatcher will thus be able to take proper action in case of emergency.

Dispatcher's Office – Voice, Data and Video Recordings

With the help of all these telecommunications means, the dispatcher will be able to control the entire operations of the railroad. No train or track equipment should be allowed to move without the dispatcher's authorization. All the incoming and outgoing communications of the dispatch office shall be recorded to facilitate the understanding of what happened and the determination of related responsibilities in case of incidents. This recording procedure applies to data, voice and video communications.

3.11.2 POWER SUPPLY AND TRACTION POWER

The future overhead contact system (OCS) to be proposed shall be a reliable, well-proven system, suitable for speeds up to 100 km/h. The space requirements of future electrification and provisions for earthing have to be considered.

The application of an AC traction power supply requires a safe return circuit line and the earthing of all metal components as well as the limiting of the interferences to parallel installed telecommunication and signal wires. This requirement is met by earthing of the metal components to the earth track or by installation of an earth net.

All metal components located within the influence area of the catenary or the pantograph must be connected to the earth.

During operation at least two rails must be available for the return current. In order to prevent the formation of extremely high contact potentials, low resistant connections are installed between rails and return circuit line.

According to the technology used for train detection for the signalling system, the outer rail of the track may be used as earthing and is connected to the other components of the earthing system. In this case, the inner rail is balanced to ground and connected to the outer rail according to the requirements of earthing or signalling components, respectively, by means of so-called “S-connectors” every other 600 m to 700 m.

This system can be applied for all track sections. On viaducts, however, additional measures for compensation of possible potentials and protection against excessively high potentials in case of catenary wire breakage are necessary.

The reinforcement steel within the concrete must be connected with each other. The reinforcement steel of different bridge sections are connected electrically by means of a copper conductor which has to be connected to the ground rail as well.

Additionally, the concrete reinforcement is connected to the earthing of the foundations. These measures balance possible potential deviations and prevent structural damage and inadmissible high potential differences due to contact wire tear. This also assures a reliable lightning protection for the signalling devices and the structure itself.

Probably at least one substation and the interconnection with the public power network will be required. The preferred location is likely to be in the middle of the line (K.P. 35 – K.P. 40).

System Description

<u>Principles for the 2 x 25 kV System</u>

2*25KV AC system will be used as electrical connection between the railway and the power supply in order to allow less disequilibrium between the three phases of the alternative current.

<u>General arrangement</u>

This 2*25 kV system has been developed to ensure a high level of compatibility between different railway networks, and is widely used in the world.

Power transformers on the traction substations are fitted with a secondary winding with the center point connected to the rails. One of the winding ends is connected to the overhead lines, the other to the feeders running in parallel to the overhead lines.

Autotransformers with low internal impedance are similarly connected to the secondary windings on the substation transformers, and spaced every 8 to 10 km along the line to supply the power transmitted at 50 kV to the overhead line thus supplied at 25 kV. They feature the following functions:

- Power supply;
- Sectioning at sector ends;
- Sub-sectioning on line; and
- Tracks paralleling.

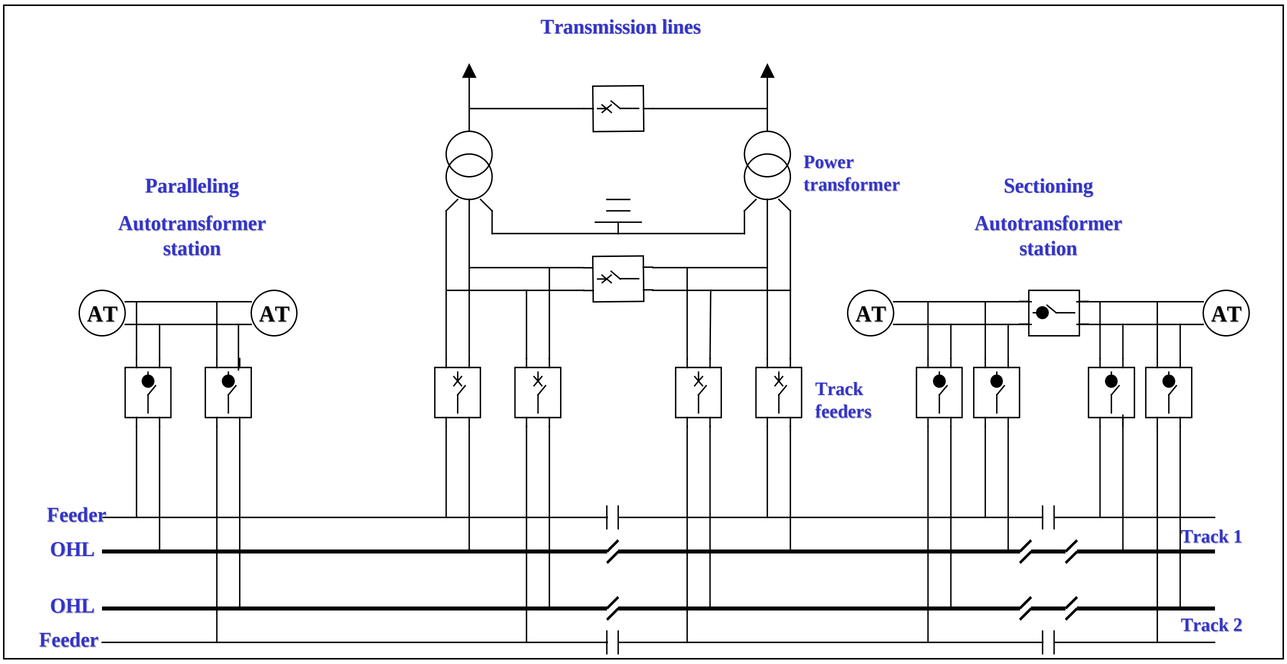


Figure 3-39 Electrical Principle of 2 x 25 kV

Compared to the 1 x 25 kV arrangement, this configuration has the following benefits:

- 3 times less line losses,
- less voltage drops,
- maximum space between substations,
- higher number of trains for the same installed power,
- disturbance limiting effect on the neighbouring low-level transmission cables.

1x25kV AC means single phase power supply for the overhead catenary unlike the 2x25kV AC system which consists in two phase power supply with 25kV voltage between overhead catenary (positive feeder) and rail, and 50kV voltage between positive and negative feeder. Combined with autotransformers at frequent intervals this system increases the distance between substations, reduces induced interference to signalling- and telecommunication equipment (probably meant with “low-level cables”) and reduces the imbalance in the overlaying three-phase power grid.

Sub-sectioning posts for the overhead lines, fitted only with mast mounted switch devices, will be installed:

- at train stations;
- at workshop, yards and engine-shed supply points; and
- at communication points between tracks right on the line.

These facilities are designed to provide overhead line sub-sectioning in the following events:

- crossovers for occasional wrong-track working;

- elementary sections at the train station; and
- engine-shed and workshop power supply and sub-sectioning.

Remote Control of Electrical Facilities (SCADA)

The substation and electric traction stations are remotely controlled from the Remote Control Centre (RCC) as well as any line switching device supplying the primary OHL (e.g. overhead line sections designed to ensure power supply continuity to the line).

Conversely, overhead line components in turnout service tracks – mainly fitted in engine-sheds and workshops – are considered as secondary OHL and the switching devices supplying them can be placed under the authority of a safety employee in charge of locally switching the devices involved.

Overhead Lines (OHL)

The function of the overhead line (OHL) is to transmit energy from the fixed installations of the electric railway to the moving traction units. In order to fulfil this function to the required standards of reliability and economy, the major features of the overhead line must be designed in accordance with the criteria set out below.

The current collection system is a combination of overhead line and pantograph sub-systems, and the quality and reliability of the performance of the current collection system depends on the characteristics of both sub-systems.

The overhead line is designed so that, at the operational speed specified, the pantograph's interaction with the contact wire shall always be such that the quality of the current collection and the dynamic behaviour of the complete system are within the parameters to be specified.

The current collection performance depends upon the design of the pantograph and this has to be considered when designing the OHL.

The combination of conductors forming the live part of the OHL in open line is designed as the polygonal and vertical type. The followings briefly characterizes the overhead line system:

- a grooved contact wire automatically tensioned by a dedicated tensioning device located at both ends of the tension section length;
- a messenger cable automatically tensioned by a dedicated tensioning device located at both ends of the tension section length;
- droppers (cable type) hanging the contact wire on the messenger;
- an aerial protection cable, non-mechanically compensated, fastened to the outer wing of the cantilever slope side by a suspension clamp;
- a feeder in phase opposition, which can be:
  - aerial cable, on open air, non-mechanically compensated, hung from a dedicated cap and pin insulator mounted at one end of a cantilever fastened at pole top, on slope side;
  - an insulated cable in case of installation in tunnels;
- a non-compensated supply feeder (eventually).

In tunnels, the same type of suspensions as those for open line equipment is used, except that the system height is reduced. Consequently, the span is also reduced.

3.11.3 STATIONS

The stations along the line are to serve as passenger and freight facilities, as well as for operational purposes (crossing and passing sidings). Several intermediate halts for passengers are foreseen. Their location will be reviewed as the Project further developed with regard to the local demand and the connection to the adjacent traffic infrastructure.

Regarding the operational requirements of a single track line, the distance between two stations has to be limited. Thus, a station may be planned at a location where no considerable traffic demand exists (e.g. Zidilovo).

The length of the sidings refers to a train length of 600 m. The AGTC (European Agreement on International Combined Transport Lines) intends a target value of 750 m length. At stations with regular freight train crossing at least one siding with this length should be provided.

The passenger platforms have a length of 100 m. The planned arrangement is a lateral platform at the side of the station building and a small platform (app. 2 m wide) between main track and siding. For safety reasons, this platform should be replaced by a platform which provides sufficient space for passenger and platform installations according to the applied structure gauge. If access is made by level crossing it should not cross the main track.

The platforms of the halts would be combined, as appropriate, with neighboring road under/overpasses in order to avoid track crossing.

The number dimensions of the freight facilities and tracks will be reviewed according the outcome of the traffic and operational concept.

3.11.4 ROLLING STOCK (PASSENGER & FREIGHT) MOVEMENTS & TYPES

There will be 2 stages in the operation of the railway: during Stage 1, anticipated to last between 2014 and 2018, only Section 1 will be operational and will run on diesel traction. From 2018 onwards, the three sections will be operational, and the railway will operate on electric traction.

With regards to diesel needs during Stage 1, at the time of preparing the ESIA there is only one diesel storage facility, which is located in Skopje. In the future, when the Project is implemented, depending on the needs, a new diesel storage facility may be constructed in the Northeast region. A full ESIA will be prepared for this facility.

Taking into account the growing demand for passenger services along the new line, the improvement of the access of the regional catchment area to major centers, Kumanovo and Skopje, the establishment of a direct railway connection between Skopje and Sofia, and also between Albania and Bulgaria via Macedonia, the service concept is based in the following assumptions:

Regional services

- The domestic (regional) trains will be operated by DMU (Diesel Multiple Unit) Trains or EMU (Electric Multiple Unit) Trains. The available types of DMU/EMU (e.g. FLIRT, TALENT) make possible to adapt the train configurations to the growing demand.
- The passenger train programme for domestic services will cover the demand for passenger services along the Project line and supply a capable railway connection between the catchment area of the line Kumanovo to the Bulgarian border and the economic, administrative and educational centre of Skopje.
- The operational programme considers in particular that the city of Kumanovo and its eastern surrounding area (which have the biggest demand) will be connected to Skopje with sufficient passenger services of demand-related frequency on the basis of synchronised timetables. Therefore, the regional services should be extended from/to Skopje.
- The regional services will be carried out based on a synchronised timetable with fixed frequencies. Each station and halt will be served on a regular interval (e.g. every hour or depending on demand).

  It is intended to operate 2 lines for regional passenger's services:
- Line 1 will serve the route Skopje-Kumanovo-Pero Cico (which has the shortest distance to the centre of Kumanovo city) because a strong demand for passenger services is concentrated in this section.

The trains between Skopje-Kumanovo and Pero Cico (Line 1) will stop at each station and halt between Kumanovo and Pero Cico.Between Skopje and Kumanovo they will stop only in major access points in order to offer attractive travel times.

- Line 2 will run from Skopje via Kumanovo-Beljakovce to Kriva Palanka, and later extended to Deve Bair (border BG) on demand during the appraisal period.

  The regional trains between Skopje-Kumanovo and Kriva Palanka (Line 2) will stop within the section between Kumanovo and Kriva Palanka/ Deve Bair border BG at each station and halt in order to serve the catchment area by the rail services.

  Furthermore, a regional express train along the route Skopje-Kumanovo-Kriva Palanka will offer a faster service and stop only at Kumanovo (and there may be various stops in the city), Kratovo and Kriva Palanka.

International services

- The international services will mainly run between Skopje and Sofia as long-distance services with direct interchanges at Skopje and Sofia to other origin/destinations in Macedonia, Bulgaria and Albania (from 2019 Skopje-Sofia, from 2021 Albania-Skopje-Bulgaria).
- The international trains are anticipated to be fast long-distance trains between Skopje and Sofia, only stopping on the Macedonian side at Kumanovo and Kriva Palanka. They will be operated as locomotive-hauled trains with five coaches or DMU/ EMU. The use of more modern train configurations (EMU) will depend on decisions of MZ-T (Macedonain Railways – Transport) and BDZ (Bulgarian railways).
- Due to the intentions of BDZ to implement some modernization, including the electrification of the sections between Gyueshevo and Sofia, until 2024 the international passenger services between Skopje and Sofia will have to be operated by diesel traction on the Bulgarian side. On the Macedonian side, electric traction will be possible. Therefore, a change of tractive stock in Gyueshovo will be required between 2019 and 2024. In 2025 the Bulgarian sections will be modernised and electrified and railway services will be fully operated on modern standards. In order to offer demand-oriented travel times between the Bulgarian border and Sofia, it is assumed, for the period until 2025, that passenger services will be operated by tilting trains. Otherwise, non-attractive travel times would be the consequence.
- The connection with other origins / destinations in Macedonia, Bulgaria and Albania should be ensured by an integrated timetable with fixed interchanges mainly at the node of Skopje.

Based on the above mentioned assumptions, the following passenger services are anticpated to commence in 2019 (start of operations along the line as a whole) with regards to volume and regional structure of demand for passenger traffic along the project line:

Stage	Category of services	PESSIMISTIC	MOST LIKELY	OPTIMISTIC
Stage 1 ***(mid of 2015-2018):*** Re-opening of Kumanovo-Beljakovce section (diesel traction)	**Domestic/ regional services:** *Line 1:* Regional train (Skopje-) Kumanovo-Pero Cico	12 train pairs /d	12 train pairs /d	12 …16 train pairs /d
	Line 2: Regional train (Skopje-) Kumanovo-Beljakovce	4 train pairs/d	4 train pairs/d	4 train pairs/d
Stage 2/3 (from 2019): Completion of the section Beljakovce –border MK/BG and connection to	**Domestic/ regional services:** *Line 1:* regional train (Skopje-)	12 train pairs/d	12 train pairs/d	12 …16 train pairs/d

Stage	Category of services	PESSIMISTIC	MOST LIKELY	OPTIMISTIC
BG railway network (on MK side from 2019 electric traction; on BG side between 2019 and 2024 diesel traction, from 2025 electric traction)	Kumanovo-Pero Cico			
	Line 2: Regional train (Skopje-) Kumanovo-Beljakovce-Kriva Palanka –border BG	4 train pairs/d	4 train pairs/d	4 train pairs/d
	Regional express (Skopje-) Kumanovo-Kriva Palanka	2…3 train pairs/d	2…3 train pairs/d	2…6 train pairs/d
	Border-crossing services: Inter-city (Skopje-) Kumanovo-Kriva Palanka-BG border (-Sofia)	2 train pairs/d	2…4 train pairs/d	2…6 train pairs/d
	International regional express (Skopje-) Kumanovo-Kriva Palanka-BG border (-Sofia)	2 train pairs/d	2 train pairs/d	2 … 4 train pairs/d

Table 3-22 Anticipated Passenger Services

Based on the results of the transport demand forecast, the freight transport along the Project line will have the following daily and annual volumes:

Section(traffic zones and assigned railway stations) 1)		Freight transport volume tonnes/d			Freight transport volume '000 tonnes p.a.		
		2019 Start of Stage 2/3	2030 Stage 2/3	2040 End of Evaluat. Period	2019 Start of Stage 2/3	2030 Stage 2/3	2040 End of Evaluat. Period
Scenario: PESSIMISTIC							
Kumanovo - Rankovce (Kumanovo station Ginovce station)	**Total**	1,904	3,289	4,240	634	1,095	1,412
	thereof:						
	dom.	389	648	811	130	216	270
	int.	1,514	2,641	3,430	504	879	1,142
Rankovce-Kriva Palanka (Ginovce station-Kriva Palanka station)	**Total**	1,741	2,978	3,840	580	992	1,279
	thereof:						
	dom.	227	338	411	76	113	137
	int.	1,514	2,641	3,430	504	879	1,142
Kriva Palanka-border MK/BG (Kriva Palanka station-border crossing point)	**Total**	1,594	2,780	3,610	531	926	1,202
	thereof:						
	dom.	80	139	181	27	46	60
	int.	1,515	2,641	3,430	504	879	1,142
Scenario: MOST LIKELY							
Kumanovo - Rankovce (Kumanovo station-Ginovce station)	**Total**	2,008	3,892	5,350	669	1,296	1,782
	thereof:						
	dom.	430	865	1,151	143	288	383
	int.	1,578	3,116	4,199	525	1,038	1,398
Rankovce-Kriva Palanka (Ginovce station-Kriva Palanka station)	**Total**	1,841	3,586	4,820	613	1,194	1,605
	thereof:						
	dom.	263	470	621	88	157	207
	int.	1,578	3,116	4,199	525	1,038	1,398
Kriva Palanka-border MK/BG (Kriva Palanka station-border crossing point)	**Total**	1,661	3,280	4,420	553	1,092	1,472
	thereof:						
	dom.	83	164	221	28	55	74
	int.	1,578	3,116	4,199	525	1,038	1,398
Scenario: OPTIMISTIC							
Kumanovo - Rankovce (Kumanovo station-Ginovce station)	**Total**	2,196	5,564	7,960	731	1,853	2,651
	thereof:						
	dom.	466	1,268	1,814	155	422	604

Section(traffic zones and assigned railway stations) 1)		Freight transport volume tonnes/d			Freight transport volume '000 tonnes p.a.		
		2019 Start of Stage 2/3	2030 Stage 2/3	2040 End of Evaluat. Period	2019 Start of Stage 2/3	2030 Stage 2/3	2040 End of Evaluat. Period
	int.	1,730	4,296	6,147	576	1,431	2,047
Rankovce-Kriva Palanka (Ginovce station-Kriva Palanka station)	**Total**	2,008	5,001	7,160	669	1,665	2,384
	thereof:						
	dom.	278	705	1,014	93	235	338
	int.	1,730	4,296	6,147	576	1,431	2,047
Kriva Palanka-border MK/BG (Kriva Palanka station-border crossing point)	**Total**	1,821	4,522	6,470	606	1,506	2,155
	thereof:						
	dom.	91	226	324	30	75	108
	int.	1,730	4,296	6,147	576	1,431	2,047

Table 3-23 Estimated Freight Transport along the Project Line

3.11.5 RAILWAY MAINTENANCE OPERATIONS

Maintenance of railways is regulated with Rulebook for way of maintenance, way of evidencing and usage of data for the permanent way (Official Gazette No. 137 dated 14.11.2007).

According to this Rulebook maintenance of tracks, appliances and facilities on the railway should be done in accordance with relevant railway standards and other technical regulation and norms which refer to railway and facilities, objects and appliances on the tracks, if it`s not required differently with this rulebook.

Maintenance of permanent way is separated to:

1) Regular maintenance is planned priory and it's repeating periodically. It's consist from: current maintenance, average repairing and main repairing.
2) Investment maintenance which consists from: reconstruction of part of the railway and servicing.
3) Unplanned maintenance

Regular maintenance aims to remove smaller defects and shortages on permanent way occurred in the period between average and main repairing. With regular maintenance the aim is to delay attrition of the track material and within regulated tolerance aims to keep the width, height and direction of track. Regular maintenance works include: dewatering of ballast, protection of tracks from outwear, lubrication and protraction of track accessories and checking of the accuracy of the same, maintenance of built in tracks (shackling, bunging and coating), regulation of the tracks, returning of misbalanced tracks, checking of profiles, replacement of tracks, replacement of tracks accessories and etc.

Investment maintenance consists of all works which can not be done under regular maintenance. For all works under investment maintenance, project for reconstruction needs to be prepared as well separate a EIA.

Planned maintenance is related with unplanned attrition of material, force majeure (floods, landslide, gully, sliding, emergency situations or are caused by some works in vicinity of railway, beside the railway or at the railway.

Vegetation Management

Regular maintenance of vegetation within the railway line rights-of-way is necessary to avoid interference with train operations and track maintenance. Unchecked growth of trees and plants can cover signals, fall into the tracks and overhead power lines, and prevent workers from getting to places of safety when trains are passing.

The railway regulation requires the management of vegetation so that it does not become a fire hazard (because trains produce sparks), obstruct visibility of railway signs and signals, interfere with track site duties performed by railway employees, prevent proper functioning of signal and communication lines, or prevent railway employees from visually inspecting the moving equipment.

The regular maintenance of rights-of-way to control vegetation may involve the use of mechanical methods (e.g. cutting/mowing with heavy machinery or hand pruning) and use of herbicides.

Herbicides are essential in railway vegetation management programs for compliance with safety regulations. It is not possible to ensure safety and reliability using non-chemical control methods alone. For weed control in the ballast section-the rock underlining the track structure- there is no proven alternative to targeted herbicide applications.

Without vegetation management using herbicides, excessive weed growth within railway tracks would affect track geometry, causing track instabilities and potentially leading to accidents. Poorly controlled vegetation also lessens the effectiveness of safety inspections and impedes drainage. In addition, leaf litter and debris on track rails creates slippery conditions for acceleration and breaking.

Table 3-24 below shows the main interferences with train operations and track maintenance, the associated risks, and the recommended measures to reduce these risks.

	Issue	Risks	To reduce occurrence
	Trees/branches falling on to the track. Vegetation fouling the clearance envelope.	Injury to train drivers and passengers on train. Injury to work crews. Damage to trains.	Select appropriate species that are not subject to wind throw or shedding branches. Plant trees a distance away from track of the mature height of the tree.
	Vegetation obstructing line of sight at level crossings.	Collision of trains with road vehicles who fail to give way.	Select appropriate low growing species, e.g. native grasses.
	Vegetation obstructing line of sight of signaling or signage.	Reduces braking distances of trains and increases chances of SPAD (signal passed at danger).	Maintain clearance envelope. Select appropriate low growing species, e.g. native grasses.
	Vegetation fouling communication/power lines	Broken telemetry wires may allow two trains to enter a section resulting in a head-on collision. Fires may result from short circuiting power lines.	Maintain clearance envelope under and around pole lines.

	Issue	Risks	To reduce occurrence
	Vegetative fuel.	Sparks from trains or work crews, lightning strikes or arson may result in a fire on the rail reserve.	Reduce fuel loads by managing mechanically, burning or substituting with vegetation of lower biomass. Chemical management may be used in areas of non-native vegetation.
	Trees/shrubs on face of rock cutting leading to 'root jacking'.	Rocks falling onto rail infrastructure resulting in damage. Rock falls causing injury to people.	Remove trees/shrubs from faces of rock cuttings.
	Excessive vegetative growth in work areas, e.g. signal boxes, shunting yards etc.	Hazardous to work crews – living dangers, e.g. snakes and also tripping hazards.	Keep work areas maintained – reduce weed growth as outlined in this document.
	Growth at the toe of ballast reduces track drainage.	Reducing drainage softens formation and leads to track defects and increased maintenance.	Keep toe area clear by use of appropriate chemical.

Table 3-24 Summary of Vegetation Management Related Maintenance Issues

Chapter 4 Assessment Methodology & Scoping Assessment!

Defines the scope of the assessment based on the issues which have the potential to cause significant effects on the receiving environment and communities, the scoping opinion of the relevant authority and the opinions of stakeholders. Describes the methodology applied for the assessment of potential environmental and social impacts and the determination of the significance of residual effects.

4 ASSESSMENT METHODOLOGY & SCOPING ASSESSMENT

4.1 GENERAL APPROACH TO THE ASSESSMENT

The ESIA Methodology is based on extensive experience and knowledge of the:

a) Environmental and Social Impact Assessment procedure in Macedonia;
b) International environmental and social policies and performance requirements (e.g. EBRD, EIB and IFC);
c) Environmental impact assessment techniques and methods (e.g. national and EU Guidance on EIA procedures, Scoping Check Lists, DMRB Volume 11[1], Leopold Matrix, Geographical Information Systems GIS), Environmental auditing questionnaires etc.);
d) National and EU environmental and social legislation relevant to the Project, see *Chapter 2* (and the understanding of the important gaps existing between National & EU legislation);
e) Multilateral Conventions that Macedonia has ratified, including those focused on transparent and open public disclosure processes (see *Chapter 2)*, for example the Aarhus and Espoo Conventions[2];
f) Importance of public involvement at the earlier phases of project preparation in order to ensure open discussion and public participation in the decision-making process.

As a degree of the required works for the Railway Corridor VIII – Eastern Section Project were previously completed this has been taken into account in the assessment process.

The aim of an Environmental & Social Impact Assessment (ESIA) is to identify the potential environmental and social impacts of a project and to evaluate mitigation and management measures to avoid, reduce or remediate potential impacts. The general approach to the assessment of the Railway Corridor VIII – Eastern Section Project has been developed on the basis of the standard ESIA practice defined in the following steps:

- **Define the Project & Consider Alternatives:** Define the proposed Project activities, timeframe and details which are likely to affect the surrounding environment and communities, along with considering the alternatives (e.g. route alignment alternatives) *(see Chapter 3)*;
- **Scoping:** Define the scope of the assessment based on the issues which have the potential to cause significant effects on the receiving environment and communities, and from the Scoping Opinion of the regulatory authority in this regard (i.e. the MoEPP) *(see Chapter 4)*;
- **Study Area(s):** Establish the study areas, including both the spatial and temporal boundaries *(see Chapters 5 & 6)*;
- **Baseline Conditions:** Define the existing baseline social and environmental conditions of the study area along the route and within the potential area of influence of the Project. The baseline seeks to identify the environmental and social receptors and resources within the study area in order to understand and determine the value (or sensitivity) of these receptors and resources *(see Chapter 5)*;
- **Identify Potential Social & Environmental Impacts of the Project:** Define (*for relevant aspects*) the value (or sensitivity) of the receptors and resources likely to be impacted. Identify the potential environmental and social impacts, (including cumulative, synergistic and transboundary impacts).

[1] Design Manual for Roads and Bridges (DMRB); Volume 11: Environmental Assessment: Section 2 (2008); dft.gov.uk
[2] UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (adopted on 25th June 1998); (Aarhus Convention) and Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) (February 1991)

Determine the magnitude of potential impacts (i.e. change) from the Project on the environmental and social baseline conditions (including the receptors and resources). Determine the likely significance of the effect of these impacts **before mitigation measures are applied** (i.e. Significance of Effects (**without mitigation**)); *(Chapter 6);*

- **Detail Appropriate Mitigation Measures:** Detail appropriate mitigation measures to address predicted negative effects and enhancement measures to maximise anticipated benefits *(see Chapter 7)*;
- **Assess the Residual Effects of the Project and Determine Level of Significance:** Determine significance of residual effects (including any residual cumulative, synergistic and transboundary effects) after consideration of the effectiveness of the design and committed mitigation measures. Therefore this stage of the assessment determines the likely significance of any residual effects **following the application of mitigation measures** (i.e. Significance of Effects **(with mitigation)**) by considering the Significance of Effects **(without mitigation)** along with the **probable success of mitigation measures**; *(see Chapter 7)*.
- **Plan Environmental & Social Management & Monitoring Arrangements, including Stakeholder Engagement**; *(see Chapter 8)*.

This Chapter of the ESIA provides a description of the assessment methodology for the Railway Corridor VIII – Eastern Section Project. *Chapter 3* of the ESIA outlines the Project Description and Consideration of Alternatives, based on the current knowledge of the Project and previous project preparation activities. Baseline environmental and social conditions are described within *Chapter 5*. Potential environmental and social impacts, mitigation measures and residual effects are presented within *Chapters 6* and *7,* respectively. With the environmental and social management and monitoring arrangements for the Project being described in *Chapter 8.*

The ESIA procedure in Macedonia, which follows the requirements of EU Directives on ESIA, consists of 4 main steps:

- a **Screening** process (in which the need or not to subject a particular project to full ESIA procedure is determined);
- a **Scoping** process (where the authority and Project Proponent (*in this case the MoTC)* establishes the content and extent of the matters and critical issues to be covered in ESIA study);
- the **Preparation of the ESIA** study itself (according to the guidelines established in the legislation and the requirements set in the scoping decision); and
- the **Decision-making process to grant or reject the project implementation consent** (based on the analysis of the adequacy of the ESIA study to demonstrate the environmental and social performance of the project, and the input of the stakeholders resulting from the stakeholder engagement process that has taken place during the ESIA procedure). After project implementation, the procedure is to continue by monitoring the environmental and social performance of the project.

The ESIA procedure is briefly summarized in *Figure 4-1* Diagram of National ESIA Procedure and a more detailed description of this procedure is provided in *Chapter 2*.

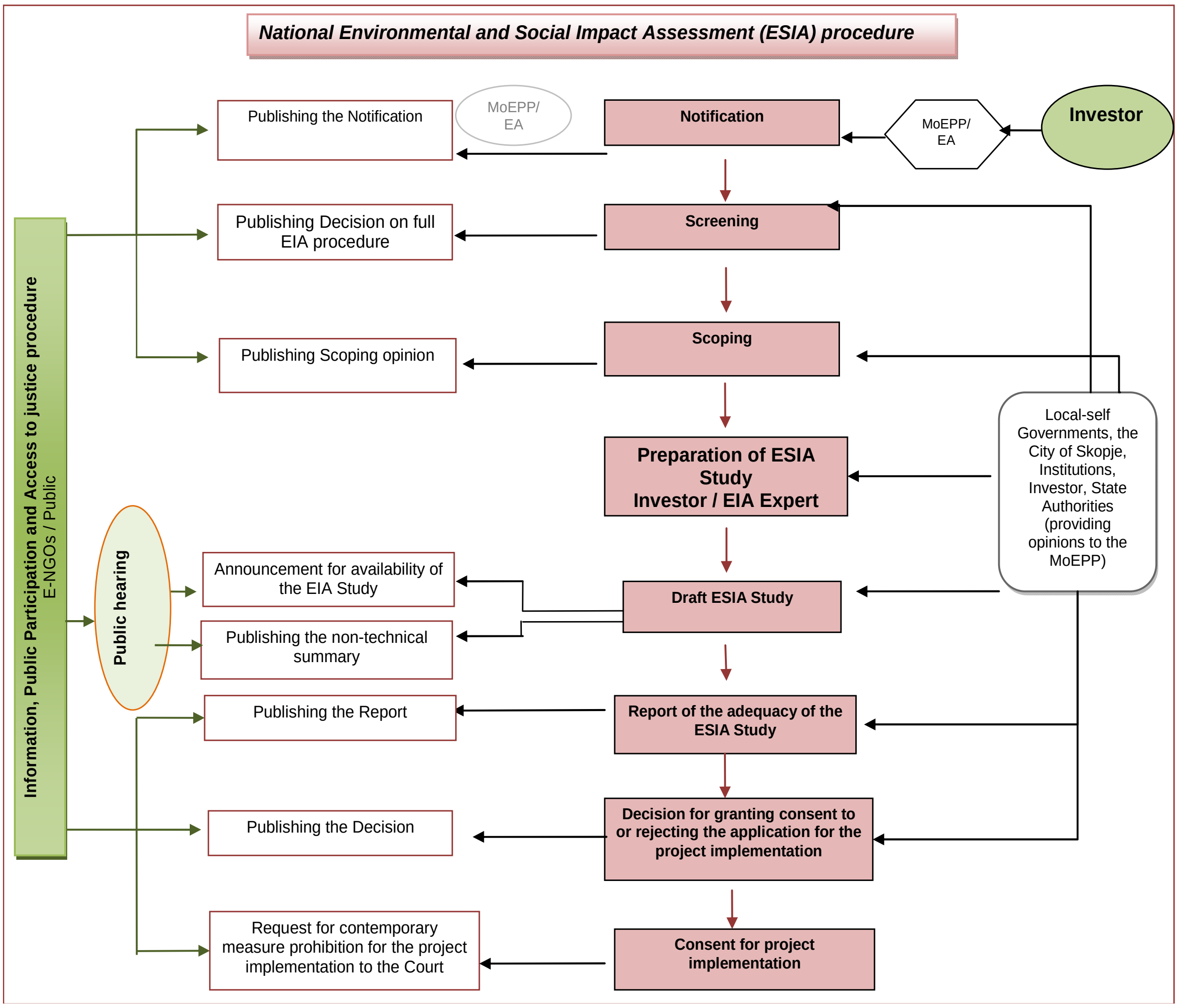


Figure 4-1 Diagram of National ESIA Procedure

Below the screening and scoping steps undertaken for the Railway Corridor VIII – Eastern Section Project are described, followed by a description of the methodology used in the preparation of the ESIA study. A full description of the organization of the ESIA study is provided in *Chapter 1*.

4.2 SCREENING

The "Railway Corridor VIII – Eastern Section" Project falls under Annex I of the *Decree on determining projects for which the full EIA procedure should be carried out* (Official Gazette No. 74/05), under sub-category 7(a): Construction of lines for long-distance railway traffic and airports with a basic runway length of 2,100 m or more. Consequently, the Project has been subject to the full EIA procedure, according to the Macedonian environmental legislation (*listed in Chapter 2, Sub-chapter 2.1.1*).

Likewise, according to the EBRD categorization of the financed projects based on environmental and social criteria reflecting the level of potential impacts, nature and level of assessments, information disclosure and stakeholder engagement, the Project falls under the Appendix 1: Category A projects, sub-category 7: Construction of motorways, express roads and lines for long-distance railway traffic. Therefore a participatory assessment process has been undertaken following the EBRD Performance Requirements given in their Environmental and Social Policy (2008[3]), as well as the EIB's environmental and social requirements outlined in their Environmental and Social Practices Handbook

[3] Environmental & Social Policy (May 2008); European Bank for Reconstruction and Development http://www.ebrd.com/downloads/about/sustainability/2008policy.pdf

(Version 2: 24/02/2010). The development of the Macedonian EIA and EBRD's ESIA has been consolidated into one process and documented in this single report.

4.3 SCOPING OPINION & ASSESSMENT

A scoping assessment has been undertaken to identify the environmental and social aspects which are likely to be potentially affected by the Project in order to determine the areas of the assessment that should be focused on. The scoping process considered the following matters:

- the scoping opinion and guidance provided by the Ministry of Environment and Physical Planning (MoEPP);
- Stakeholder Scoping; and
- Scoping matrix (based on the Leopold Matrix method to a degree): a scoping matrix has been used to take account of the potential interaction between the project activities and the various environmental and social aspects.

4.3.1 SCOPING OPINION & GUIDANCE FROM REGULATOR (MOEPP)

According to the national ESIA procedure, the Ministry of Transport and Communication/JP "Macedonian Railways"- PERI submitted the "*Notification Letter to the Ministry of Environment and Physical Planning – Environmental Administration"* in March 2011, asking for a scoping opinion to identify the types of environmental impacts to be investigated in more detail and to be reported in the ESIA Study. The Ministry of Environment and Physical Planning (MoEPP) provided officially the Decision on the necessity for full ESIA procedure in June 2011. As for the scope of the study, besides the questions included in the Checklist for determination of the scope of the study for evaluation of the project's impact on the environment, the investor was required to elaborate in detail the following issues (a copy of the Decision with archive number 11-2285/2 from 17.06.2011 is provided in *Annex 2*):

a) *Visual aspects:* the physical characteristics and visual effects of the railway infrastructure related to the acceptability of the new landscape of the region by the local population and other receptors, especially in the operational phase, should be included;
b) *Biological diversity:* the study should include an analysis of the biological diversity of the region, possible presence of protected and affected types of habitats, presence of protected areas, areas envisaged to be put under protection, presence of ecosystems, as well as the potential impacts of the project's execution;
c) *Cumulative impacts:* an analysis of the cumulative impacts should be included in case there are projects / installations with a potential for similar impacts on the environment in the surrounding of the proposed project; and
d) *Socio- economic aspects:* a review of the potential direct and indirect effects of the project on the local economy and the social conditions in the region should be included.

These issues and all other relevant socio-economic and environmental issues have been covered as well, according to the national legislation on ESIA Study Content (*Listed in Table 2-1; Chapter 2).*

4.3.2 STAKEHOLDER SCOPING MEETINGS

In order to ensure stakeholder engagement early in the environmental and social appraisal process, Scoping Stakeholder Meetings were organized during January to May 2011 with all identified stakeholders (the Stakeholder Matrix is given in the Stakeholder Engagement Plan (SEP) *see Chapter 12*). The objectives of the meetings were to:

a) Disclose relevant project information;
b) Understand better the local circumstances regarding the social and economic development of the region/municipalities, and opportunities for further development after the project implementation;

c) Discuss the possible environmental sensitive areas along the railway corridor and any “hot” environmental issues already identified within the strategic environmental planning documents; and
d) Discuss the best suitable consultation methods and ways in which the public can participate in open, proactive manners.

All information and data on environmental and social issues relevant to the project activities were welcome and taken into account for the baseline research. All local specific conditions or priorities already adopted in strategic planning documents (e.g. LEAP (Local Environmental Action Plan), LER (Local Economical Development), Waste Management Plan and Programmes, various environmental analytical tests on water, noise and air quality) were also taken into consideration.

All the main findings, concerns and recommendations provided by the various stakeholders during the scoping meetings were taken into consideration in the scoping assessment. The stakeholders pointed out several crucial issues including:

a) the large dump site for inert waste near Kuklica was developed as a temporary one and due to the lack of restored/ re-cultivation and village being flooded;
b) necessity of reuse of the inert waste by the local SMEs;
c) the protection of small rivers/streams near Kriva Palanka (Krkljanska and Kiselicka);
d) need for rail crossings (over and under);
e) the access roads that will be constructed should be available for people to have easy access to the train;
f) the signaling should be made on proper manner to avoid any accidents;
g) the existing roads will be damaged due to movement of heavy vehicles and machines, so the rehabilitation of the roads is required when the construction work finish;
h) the necessity of employment of the local population;
i) level of noise during the operational phase; and
j) needs for public awareness about the risk control and reduction of railway accidents.

4.3.3 SCOPING MATRIX

The potential environmental and social[4] impacts of the planned rehabilitation project activities (especially important for the Section 1 of the railway alignment) and construction activities of the planned railway line for the Section 2 and Section 3 were reviewed in the Scoping Matrix for the main project phases to identify the likely environmental and social aspects which will be impacted by them. The Project activities that have been considered as part of the Scoping Matrix include those to be undertaken during the design, rehabilitation, construction and operation of the railway. These phases are described below and includes the interim operation of Section 1 using diesel traction and operation of the whole eastern section (Section 1 to 3) using electric traction:

- The *Construction Phase (including design)* activities considered in the scoping phase and where relevant within the subsequent impact assessment includes all those undertaken during the time of building and construction of all railway elements for the entire Project during both investment delivery phases (Stage 1 and Stage 2/3; *see Chapter 3 Project Description).* This would include all construction activities and *decommissioning* of the temporary construction facilities.
- Two *Operational Phases* which are considered reflective of the investment delivery phases (Stage 1 and Stages 2/3 outlined in *Chapter 3):*
    - *Operational Phase (Stage 1)*: Operation of Section 1 **Kumanovo to Beljakovce** only using diesel traction from the end of 2014 to 2018 when Stages 2/3 are anticipated to be completed; and

[4] Also referred to as socio-economic.

- *Operational Phase (Stage 2)*: Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 **Kumanovo to Bulgarian border (Deve Bair)** using electric traction anticipated to commence railway operations by the end of 2018.

The *Operational Phase* assessment considers all operational activities including:

- Operation of the railway line, which may potentially result in impacts such as the generation of noise and vibration, release of chemicals, fuels or hazardous substances leakage from the freight traffic, killing of crossing animals, generation of various waste streams; and
- Maintenance activities of the trains/track or electrification system, which may potentially result in impacts such as on the occupational health and safety for the workers that will perform regular maintenance of the railway and public safety during the maintenance.

Decommissioning of construction sites and temporary facilities is also considered within the scope of the assessment as part of the *Construction Phase* activities. However, decommissioning of the railway line has not been considered within the ESIA at this stage due to both limited information being available at this stage with regard to the ceasing of operation of the railway and given the intention is with maintenance the railway line will continue to operate beyond its design life. In the event that the railway line ceases operation and needs to be decommissioned relevant approvals will be sought and if required an ESIA produced for this phase.

The potential impacts (adverse and positive) of all planned project activities have been identified and the interaction among the project activities in all these phases and the natural/physical environment and social-economic life of the population was addressed using the Environmental and Social Scoping Matrixes below.

		PROJECT ACTIONS/ACTIVITIES	Soil quality	Soil erosion	Topsoil	Surface water quality	Surface water flow patterns	Sediments deposition	Groundwater quality	Hydrogeological flow patterns	Air quality	Noise and vibrations	Landscape	Flora	Fauna	Habitats	Protected and Designated sites	Cultural Heritage
Construction phase	1	*Clearance of existing land, vegetation and buildings*	X	X	X	X		X			X	X	X	X	X	X	X	
	2	*Temporary sites used for construction works (material storage and equipment maintenance camps, concrete batching plants, crushing plants) and housing of construction workers*	X		X	X			X		X	X	X	X	X	X		
	3	*Above ground construction, earthworks, cut and fill or excavations, and building of linear structures and stations*	X	X	X	X		X	X	X	X	X	X		X	X	X	X
	4	*Underground works including mining or tunnelling*							X	X	X	X						
	5	*Haulage roads*			X								X	X		X	X	X
	6	*Construction traffic and machinery movement*	X	X		X		X	X		X	X	X	X	X	X	X	
	7	*Inert waste landfills*									X		X	X	X	X	X	
	8	*Borrow pits*	X	X	X	X		X			X		X	X	X	X	X	X
	9	*Impoundment, realignment or other changes to the hydrology of watercourses or aquifers*	X	X	X	X	X	X		X				X	X	X	X	
	10	*Rivers/Stream crossings (building the bridges)*	X	X	X	X	X	X						X	X	X	X	
	12	*Usage, storage, transport, handling or production of hazardous substances*				X			X								X	
Operational phases		*STAGE 1 (Diesel traction)*																
	1	*Trains passing*				X			X		X	X			X	X	X	
	2	*Presence of permanent way, bridges, tunnels and stations*					X	X					X			X	X	
	3	*Passengers/loads in/out the trains and at stations*				X					X	X						X
	4	*Maintenance of railway track*				X			X		X			X	X	X	X	
		STAGE 2 (Electrical traction)																
	1	*Trains passing*				X			X			X			X	X	X	
	2	*Overhead power lines*													X	X	X	
	3	*Presence of permanent way, bridges, tunnels and stations*					X	X					X			X	X	
	4	*Passengers/loads in/out the trains and at stations*				X					X	X						X
	5	*Maintenance of railway track*				X			X		X			X	X	X	X	

Table 4-1 Scoping Matrix – Environmental Aspects - Identification of the Potential Interactions Between Project Actions and Environmental Aspects

Phase	No.	PROJECT ACTIONS/ACTIVITIES	Land and Property	Community Health and safety	Community tensions	Access & Severance	Disruption of utilities	Economy	Employment	Education and Training	Vulnerable groups	Workforce Related impacts	Communities "Quality of Life"
Construction phase	1	*Above ground construction, earthworks, cut and fill or excavations, and building of linear structures and stations*	X	X	X	X	X	X	X	X	X	X	X
Construction phase	2	*Temporary sites used for construction works (material storage and equipment maintenance camps, concrete batching plants, crushing plants) and housing of construction workers, placement of borrow pits and landfill*	X		X	X	X	X	X	X		X	
Construction phase	3	*Haulage roads*	X	X		X							X
Construction phase	4	*Construction traffic and machinery movement*		X	X	X						X	X
Construction phase	5	*Manipulation with hazardous materials during construction and transport of raw materials and finished materials*		X								X	
Operational phases	*OPERATIONAL PHASE (Stage 1) Operation of Section 1 Kumanovo to Beljakovce only with Diesel Traction The fact the railway is operated under diesel or electrical power does not create differential impacts in social receptors*												
Operational phases	*OPERATIONAL PHASE (Stages 2/3) Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 Kumanovo to Bulgarian border (Deve Bair) using Electric Traction*												
Operational phases	1	*Presence of permanent way, bridges, tunnels and stations, passenger and freight traffic*	X	X		X		X	X	X	X	X	X
Operational phases	2	*Passengers/loads in/out the trains and at stations*		X								X	
Operational phases	3	*Maintenance of railway track*										X	
Operational phases	4	*Trains passing*		X								X	X
Operational phases	5	*Overhead power lines*		X			X					X	

Table 4-2 Scoping Matrix – Social Aspects - Identification of the Potential Interactions Between Project Actions and Social Aspects

4.3.4 CONCLUSIONS TO PROJECT SCOPING ASSESSMENT

Based on the scoping process, which has considered the findings from the Stakeholder Scoping Meetings, the scoping opinion and guidance provided by the MoEPP and from the Scoping Matrixes to identify the potentially affected environmental and social aspects, the assessment of impacts in the ESIA has focused on the following issues:

- Soil and waste;
- Surface and ground water;
- Air emissions and air quality including climate change;
- Landscape and visual effects;
- Noise and vibration;
- Habitats;
- Flora and Fauna;
- Protected and Designated areas;
- Natural, cultural and archaeological heritage;
- Job creation;
- Income opportunities;
- Labour and working conditions including OH&S standards;
- Community safety and health;
- Livelihood;
- Living conditions;
- Railway accidents;
- Development of local, regional and national economy.

In addition, consideration has also been given to the cumulative effects, synergy among impacts and transboundary impacts (see *Chapter 7*).

4.4 SPATIAL & TEMPORAL SCOPE

4.4.1 SPATIAL STUDY / INVESTIGATION AREA

The spatial scope of the study/investigation area for the assessment has been determined for each of the environmental and social aspects/topics on a case by case basis in order to reflect both the:

- potential area of influence of the Project; and
- the surrounding environment over which significant effects could reasonably occur both from the Project and in combination with any other relevant projects/developments in the area.

For the majority of the environmental and social aspects/topics, the strip of land adjacent to the railway alignment has been considered for the assessment of impacts. However, where sensitive receptors and resources are located beyond the immediate area along the route, this has been considered where appropriate to be part of the study area for certain environmental and social topics. The results of the consultation with stakeholders (e.g. Stakeholder Scoping Meetings) have been considered when determining the relevant spatial study area for specific environmental and social topics.

Where relevant, consideration is given to the potential ‘regional’ and ‘local’ effects of the Project in determining the study areas. Therefore, where appropriate, for some topics, and specifically the social ones, a Regional Study Area (RSA) and a Local Study Areas (LSA) have been adopted. The social topics (including socio-economic and land use_ Local Study Area were determined by consideration of the potential effects on local communities. Given the wider regional and national influence of the Railway Corridor VIII-Eastern Section Project, a Regional Study Area (i.e. the North-East region of Macedonia) was considered relevant for certain elements of the socio-economic assessment. The environmental topics study areas were determined by consideration of potential effects on the physical and natural environment per environmental topic.

Both potential direct and indirect effects are considered in the impact assessment and in determining the appropriate study areas. Each topic has considered the areas where direct effects are likely to occur (i.e. generally within the Project footprint with a relevant buffer) and the area where indirect and cumulative effects are likely to occur on the surrounding area and the communities that live and work in the area from the proposed Project activities during construction and operation of the railway.

In any case, in Chapter 5 describing the environmental and social baseline, the study area is defined for each individual environmental and social aspect.

4.4.2 TEMPORAL SCOPE OF ASSESSMENT

The Railway Corridor VIII – Eastern Section Project will be delivered in 2 main phases (Stage 1 and Stages 2; *see Chapter 3)*. Hence, it has been determined that the ESIA should address the following assessment phases:

- The *Construction Phase (including design):* during the time of building and construction of all railway elements for the entire Project during both investment delivery phases (Stage 1 and Stage 2; *see Chapter 3 Project Description).*
- Two *Operational Phases,* which are considered to be reflective of the investment delivery phases (Stage 1 and Stage 2 outlined in *Chapter 3):*
    - o *Operational Phase (Stage 1)*: Operation of Section 1 **Kumanovo to Beljakovce** only using diesel traction from the end of 2014 to 2018 when the construction of Stage 2 is anticipated to be completed; and
    - o *Operational Phase (Stage 2)*: Operation of completed Railway Corridor VIII – Eastern Section Project Sections 1, 2 and 3 **Kumanovo to Bulgarian border (Deve Bair)** using electric traction, railway operations are anticipate to commence by the end of 2018.

4.5 BASELINE ENVIRONMENTAL & SOCIAL CONDITIONS

4.5.1 BASELINE DATA GATHERING

The baseline data gathering was designed to provide sufficient data and information on the existing state of environment, socio-economic and other social conditions of the study/investigation area at the national, regional(covering the north-eastern region), and local(focused on the specific conditions in the immediate vicinity of the railway alignment), as appropriate.

The following baseline research methods were used:

a) Desk based research through the available strategic planning documents (e.g. National Transport Strategy, Spatial Plan for Macedonia, Annual Reports from the State Statistical Office, National Environmental Action Plan II, National Environmental Approximation Strategy, National Biodiversity Strategy and Action Plan, Programme for development of the North-Eastern region, Local Environmental Action Plans, Local Economic Development Plans, main project documentation, and studies on specific environment/social issues (e.g. Main Project on landfills for inert waste, Expropriation Report, Archaeological Research Reports, etc.);

b) Research through the existing social-economic databases (e.g. regional and local population indicators like demographics, migration patterns, social development indicators like unemployment, employment, economy structure, labour market, income levels, land use, e- NGO, social organizations and national data on the macro economic situation, economic activities, education, health, recreation, social policy, development priorities, etc.);

c) Research through the existing environmental databases (e.g. protected areas along the alignment, Emerald Network areas, natural, cultural and archaeological sites near the route, characteristics of land, geomorphology, noise indicators, water resources and water quality, existing waste practices in Macedonia, air quality, etc.);

d) Field visits – several site visits were performed by the ESIA experts and responsible persons from PERI with the main aim of gathering site specific information or generating data needed to better understand better the sensitivity of the receptors that may be potentially affected by the project through meetings, questionnaires, measurements, etc.;

e) The field observations and the habitat types mapping performed in May-June 2011 in order to recognise the existing habitats, evaluate the biodiversity of existing ecosystems, and recognise the sites of special importance concerning the biodiversity and the natural heritage;

f) The Survey on socio-economic conditions of the population living in the settlement of PeroCico, Kumanovo, conducted by the Center for Social Welfare Kumanovo;

g) The noise surveys conducted in July 2011 to make up for the lack of existing data on noise indicators along the railway route; and

h) Expert judgment for some issues where no other data source was available.

4.5.2 SOURCES OF DATA

The main sources of information and data were the public enterprise "Macedonian Railways - Infrastructure" – PERI, the Ministry of Transport and Communication, the Ministry of Environment and Physical Planning, the Ministry of Culture, the Center for Social Welfare Kumanovo, the State Statistical Office of the Republic of Macedonia, The Ministry of Economy, the Ministry of Social Affairs and the municipalities of Kumanovo, Kratovo, KrivaPalanka and Rankovce.

A detailed list of all the relevant data and information sources used during the development of the ESIA Study is presented in *Chapter 15 References*.

4.6 ASSESSMENT METHODOLOGY

The impact identification and assessment process has been carried out based on the baseline conditions identified, the value/sensitivity of resources and receptors, and the project actions and activities that may significantly affect the baseline environmental or socio economic conditions during any of the various project phases (i.e. Temporal Scope described above). The assessment has followed the methodology and Significance Criteria described below (unless specifically noted within the impact assessment sections *(Chapters 6.2 and 6.3)*, and has concentrated on identifying the likely significant residual effects of the Project. Broadly, significance is a function of:

- The value of the resource or the sensitivity of the receiving environment/community/receptor and numbers affected (where relevant), including the current status/characteristics of community receptors;
- The type (direct/indirect/cumulative) and the magnitude of the impact(low/medium/high), and whether it be adverse or beneficial;
- The reversibility of the impact (reversible/irreversible impact);
- Geographic extent of the impact (local/regional/national or transboundary/global);

- Time when the impact occurs (immediate/delayed);
- Duration of the impact (short term/medium term/long-term);
- Likelihood of the impact occurring (certain/probable/unlikely).

Unless specified otherwise within the methodology for each topic, the value, magnitude of change and significance of effect has been established based on the guidance below (which has partially been based on the Leopold Matrix method and good practice guidance for linear project (e.g. as contained within DMRB Volume 11 Section 2[5])).

4.6.1 ASSIGNING VALUE (OR SENSITIVITY) OF ENVIROMENTAL & SOCIAL RESOURCES AND RECEPTORS

Certain environmental and social aspects/topic assessments have defined (*for relevant aspects*) the value (or sensitivity) of the receptors and resources likely to be impacted, such as watercourses, landscape quality, habitats and cultural heritage. The value of potential environmental and social receptors and resources has been established, unless stated in the topic impact assessments (*Chapter 6)* in accordance with the generic criteria outlined in the table below:

Value (sensitivity)	Typical descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or Lower)	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 4-2 Generic Environmental/Social Value (or Sensitivity) Criteria[6]

4.6.2 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS

The potential environmental and social[7] impacts (adverse and positive) of all planned project activities during the Construction and Operational Phases were initially identified by means of the Scoping Matrix, where the interactions between relevant project activities and the natural/physical environmental aspects and the social aspects were considered to determine whether the interaction may create a potential impact.

The potential impacts on the baseline conditions were then evaluated according the following criteria:

Criteria	Further Description of Criteria	Indicative Assessment Thresholds used for each Rating Criteria:	
		Threshold	Typical Descriptions
Characterization of Impact	Direction of the impact.	Positive	Impact is an improvement on the current situation or is desirable
		Negative	Impact is a worsening over the current situation or is not desirable.

[5] Design Manual for Roads and Bridges (DMRB); Volume 11: Environmental Assessment: Section 2 (2008); dft.gov.uk
[6] Based upon DMRB Volume 11 Section 2 part 5 Table 2.1; August 2008 (dft.gov.uk).
[7] Including socio-economic impacts.

Criteria	Further Description of Criteria	Indicative Assessment Thresholds used for each Rating Criteria:	
		Threshold	**Typical Descriptions**
Type of Impact		Direct	Project results in a direct impact upon aspect/receptor/resource (i.e. generally within the Project footprint with a relevant buffer).
		Indirect	Indirect effect upon aspect/receptor/resource.
		Cumulative	Cumulative effect upon spect/receptor/resource.
Reversibility	Reversibility is the ability for a physical parameter, biological or social community to return to the conditions that existed prior to the impact.	Reversible	The effect is reversible.
		Irreversible	The effect is potentially permanent and not reversible.
Geographic Extent	Describes the area over which the particular impact will occur and is related to the spatial boundaries of the assessment.	Local	Impact is limited to specific individuals or population groups/communities or environmental receptors at or close to the Railway Corridor VIII-Eastern Section.
		Regional	Impact extends across the North-Eastern region of Macedonia.
		National or Transboundary	Impact extends through much or all of Macedonia or Bulgaria/South East European (SEE) area.
		Global	Effect extends globally beyond SEE area.
Time when the impact occurs	Associated with when the impact will occur.	Immediate	Effect occurs immediately following project activity/action.
		Delayed	Effect delayed and occurs sometime after project activity/action.
Duration	Refers to how long an impact will occur and is closely related to the project phase or activity that could cause the impact.	Short-term	Impact is expected to last in the short-term (e.g. less than two years).
		Medium-term	Impact is expected to last in the medium-term (e.g. between two and ten years).
		Long-term	Impact extends throughout operation of railway and/or beyond 10 years.
Likelihood of appearance	The likelihood that the impact will occur.	Unlikely	The impact can be considered to be unlikely to occur.
		Probable	The impact can be considered to have a medium likelihood of occurring.
		Certain	The impact can be considered to have a high likelihood of occurring.
Magnitude	Describes the nature and extent of the social or environmental impact, and is quantified in terms of the amount of change.	Negligible/No change	Does not have a measurable impact.
		Low	Has a distinguishable low level impact on the environmental component or on individuals within the local population/social aspects. For *Negative* Impacts: Some measurable change in resource or its quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. For *Positive* impacts: Minor benefits to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on resource or reduced risk of negative impact occurring.

Criteria	Further Description of Criteria	Indicative Assessment Thresholds used for each Rating Criteria:	
		Threshold	**Typical Descriptions**
		Medium	Impacts are both distinguishable and measurable and affect the majority of the local population/social aspects or environment. For *Negative* Impacts: Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. For *Positive* Impacts: Benefit to, or addition of, key characteristics, features or elements; improvement of receptor/resource quality.
		High	Has a measurable and sustained positive or negative impact on social or environmental aspects. For *Negative* Impacts: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. For *Positive* Impacts: Large scale or high improvement of resource quality; extensive restoration or enhancement; major improvement in receptor/resource quality.

Table 4-3 Criteria for Evaluation of the Potential Impacts

Furthermore, for certain topics quantitative thresholds/limit values (e.g. air quality, water quality, noise levels etc) have been considered in determining the **Magnitude of Impact.**

4.6.3 SIGNIFICANCE CRITERIA

The likely significance of the effect of these impacts before mitigation measures are applied (i.e. Significance of Effects (without mitigation)) were then assessed based on the following the generic Significance Criteria outlined in the Table below. Furthermore, this Significance Criteria has been considered when determining the significance of the Residual Effects (with mitigation) referred to below under *Sub-chapter 4.6.5.*

Significance Category	Typical description of effects
Very Large	Only negative effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not always, associated with sites or features of international, national or regional importance that are likely to suffer a significant permanent irreversible impact and loss of resource integrity. However, in special cases a major/high change in a site or feature of local importance may potential enter this category. Significant permanent irreversible impacts to a defined community and its quality of life and socio-economic status which would represent key factors for decision–making processes related to the Project. Significant risks to community safety which may result in fatalities that cannot be mitigated. Loss of properties , land and livelihood opportunities of a scale which would make a defined community and its quality of life unsustainable.
Large	Effects are measurable and sustained and result in strong concern among stakeholders or result in substantive changes in defined populations/communities or result in a large change in environmental or social/socio-economic conditions. Usually are of long-term duration and not easily managed. These effects are likely to be important at a regional to national level because they contribute to achieving national/regional objectives or are likely to result in regulatory objectives being exceeded and/or breach in legislation. Project may involve the demolition of dwellings/acquisition of properties and other changes to communities, and especially vulnerable people, which have a material impact on the quality of life in the neighbourhood (e.g. loss of housing or livelihood that cannot be replaced in the locality or compensated for) and/or socio-economic status of the population . Effects on other land uses, such as acquisition of property and land, which may lead to closure of a community facility and material loss to the community/ businesses/livelihoods which cannot be replaced in the locality or be compensated for. Significant risks to community safety which cannot be easily mitigated. Large increases in local journey times as a result of the implementation of the Railway.
Moderate	Effects are both distinguishable and measurable, and result in awareness or concern among stakeholders or materially affect the well-being of defined populations/communities or result in intermediate/medium

Significance Category	Typical description of effects
	change in environmental or social/socio-economic conditions. Usually are of a short-term to medium-term duration and are amenable to management if they occur over the longer term. These effects are likely to be important at a local administrative area governance level because they contribute to achieving an area's objectives or may result in regulatory objectives being exceeded and/or breach in legislation. Residential land-take/acquisition and/or impacts on the communities are sufficiently large to result in a material effect through diminishing the quality of life /socio-economic status in the neighbourhood, although some replacement can be made in the locality or be compensated for. Non-Residential land acquisition and /or effects on land uses (e.g. agriculture) or on communities is sufficiently large which could result in increased management/operational difficulties for the facilities/businesses/communities using this land. Some increases in local journey times as a result of the implementation of the Railway.
Slight	Low-level effects are distinguishable. These are usually of a short-term nature and geographically limited. Result in small change in social/socio-economic and environmental conditions. Even if they are sustained and widespread effect they are not considered disruptive to normal social/socio-economic or baseline environmental conditions. These effects may be raised as local issues but are unlikely to be important in the decision-making process for the Project and its approval. Residential land-take/acquisition and/or impacts on the communities are not sufficiently large to result in a material effect through diminishing the quality of life /socio-economic conditions in the neighbourhood, as replacement could be made in the locality or compensation arrangements would sufficiently rectify any detrimental effects on quality of life. Non-Residential land acquisition and /or effects on land uses (e.g. agriculture) or on communities which would, at most, result in slight increased management/operational difficulties for the facilities/businesses/communities using this land. Minimal increases in local journey times as a result of the implementation of the Railway.
Neutral	No discernible change in social/socio-economic and environmental conditions. The effect is likely to have negligible or neutral influence, irrespective of other effects.

Table 4-4 Generic Significance Criteria

Unless specified otherwise, for environmental and social topics the significance of effects has been established considering the rating criteria above for Potential Impacts and the Value/Sensitivity of the effected environmental/social receptor/resource. Where the Value/Sensitivity has been defined the following matrix (Table below) has been considered in arriving at the Significance of Effect *(without mitigation)*:

		Magnitude of impact			
Environmental/Social Receptor/Resource Value (or Sensitivity)		**Negligible/No Change**	**Low**	**Medium**	**High**
	Very High	Neutral or Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral or Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral or Neutral/Slight	Slight	Moderate	Moderate or Large
	Low	Neutral or Neutral/Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 4-5 Significance of Effect

Furthermore, for certain topics quantitative thresholds/limit values (e.g. air quality, water quality, noise levels etc) have been considered in determining the magnitude of impact (see above) and have been considered in determining the significance of effect. For example for Noise the following table is used.

Change in Noise Level (dB(A))	Magnitude of Impact Category	Initial Indicator of Significance
+5 or greater	High Negative	Potentially significant increase[8]
+3 to +4.9	Medium Negative	
+1 to +2.9	Low Negative	Unlikely to be significant
+0.9 to -0.9	Negligible	
-1 to -2.9	Low Positive	
-3 to -4.9	Medium Positive	Potentially significant decrease
-5 or less	High Positive	

Table 4-6 Derived significance criteria for noise

The main findings and description of the potential environmental impacts and Significance of Effect (**without mitigation**) are presented in *Chapter 6.2* where these are discussed for the following affected receptors: a) land use, b) surface and ground waters, c) air quality, d) soils, e) landscape and visual aspects, f) acoustic quality (noise and vibrations), g) generation of waste and appropriate waste management needed, h) biodiversity, including habitats, flora, and fauna, i) natural, cultural and archaeological heritage.

The main findings and description of the positive and negative social (including socio-economic) impacts and Significance of Effect **(without mitigation)** are presented in *Chapter 6.3*, where the following issues are addressed: a) income opportunity, b) job creation, c) development of SMEs, d) development of the North-Eastern Region, e) transport improvement for people and goods across Corridor VIII, f) new investments, g) health and social risks, including railway accidents, h) involuntary resettlement and land acquisition, i) community safety, j) occupational health and safety, and working relations, k) labour rights, and l) gender issues.

4.6.4 APPROACH TO MITIGATION MEASURES

Based on the main findings on the positive and negative environmental and social/socio-economic impacts and their assessment, measures to avoid, prevent, mitigate or compensate the adverse impacts were identified and proposed. The mitigation measures proposed are based on the relevant national, EU and international standards and good practice.

In order to guarantee that the measures are implemented and perform adequately, target and evaluation criteria were developed for each measure and incorporated into a Management and Monitoring Programme defining the specific parameters that will be monitored, their method of checking, their monitoring time, period, and frequency, their location, their threshold levels, and the responsible person/institution in charge of the monitoring. The Environmental and Social Management and Monitoring proposals are presented in *Chapter 8*.

[8] Effects of a 'Large/Very Large' nature are viewed as significant; however it should be noted that effects of a Medium negative nature could also be potentially significant, specifically when acting in combination with other effects.

4.6.5 ASSESSMENT OF RESIDUAL EFFECTS

The assessment then goes on to determine the significance of residual effects (including any residual cumulative, synergy and transboundary effects) after consideration of the effectiveness of the design and committed mitigation measures. Therefore this stage of the assessment determines the likely significance of any residual effects following the application of mitigation measures (i.e. Significance of Effects (with mitigation)) by considering the Significance of Effects (without mitigation) along with the probable success of mitigation measures; *(see Chapter 7)*. The Significance Criteria described above is also considered in the determination of the significance of residual effects. The probable success of mitigation measures is determined by the following criteria:

- *Unknown:* the proposed mitigation measures are untried elsewhere in similar circumstances and the success of it is unknown*;*
- *Low:* the proposed mitigation measures have been successful but in different circumstances and with a different aim*;*
- *Moderate:* the proposed mitigation measures have been successful in different circumstances with the same type of aim; and
- *High:* the proposed mitigation has been successful in the same circumstances with the same type of aim.

In *Chapter 7* the following assessment of **each identified** potential environmental and social impact is undertaken:

- A description of the Significance of Effect (without mitigation) *(see above)* from *Chapter 6*;
- Followed by a description of the probability of success of the relevant mitigation measures*;* and
- Based on the Significance of Effect (without mitigation) and the rating of probability of the success of the relevant mitigations paying consideration to the Significance Criteria the Significance of a Residual Effects (with mitigation) is determined.

4.6.6 ASSESSMENT OF LABOUR & WORKING CONDITIONS

Concerns related with Labour and working conditions are elaborated under Workforce related impacts and issues Chapter 3, Subchapter 6.3.

4.6.7 ASSESSMENT OF RAILWAY SAFETY

Regarding Railway safety this has been assessed under:

- Community health and safety - Safety issues associated with crossing of rail track Subchapter 6.3.3;
- Workforce related impacts and issues – Railway workers safety during operation of railway Subchapter 6.3.11 ; and
- Quality of life Subchapter 6.3.12 - Safety during operational phase.

4.6.8 ASSESSMENT OF CUMULATIVE, SYNERGISTIC & TRANSBOUNDARY EFFECTS

The assessment of transboundary effects refers to those actions of the Project which may cause the effects on resources that are beyond the frontier of the Republic of Macedonia, for example within Bulgaria.

The assessment of the cumulative and synergistic effects refers to the events in which multiple actions affect the same resource(s); this is, the incremental impacts of an action, or actions, are added to other past, present and reasonably foreseeable future actions. In relation to cumulative and synergistic effects there are generally two types noted below:

- Cumulative ’in combination’ effects from the Project on a single receptor (e.g. combination of the effects on local communities etc.).
- Cumulative impacts from different projects in the area in combination with the Project being assessed, in this case Railway Corridor VIII-Eastern Section.

The assessment of cumulative effects arising from the combination of effects of the Project on a single receptor/resource is carried out as part of the assessment methodology presented above. Thus, in part of the assessment the focus is placed on the cumulative impacts arising from other Projects, but taking into account the cumulative effect from the actions of the railway Project.

In the assessment of the cumulative, synergistic effects, mainly cumulative effects are addressed, with synergistic effects addressed only when there is sufficient information to document the synergistic result of the combined effects. This is, the effects of combined effects will be normally treated as additive and referred to as cumulative effects since the synergistic results of combined effects are often complex to assess and require a detailed knowledge of the causing actions, which is not the case in this assessment, where the knowledge of other projects in the area that can interact with Project Railway Corridor VIII-Eastern Section is limited.

For the assessment of cumulative effects, a checklist type of approach is used. A matrix is created for each of the projects identified in the area that can interact with the Project and for each of the receptors that are affected by the Project. Those receptors that are estimated to be also affected by one or more actions of any of the other projects are checked, as shown in the following example, using the environmental receptors:

Environmental Receptor/Resource	Project 2	Project 3
Soil quality		✓
Soil erosion		✓
Topsoil		✓
Surface water quality	✓	
Surface water flow patterns	✓	
Sediments deposition	✓	
Groundwater quality		
Hydrogeological flow patterns		
Air quality		✓
Noise and vibrations		
Landscape	✓	
Flora	✓	✓
Fauna	✓	✓
Habitats	✓	✓
Protected and Designated Areas		
Cultural Heritage		✓

Table 4-7 Environmental Receptors Checklist

Then, for each receptor where cumulative impacts with other projects are identified, an explanation of the expected combined effect is provided, with an estimation of the significance of the residual cumulative effect based on the significance criteria established in Chapter 4.6.3.

4.6.9 ASSESSMENT SUMMARY TABLES

The findings of the assessment have been summarised in the following table format for each phase namely; ***Construction Phase and the two Operational Phases,*** within *Chapter 7;* and a description is given of any residual effects of a potentially significant nature. In addition, any significant residual effects identified in the assessment of Cumulative, Synergistic & Transboundary effects are summarised within this Chapter.

Environmental/ Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
CONSTRUCTION PHASE												
OPERATIONAL PHASE (Stage 1) Operation of Section 1 Kumanovo to Beljakovce Only with Diesel Traction												
OPERATIONAL PHASE (Stage 2) Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 Kumanovo to Bulgarian border (Deve Bair) using Electric Traction												

Table 4-8 Assessment Summary Table

4.7 STAKEHOLDER ENGAGEMENT

The right to meaningful participation of the public during the ESIA procedure for the Project has been addressed through the Stakeholder Engagement Plan (SEP), which was developed with the main aim to ensure:

a) identification of the directly and indirectly affected stakeholders or those interested in the Project's development;
b) Project information disclosure through the whole ESIA procedure;
c) meaningful consultation with the various stakeholders using different, appropriate communication methods and tools; and
d) an effective grievance procedure by which people can make comments or complaints is established and available.

The SEP is a part of ESIA Study, and is presented in *Chapter 12*. It has been posted on the internet under the following links, together with the Project Leaflet:

Ministry of Transport and Communication: http://www.mtc.gov.mk
Ministry of Environment and Physical Planning: http://www.moepp.gov.mk
JP Macedonian Railway – PERI: http://mz.com.mk

Public participation and disclosure of the Project and ESIA relevant documentation are being carried out according to the nationally regulated ESIA procedure (see above ESIA procedure), including the Public hearing events that will be organized with the main aim to discuss the key findings from the ESIA Study. All relevant institutions at the local, regional and national levels will be asked to provide their comments during the timeframe for public disclosure of the draft ESIA Study. The final version of the ESIA Study will be prepared based on the relevant comments and remarks received during this process.

4.8 RESETTLEMENT

Because the Project is to affect a number of households and properties along the railway route that will need to be expropriated, a Resettlement Compensation Framework (RCF) has been prepared as part of this ESIA. The RCF sets out the agreed principles to be used and entitlements under which compensation is to be given with respect to any land acquisition that results in either physical or economic displacement which occurs as a result of project activities. A more detailed resettlement action plan shall be prepared later in the process. The Resettlement Compensation Framework is presented in *Chapter 13*.

Chapter 5 Baseline Environmental & Social Conditions !

Describes baseline environmental and social conditions, focusing on sensitive issues and vulnerable groups.

5 ENVIRONMENTAL & SOCIAL BASELINE

Chapter 5 provides sufficient data and information on the existing state of environment and economic and social conditions of the study/investigation area at the national, regional (covering the north-eastern region), and local (focused on the specific conditions in the immediate vicinity of the railway alignment), as appropriate.

5.1 ENVIRONMENTAL BASELINE

Railway Corridor VIII - Eastern Section stretches between the towns of Kumanovo and Gueshevo, at the Bulgarian border, comprises 88.1 km of rail line, crosses the municipalities of Kumanovo, Kratovo, Kumanovo, and Kriva Palanka, and passes nearby the municipalities of Lipkovo (West of the corridor) and Staro Nagoricane (North of the corridor). The larger towns along the corridor are Kumanovo and Kriva Palanka. The line starts on a relatively flat plateau in Kumanovo and gradually climbs to higher altitudes, mainly following the courses of the Pcinja and Kriva rivers upstream, to reach the mountainous area surrounding the Bulgarian border at Guesshevo. The difference between the lowest (280 m) and the highest (1,180 m) elevations of the corridor is 900 m.

The area of the corridor has had permanent inhabitation for several thousands of years. Thus, although the area has little urbanisation (with the exception of Kumanovo and Kriva Palanka), it is more or less regularly populated with the dispersed village settlements typical of North-East Macedonia, with a distribution of very sparse small groups of houses and isolated houses over large areas. The strong and long-lasting human impact on the environment, especially on wild forests, has resulted in new man managed ecosystems, comprising mainly small agricultural fields, vineyards, orchards, pastureland, and meadows, which reflect the development of the traditional crop growing which still remains.

The climate in the study area is moderate-continental. According to the meteorological stations of Kumanovo and Kriva Palanka, the average annual temperatures are 11,8 ºC and 10,2 ºC, respectively, the average annual minimum temperatures are 8,0 ºC and 5,5 ºC, and the average annual maximum temperatures are 17,4 ºC and 15,9 ºC. On average, during the year, there are 105 warm and 43 hot days in Kumanovo, while in Kriva Palanka this statistic is 79 and 20, respectively. Kumanovo is situated on a plateau open to the north, with frequent northerly winds during the winter, while Kriva Palanka is at a higher elevation between mountains, which results in lower average annual temperatures. The valleys of the rivers along the railway line, Kumanovska, Pcinja and Kriva, are characterised by a slightly warmer climate. In this area, the influence of the Mediterranean climate penetrates deep into these river valleys resulting in a milder climate along the valleys. The average annual precipitation for the meteorological stations of Kumanovo and Kriva Palanka is 549.0 mm and 565.5 mm, respectively. The maximum precipitation is in May-June and the second maximum in November, while the minimum is in August-September and February. The influence of the Mediterranean climate on the area is reflected in the annual distribution of the precipitation, and long dry summer-autumn period.

Diverse microclimate conditions are found along the railway corridor, arising from different inclination and exposition of the slopes from both sides of the river valleys crossed by the railway, the presence of river terraces (elevated flat areas in the broader parts of the river valleys), smaller or bigger hills and plateaus, and alternation of broader valleys with gorges and canyons along the rivers. Generally, there is a distinct contrast between the river valleys with humid soils, and the upper flat areas and hills, which are very dry. The whole area is crossed by streams with permanent or irregular flows, which create deeper or shallower dales with specific microclimatic conditions.

Moreover, the rich environmental setting along the project area is also influenced by the complex and diverse geology along the railway corridor. Given these influences, the study area used to define the environmental baseline, covers a strip of land along both sides of the railway line and an area around the end and starting points of the line, which is wide enough to encompass the relationships between the different environmental variables. This approach allows the study to analyse the interactions between the project actions and the environment receptors that could be affected by the project.

The sizes of the study area for each environmental variable have been selected to take into account the effects of the railway project on the environment. Examples of the approach for selected variables are described below:

- For surface water and ground waters, the water catchment areas (water bassins) of the Pcinja and Kriva rivers have been studied. Emphasis has been placed on the river stretches flowing parallel to the rail line and on the crossings of these rivers and its tributaries;
- For air quality, a wide study area comprising several kilometres (approximately 25 km around each side of the line) has been considered given that air pollutants may be transported for long distances;
- For noise and vibration, a much thiner strip (100 metres at both sides of the line) is studied since noise and vibration emissions are rapidly attenuated with distance;
- In the case of biotic and natural areas, this area has expanded to disclose the existence of particularly sensitive areas in the vicinity, including the Bulgarian territory, thus covering a radius of 35 km around the rail way line. The study of wildlife and vegetation has been complemented by sampling campaigns in areas of the project close and immediately adjacent to it.

5.1.1 TOPOGRAPHY & LANDSCAPE

5.1.1.1 STUDY AREA *('INVESTIGATION AREA')*

The study area selected for these environmental items corresponds to a 0.5 to 1 km strip of land on both sides of the planned railway line. For the landscape description a narrower band of 100 metres has been used for in the more detailed descriptions.

5.1.1.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The landscape or natural scenery is, according to the European Union Directive (85/337/EEC) on Environmental Impact Assessment (known as the EIA Directive), a subject of protection, which has to be regarded, described and evaluated in the ESIA.

5.1.1.3 DATA SOURCES

Data was obtained from the Local action plans Kratovo and Rankovce (Ministry of Environment and Physical Planning, 2008), and the following topographical maps with scale 1 : 25.000:

- Kumanovo;
- Supli Kamen;
- Strezovce;
- Stracin;
- Staro Nagoricane;
- Sakulica;
- Romanonvce;
- Pezovo;
- Petralica;

- Kriva Palanka;
- Deve Bair.

Additionally, satellite imagary (Google Earth) have been evaluated.

Site vistits were performed on: March 22th, May 18th and 19th 2011.

The Habitats maps prepared for the habitats baseline description was also used (see *Annex 5*)

5.1.1.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

Topography

Data on topography was obtained from the review of topographical maps and site visits.

Landscape baseline study

The description of the landscape along the alignment has been conducted through a desk study and site visits conducted on March 22th and May 18th and 19th 2011. The desk study was based, on one hand, on the topography of the terrain on which the railway track lies and that of the surrounding terrain, and, on the other hand, the predominant land uses along the alignment, for which the Habitats maps prepared for this ESIA were used.

The description of the landscape has been carried out dividing each of the railway sections in landscape scenery units and then defining the visual envelope for each unit.

For this study, the landscape scenery unit concept refers to a territorial unit that has a certain visual isolation with homogeneous internal characteristics. The territorial analysis of these abstract reference units has to be necessarily flexible, interpreting them as spatial units that have a certain identity (i.e. they are recognizable), homogeneous features, and some visual isolation (or at least distinguishably limits along the railway alignment).

Therefore, the definition of the landscape scenery units must be understood as indicative of an approach to the study of the area. The criteria adopted to define the landscape scenery units for this study are firstly based on the land morphology, where the shape of the terrain determines the extent of potential alterations and the basic visibility patterns. Based on this criterion, the types of high quality landscape are those in which there is a sharp contrast between horizontal and vertical elements, or both aspects are equally important (eg, a river surrounded by mountains), or no contrasts exist, with a single element fully / clearly identifiable.

The other criterion used to define landscape scenery units for this study corresponds to land uses, distinguishing among areas dominated by one or more of the following uses: industrial/urban structures, rural settlements, agricultural fields, forestry and tree plantations, pastures, and natural formations (woods, meadows, marshland).

The visual envelope defines the approximate extent of the areas of land from which there may be a view of any part of the railway structures. Where views may be possible, views towards the railway structures may be prevented by local changes in topography, built forms, vegetation, etc.

5.1.1.5 BASELINE ASSUMPTIONS & LIMITATIONS

There are no published landscape unit maps for the study area.

A digital terrain model (DTM) to describe the visual envelope could not be prepared due to lack of 3D map data for the study area. Therefore, a digital intervisibility map (or “point to point” visibility map) for systematically determining visual exposure relationships (e.g. visual envelope), could not be prepared.

5.1.1.6 TOPOGRAPHY BASELINE CONDITIONS

The main topographical features for each of the sections of Railway Corridor VIII-Eastern Section Project are described below.

Section 1: Kumanovo to Baljakovce

The corridor within Section 1 from Kumanovo to Beljakovce follows the courses of the rivers Kumanovska and Pcinja. The relief of this region is a smooth to wavy terrain. The ground level elevations vary between 290 to 404 m above sea level. The maximum altitude is 404 m, corresponding to Golem rid, approximately 800 m northeast of the rail line between K.P. 12.0 and K.P. 12.5, near the settlement of Proevce.

Figure 5-1 illustrates the predominantly flat topography in the area of the railway line in Section 1.

Figure 5-1 Marshland near Supli Kamen in Section 1

Section 2: Beljakovce to Kriva Palanka

Within Section 2, the railway line corridor follows, for the most part, the valley of the Kriva river. In this part of the investigation corridor, the valley morphology alternates open hilly areas and deep cutting canyon areas with steep slopes. The maximum altitudes are around 610 m (Golem Rid, K.P. 42.5).

Figure 5-2 illustrates the upper elevations on the hilly terrain surrounding the river.

Figure 5-2 Hill pastures in the environment of Sopsko Rudare in Section 2

Section 3: Kriva Palanka to the Bulgarian Border (Deve Bair)

In the first part of Section 3 and up to the region of Kriva Palanka, the topography is that of an open wide valley. The maximum altitudes lay around 700 m (Kriva Palanka, K.P. 73,5).

Passed the town of Kriva Palanka, and up to the Bulgarian border, the railway corridor enters a mountainous region where the Kriva river flows along a narrow valley. Maximum altitudes reach 1,181 m (mountain near Deve Bair).

Figure 3 shows the valley of the Kriva river in the mountaineous area near the Bulgarian border.

Figure 5-3 Small acre with grasslands and deciduous forests near Uzem in section 3

5.1.1.7 LANDSCAPE BASELINE CONDITIONS

With the exception of the urban areas in the proximity of the towns of Kumanovo, Kratovo and Kriva Palanka, the overall appearance of the scenery along the railway corridor is dominated by cultivated agrarian landscapes and natural landscapes.

A description of the landscape along the alignment has been conducted based, on the topography of the terrain on which the railway track lies and that of the surrounding terrain, and, on the predominant land uses along the alignment, for which the habitats maps prepared for this ESIA were used (see *Annex 5*). The landscape scenery units encountered along the three sections of the railway alignment are described below.

Description of landscape scenery units

The landscape scenery units have been defined for each one of the sections of the alignment of railway project Corridor VIII – Eastern Section. For each section a description is provided along with a photographic report to illustrate the landscape description, along with a map showing the location on the railway corridor where the picture was taken.

Section 1: Kumanovo to Baljakovce

K.P. 0.0 to K.P. 7: This unit corresponds to a relatively flat area in the flood plain of the, Lipkovskariver, where the alignment runs along a relatively highly populated area, but still with a large rural component dominated by agricultural fields, some orchards and several abandoned arable land lots. Photographs S1-1 and S1-2 illustrate this area.

The alignment passes beside the towns of Chereskoselo, Lopate and Rezanovce, with the first rows of houses at less than 50 m.

K.P. 7.0 to K.P. 10: In this unit the alignment runs 300 m from the northeastern edge of the town of Kumanovo. The immediate vicinity of the alignment is a predominantly urban, with some sparse parks, agricultural lots, and abandoned lots. In addition to Kumanovo, across the Likovsaka river and the Kumanovska rivers (which join at this point), there are other urban settlements (Sredorek and PeroCico) where houses at less than 50 meters from the alignment. Photograph S1-4 illustrates this area.

K.P. 10.0 to K.P. 17.5: This section has a more rural character, with the settlement of Proevce at the beginning, on the eastern side of the railway. The predominant land use is agricultural with some pasture areas spread along the railway, and scattered small rural settlements. The railway runs along the bottom of the gentle slopes of the hills that surround the Kumanovska river, which flows parallel to the rail tracks. Photograph S1-3 illustrates this area.

K.P. 17.5 to K.P.28.5: At the point where the Kumanovskariver flows into the Pcinja river, the alignment turns towards the Northeast to follow the Pcinja river upstream. The landscape features continue to be the same, gently sloping agricultural land in a broad flood plain, with some patches of pastures and some vineyards. Scattered along the rail line there are several rural settlements, of which SuppliKamen is the largest. The Picinja river in the first kilometres of the alignment in this section, and then the Kriva river, which flows into the Picinja river at K.P. 22-23, are important elements of this landscape, with several areas where the riparian vegetation that develops in their banks lie next to the aligment. Photographs S1-5 and S1-6 illustrate this area.

K.P.28.5 to K.P. 31.0: The river flood plain is still relatively wide, but it has significantly narrowed. The rail alignment runs along the lower level of the hill, North of the Kriva river, between the river and hill pastures. Towards the river, there are still some relatively large riparian areas covered with shrubs, willow and poplar trees on gravel and sandy banks. The rest of the area corresponds to agricultural land lots with some orchards, vineyards and tree plantations.

There are some small rural settlements in the immediate vicinity of the railway.

Photographs for Section 1

	
Photograph S1-1. Existing railroad track in the area of Kumanovo	Photograph S1-2. Existing railroad track in the area of Kumanovo

Photograph S1-3. Railroad track above river Kumanovska river in Kumanovo Spa

Photograph S1-4. View from proposed railroad station Pero Cico to the town of Kumanovo

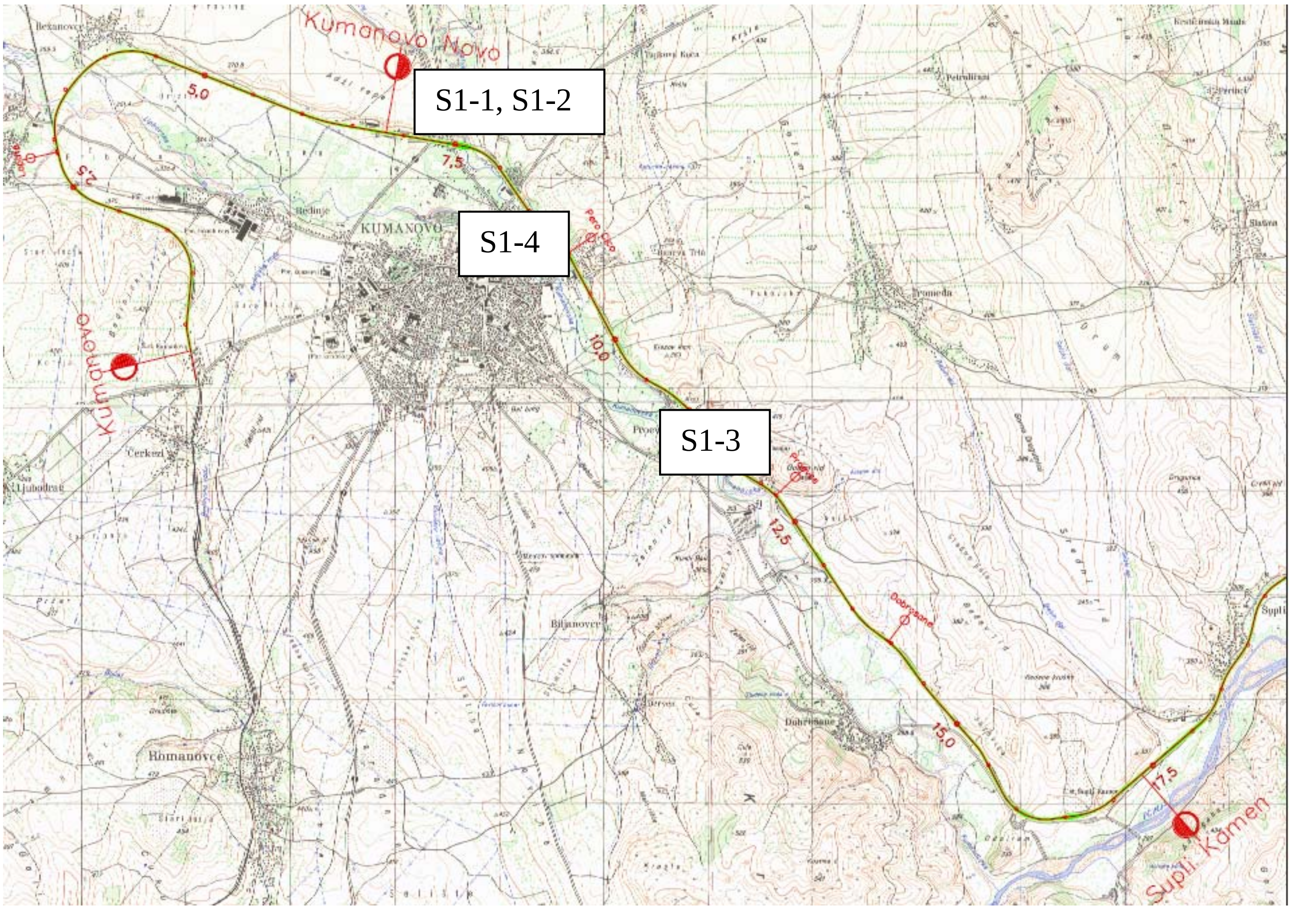


Figure 5-4 Locations of the photographs taken along Section 1 (K.P. 0.0 to K.P. 17.5)

Photograph S1-5. Abandoned railroad track on the floodplain of the river Pcinja near Supli Kamen

Photograph S1-6. Existing railroad bridge over river Pcinja

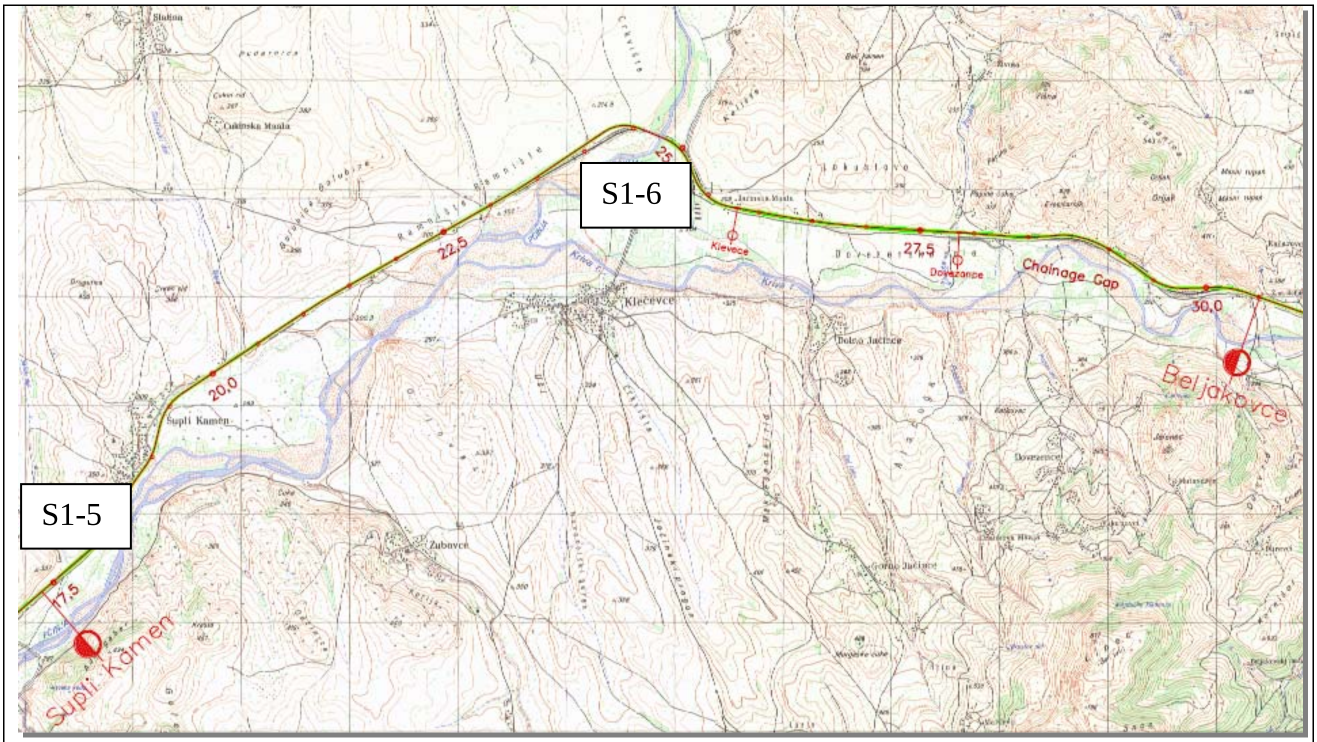


Figure 5-5 Locations of the photographs taken along Section 1 (K.P. 17.5 to K.P. 31.0)

Section 2: Beljakovce to Kriva Palanka

K.P. 31.0 to K.P.36.0: The landscape is similar to the one described for K.P. 28.5 to K.P. 31.0. Photograph S2-1 illustrates this area.

K.P. 36.0 to K.P. 41.0: The rail alignment continues to run along the Kriva river, which has still a relatively broad flood plain, but has climbed to upper elevations on the hilly terrain surrounding the river. The landscape is completely dominated by hill pastures with a few scattered agricultural lots and very few rural settlements. In this section, two points should be noted:

- **K.P. 36.0 to K.P.37.0:** At this particular point, the rail alignment crosses a rocky and stony area with chasmophytic vegetation, very interesting for their visual quality. Earth movements for the construction of the railway at this point were already performed 15 years ago. There are no major settlements in the immediate vicinity of this point, but there are some tracks accessing the towns of Kurlevci and Culak, from which the railway can be visualized.

- **K.P. 39.0 to K.P.40.0:** The rail alignment crosses, by means of viaduct, a rocky and stony area with chasmophytic vegetation. The pillars of the viaduct are already constructed, but the platform is yet to be constructed. The small settlements of Cukar and Ruinci are nearby the railway alignment in this area.

Photographs S2-3 and S2-4 illustrate this area.

K.P. 41.0 to K.P. 45.0: In this section the Kriva river flows boxed in by the surrounding mountains in a rugged area, and so does the railway, which runs along the southern side of the river at a considerable elevation above the river level (>100 m). In this section, the landscape is characterized by alternations of degraded xerothermophilous oak forest and hill pastures. Towards the end, where the river valley starts opening again, agricultural lots become more frequent. Settlements are scarce in this area. Photographs S2-6, S2-7 and S2-8 illustrate this area.

K.P. 45.0 to K.P. 50.0: The river valley widens. Landscape is similar to that of K.P. 32.0 to K.P.36.0.

K.P. 50.0 to K.P. 53.0: In this section, the river valley narrows again. The landscape is similar to that described for K.P. 41.0 to K.P. 45.0. Photograph S2-5 illustrates this area.

K.P. 53.0 to K.P.61.0: The river valley widens significantly, especially on the northern side where the alignment is located, away from the river course, at approximately 1 km. The landscape is dominated by agricultural land and plantations, with several larger settlements located on gentle slopes. Photograph S2-2 illustrates this area.

K.P. 61.0 to K.P. 65.0: The river narrows again. The landscape is similar to that described for K.P. 41.0 to K.P. 45.0. Forested areas consist of conifer tree plantations and a few patches of xerothermophilous oak forest, in addition to degraded oak forests.

Photographs for section 2

	
Photograph S2-1. Almost completely constructed bridge over Valley of Kriva river near Beljakovce	Photograph S2-2. Abandoned fruit plantation near Rankovce and Ginovci

Photograph S2-3. Meadows near Kriva river and view into a tributary glen with pylons

Photograph S2-4. Hill pastures with sparse shrubs and view into the valley with pylons

Photograph S2-5. Rolling hill with tunnel entrance in the region of Vakuf

Photograph S2-6. Typical relief with wooden slopes in valley of Kriva river

Photograph S2-7. Forms of vertical erosion in tuff slopes (earth pyramids) of valley Kriva river in the neiborhood of Kuklica

Photograph S2-8. The canyons of Kriva river in the vicinity of Vakuf

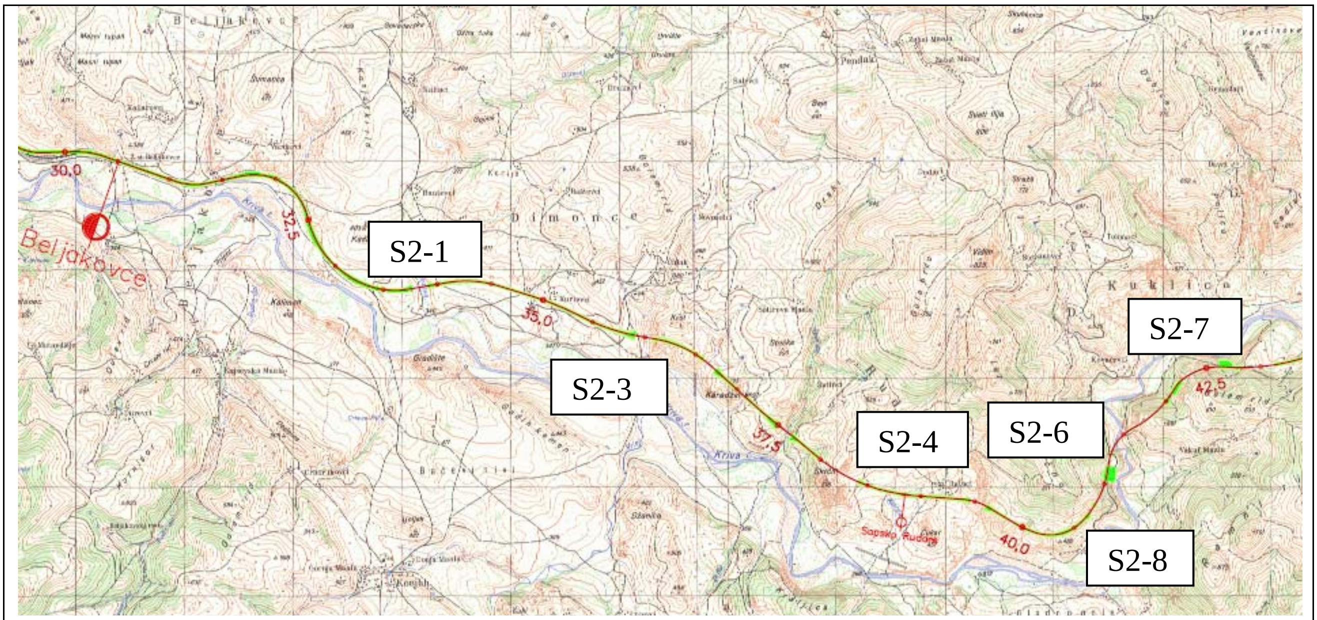


Figure 5-6 Locations of the photographs taken along Section 2 (K.P. 31.0 to K.P. 42.5)

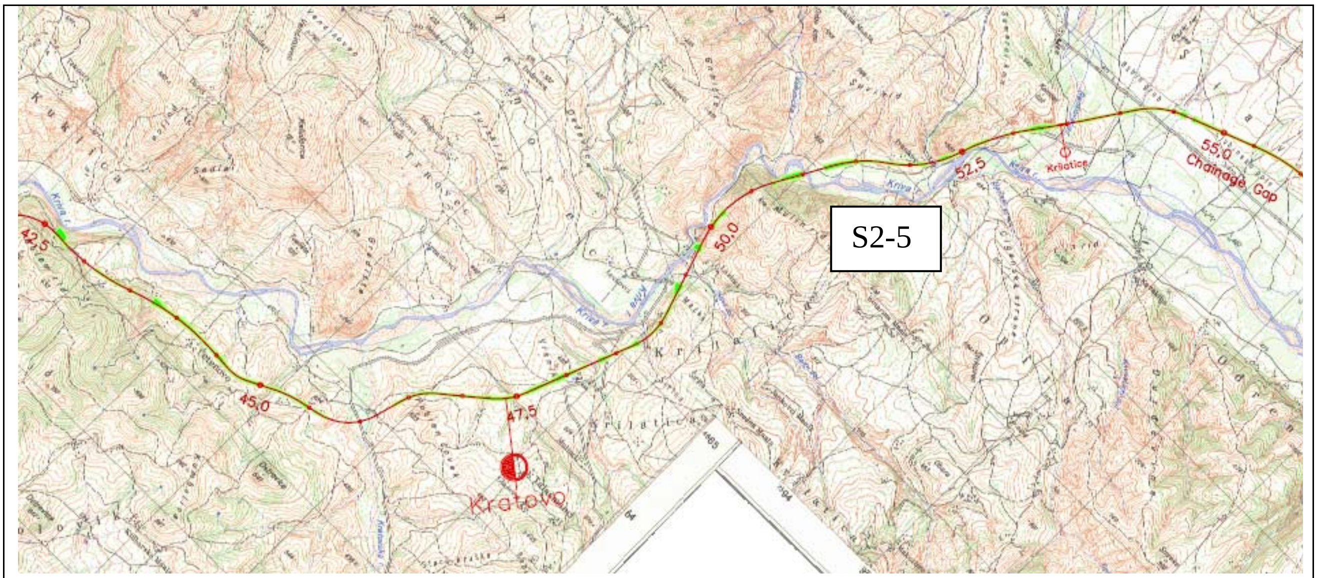


Figure 5-7 Locations of the photographs taken along Section 2 (K.P. 42.5 to K.P. 55.0)

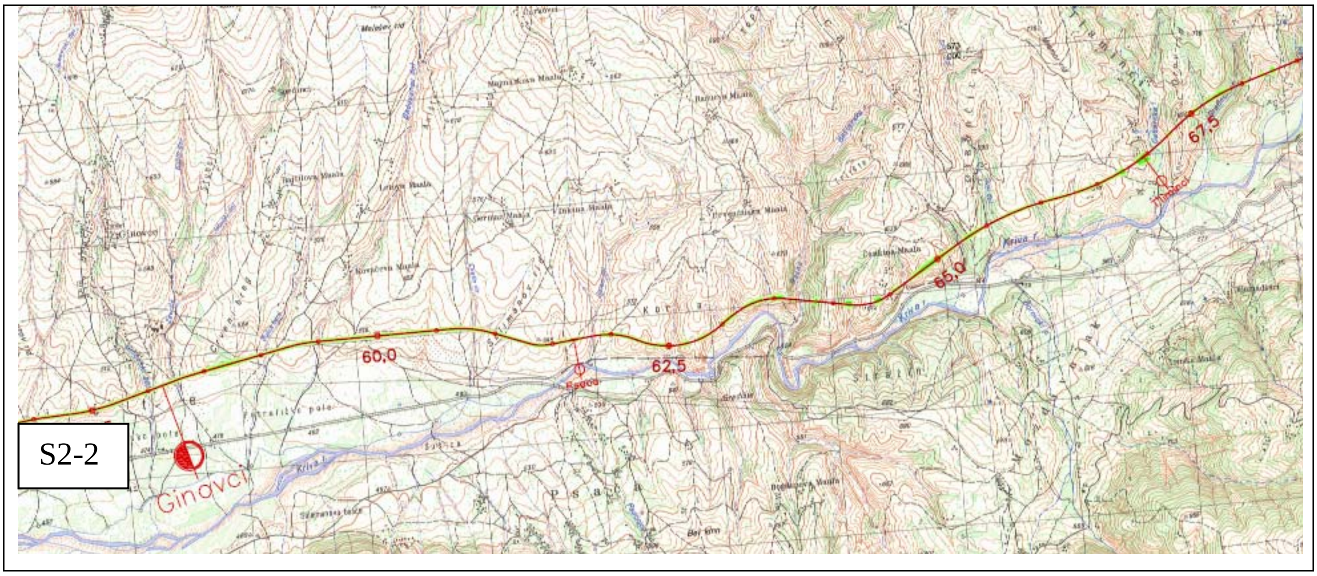


Figure 5-8 Locations of the photographs taken along Section 2 (K.P. 57.5 to K.P. 65.0)

Section 3: Kriva Palanka to the Bulgarian Border (Deve Bair)

K.P. 65.0 to K.P. 71.0: The valley becomes broader, especially on its southern side, where the slopes become less steep. The rail alignment, which runs across the more rugged northern side, crosses areas dominated with hill pastures, but there are several forested areas (conifer plantations, degraded xerothermophilous oak forests and some patches of well preservedxerothermophilous oak forest). Towards K.P. 68.0 rural human settlements become frequent, especially along the road leading to the main town of Kriva Palanka.

K.P.71.0 to K.P. 74.0: The railway alignment runs on the side of the hill north of the town of Kriva Palanka. The area corresponds to an urban settlement with a few areas of forest (black locust plantations) and pastures towards the northeast. Photographs S3-1 and S3-2 illustrate this area.

K.P.74.0 to K.P. 78.0: The river valley narrows. The landscape consists of an alternation of forested areas and pastures, where forests are dominant. Forests are mainly conifer plantations and degraded xerothermophilous oak forests. Thermophilous and mesophilousoak forests start to become more frequent as the alignment advances. There are several rural settlements on the other side of the river. Photograph S3-3 illustrates this area.

K.P. 78.0 to K.P. 88.0: The river flows boxed in by the mountains and the railway runs parallel with the river approximately 100 meters above the river bed. The area crossed is dominated by the presence of forests of different types with scattered small patches of pasture, grasslands and medows. Photographs S3-4, S3-5 and S3-6 illustrate this area.

Forests in the first kilometers of the alignment in this section mainly correspond to conifer tree plantations and mixed conifer-black locust plantation with oak, which further on are replaced by mesophillous oak forests, in the mountain slopes facing north, and thermophilous oak forests in those facing south. A large forest of submontane beech is further found between K.P. 81.5 and K.P. 84.5, approximately, on the northern mountain slope, and where the railway alignment passes along the bottom of this valuable forest. After the loop the alignment passes through a tunnel, between K.P.83 and K.P. 86 and crosses the Kriva river and heads towards the Bulgarian border, a degraded mesophillous oak forest is found in the northern slope through which the alignment runs, and thermophilous oak forest in the opposite slope.

In this section several rural settlements are encountered, especially in the proximities of K.P.80 to K.P. 84.

Photographs for section 3

Photograph S3-1. View of the town of Kriva Palanka towards the Bulgarian border

Photograph S3-2. View of the town of Kriva Palanka from the future railway alignment

Photograph S3-3. Upper course of Kriva river near Uzem

Photograph S3-4. Small cascade of a tributary of Kriva river

Photograph S3-5. Wooden mountains near the Bulgarian border

Photograph S3-6. Unmanaged grassland in a small dell

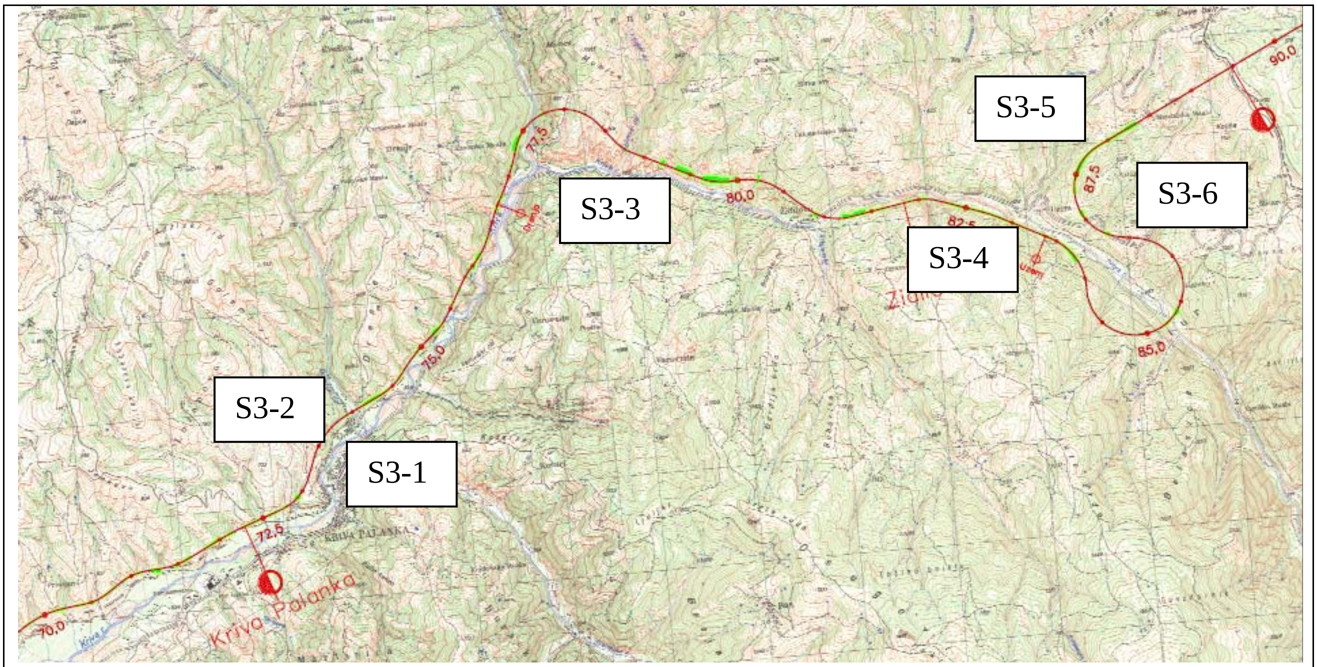


Figure 5-9 Locations of the photographs taken along Section 3 (K.P. 70.0 to K.P. 90.0)

The visual envelope for each landscape scenery unit is defined in the table below.

Landscape scenery unit	Description of visual envelope
Section 1	
K.P. 0.0 to K.P. 7 Relatively flat area, highly populated area, but with a large rural component dominated by agricultural land fields, orchards and abandoned arable land lots.	Wide open views from the Lipkovska river plain bordered by the railway alignement, and from the hills surrounding the river plain. Few visual obstables.
K.P. 7.0 to K.P. 10 Predominantly urban area on a broad valley, with some sparse parks, agricultural land lots, and abandoned lots in the immediate vicinity of the alignment.	Wide open views from the hills surrounding the Lipkovska and Kumanovska river plain. The buildings in the city of Kumanovo hinder the view of the railway from the river plain on which it lays.
K.P. 10.0 to K.P. 17.5 Rural area with gentle slopes towards the Kumanovska river dominated by agricultural land.	Wide open views from the Kumanovska river plain bordered by the railway alignement, and from the hills towards the Southwest. Few visual obstables.

Landscape scenery unit	Description of visual envelope
K.P. 17.5 to K.P.28.5 Gently sloping agricultural land in the broad flood plains formed by the Pcinja river and the Kriva river, with some patches of pastures, vineyards and scattered rural settlements. Riparian vegetation in the river banks lies next to the alignment at some points.	Wide open views from the Pcinja and Kriva rivers valleys bordered by the railway alignement, and from the hills towards the South. Few visual obstables.
28.5 to K.P. 31.0 The valley of the Kriva river has significantly narrowed. The landscape is dominated by pastures uphill, and agricultural land and relatively large areas covered with riparian vegetation towards the river.	Narrow to medium views directed to the West and East, along the Kriva river valley. No visual obstacles from the higher lands in front of the railway alignment. Trees in the flood plain may hinder the view of the railway from the lowest elevated points.
Section 2	
K.P. 31.0 to K.P.36.0 Same as for K.P. 28.5 to K.P. 31.0.	Narrow to medium views directed to the West and East, along the Kriva river valley. No visual obstacles from the higher lands in front of the railway alignment. Trees in the flood plain may hinder the view of the railway from the lowest elevated points.
K.P. 36.0 to K.P. 41.0 The rail alignment runs through upper elevations of the hilly terrain surrounding the Kriva river. The landscape is completely dominated by hill pastures with a few scattered agricultural land lots.	
K.P. 36.0 to K.P.37.0 Rocky and stony area with chasmophytic vegetation. Earth movements for the construction of the railway at this point were already performed 15 years ago.	
K.P. 39.0 to K.P.40.0 Rocky and stony area with chasmophytic vegetation. The pillars of the viaduct are already constructed.	
K.P. 41.0 to K.P. 45.0 The Kriva river flows boxed in by the surrounding mountains and so does the railway. The landscape is characterized by alternations of degraded xerothermophilous oak forest and hill pastures.	Narrow views directed to the West and East, along the Kriva river valley. The views are partially obscured by the presence of degraded oak forests with a medium density of trees. Trees in the flood plain may further hinder the view of the railway from the lowest elevated points.
K.P. 45.0 to K.P. 50.0 Same as for K.P. 31.0 to K.P.36.0.	Narrow to medium viewshed directed to the Souhwest and Northeast, along the Kriva river valley. No visual obstacles from the higher lands in front of the railway alignment. Trees in the flood plain may hinder the view of the railway from the lowest elevated points.
K.P. 50.0 to K.P. 53.0 Same as for K.P. 41.0 to K.P. 45.0.	Narrow views directed to the Northeast and Southwest, along the Kriva river valley. There are no visual obstacles in the higher lands, except at some punctual areas of patches of degraded oak forests with a medium density of trees. Trees in the flood plain may hinder the view of the railway from the lowest elevated points.
K.P. 53.0 to K.P. 61.0 The river valley widens significantly. The alignment runs away from the river course on gentle slopes dominated by agricultural land and several larger settlements.	Wide open views from the Kriva river valley bordered by the railway alignement, and from the hills towards the South. Few visual obstables.
K.P. 61.0 to K.P. 65.0 Same as for K.P. 41.0 to K.P. 45.0.	Narrow views directed to the West and East, along the Kriva river valley. The views are often obscured by the presence of conifer forests and degraded oak forests with a medium density of trees. Trees in the flood plain may further hinder the view of the railway from the lowest elevated points.

Landscape scenery unit	Description of visual envelope
Section 3	
K.P. 65.0 to K.P. 71.0 The valley becomes broader on the side opposite to the railway alignment. The rail alignment runs across the more rugged northern side through a landscape dominated with hill pastures and several forested areas (conifer plantations and xerothermophilous oak forests)	Wide open views from the Kriva river valley bordered by the railway alignement, and from the hills towards the South. The views of the railway are obscured by often occurring conifer and degraded oak forests.
K.P. 71.0 to K.P. 74.0 The railway alignment runs North of the town of Kriva Palanka through an urban area.	Wide open views from the Kriva river valley bordered by the railway alignement, and from the hills towards the South. The alignment will run mostly under a tunnel in the urban area of Kriva Palanka. Where it runs on the surface, there are few vegetal obstacles, but the buidings of Kriva Palanka may hinder the view.
K.P. 74.0 to K.P. 78.0 As the river valley narrows, the landscape consists of an alternation of forested areas and pastures, where forests are dominant.	Narrow viewshed directed to the northeast and southwest, along the Kriva river valley. The views of the railway are obscured by often occurring conifer and degraded oak forests.
K.P. 78.0 to K.P. 88.0 The river flows boxed in by the mountains and so does the railway. The landscape is dominated by the presence of forests of different types with scattered small patches of pasture, grasslands and medows. Well preserved and highly valued forests are present in this area, such as mesophillous oak forests, thermophilous oak forests, and submontane beech forests.	Narrow views directed to the West and East, along the Kriva river valley. The views are most of the time obscured by the presence of dense forests.

Table 5-1 The visual envelope for each landscape scenery unit

5.1.2 GEOLOGY, GEOMORPHOLOGY AND SOILS

5.1.2.1 STUDY AREA ('INVESTIGATION AREA')

The study area covers a strip of land along the corridor of Project Railway Corridor VIII-Eastern Section of approximately 10 km at each side of the alignment. Within this stip, the detailed description of the geological, geomorphological and soil features, has been focused on the strip of land on both sides of the railway line of 0.5 to 1 km.

Localities such as the Bislimska Klisura ravine, Ploce-Litotelmi and Kuklica, which are situated far from the railway corridor, and not influenced by it, are nonetheless mentioned in the text because they are notable natural geomorphological phenomena.

5.1.2.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

There is no specific legislation in the Republic of Macedonia regarding geological issues, except for general legislation addressing the need for protecting those areas with significant geological values, including the Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08, 48/10, 124/10, 51/11) and the Law on Nature Protection (Official Gazzete No. 67/2004).

5.1.2.3 DATA SOURCES

Data were obtained from the local action plans on Kratovo and Rankovce (Ministry of Environment and Physical Planning, 2008) Descriptive Glossary of Geographic Features – Section Kratovo- Kustendil, and

Kumanovo (Hristov&Karajanovic, 1969, 1972) and the geological maps of the area with scale 1:25,000 and 1:100,000. Aerial photographs (Google Earth) have been utilized as well.

Site visits were performed in May and June 2011. The remaining data are derived from a range of scientific articles (see the References Section to the ESIA).

5.1.2.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

The description of the geology, geomorphology and soils along the alignment was conducted via desk study and a site visit conducted in May and June 2011.

5.1.2.5 BASELINE ASSUMPTIONS & LIMITATIONS

The primary resource for the geological data was the Basic Geological Map of SFR of Yugoslavia - Sections Kumanovo, Kratovo&Kustendil; 1:100000, Geological Institute Skopje, edited and published by the Federal Geological Institute, Belgrade 1983 and the geological maps of the area with scale 1:25,000. No other geological maps are available.

The information was collected from the sources indicated above and is limited to these sources and the expert knowledge of the geologiststhat prepared this baseline.

The description of soils along the railway alignment was based on the little information existing about the areas the different types of soils known to be present in the area of the railway corridor may occupy and on the types of geological substrates intersected by the railway alignment.

5.1.2.6 GEOLOGY, GEOMORPHOLOGY AND SOIL BASELINE CONDITIONS

The area of the railway line track belongs to two large geotectonic units: the Vardar zone in the West, and the Serbian-Macedonian massif in the East. The middle section of the track occupies the northern part of the Tertiary-Quarternary volcanic complex of Kratovo-Zletovo volcanic area which forms part of the Vardar zone. The two geotectonic units are divided by a regional disconformaty, which extends northwest into the Kratovo-Zletovo volcanic area, and south in KocanskaKotlina basin.

In the considered terrain, Osogovo and German anticlinoria and other plicative structures were formed by the Prepalaeozoic orogeneses. A number of synanticline structures mutually connected in the Riphean-Cambrian rocks were created by the Hercynian orogenesis. Both structures have a northwest-southeast stretch with a dip towards the Southwest. The Alpine orogenesis is represented by disjunctive tectonics, which has led to the formation of many rifts filled with volcanic rocks and various other pyroclastics. Diverse ore deposit occurrences and deposits of complex poly-metallic type (lead, zinc, copper, cadmium, uranium, etc.) along with numerous occurrences of non-metal mineral raw materials (opal breccia, quartzites - silexes and tuffs themselves as non-metal mineral raw materials bind to the dislocations and volcanism in Kratovo-Zletovo volcanic area (from a genetic aspect, this is related to the Alpine orogenesis).

GEOLOGY

The geological structures that are found along each of the sections of the railway corridor are described below.

Section 1: Kumanovo-Beljakovce

Palaeozoic

Amphibole-Pyroxene Shales (Sam)

They are distributed in a narrow belt in the lower catchment of the Kriva river on the left side of its valley. They comprise feldspars, which constitute in excess of 50 % of the rock, amphiboles, pyroxene and very rarely quartz and calcite. White fine-grained to single-grained marbles overlie the shales. The belt of the amphibole-pyroxene shales is approximately 500 meters in depth.

Marbles (M)

They are developed on the left riverbank of the Kriva river before its confluence with the Pcinja and in a small segment downstream to the confluence of the Kumanovska and Pcinja rivers. A larger portion of them is present on the left riverbank of the Kumanovska river Southeast of Kumanovo. Marbles are white and grey in colour. They consist of coarse calcite grains with admixture of limonite. Sporadically, shale texture is noticeable in the marbles, with a certain percentage of mica.

Granites (YPz)

Granites occur on the left riverbank of the Kriva river south of Krasta (457 m). These are primarily leucocratic rocks, fine-grained, shale-like, with conspicuous foliation. They represent shale-like cataclasedbiotite granite impressed in Palaeozoic shales. The rock is grey to grey-black in colour and with a granular structure.

Serpentinite (Se)

Serpentinites are represented by several minor masses in the surroundings of Supli Kamen village. This is a dense aphanatic rock, dark green to black in colour, and shell-like make-up.

Mesozoic

Facies of Shoal Limestone (J^3_3)

They are distributed in the huge limestone massif near Belanovce village in the Pcinja river valley in Bislimska Klisura ravine. At the base they consist of clay-like and marly thin slab-like limestone, with thin layers of pure claystone and marlstone, only seldom with fine-grained conglomerates, while upwards they turn from slab-like and bank-like into typical massive shoal limestone. The limestone colour is grey to grey-white. Many individuals and species of the macrofaunistic remnants have been found such as the following: *Episterptophillumtitonicum, Ptygmatis pseudobruntruntana, Pt. carpattica, Terebratula moravica* etc. The entire faunistic association has been identified as Tithonian (Late Jurassic).

Palaeogene Sediments

These rocks are comprised of diverse flysch sediments of the Upper Eocene age.

The Upper Eocene sediments are developed on both riverbanks of the Kriva river at the confluence with the Pcinja river. In their composition they are primarily sandy, and the current type of sediments represents a separate facies of the Upper Eocene flysch, which is the one that most manifests flysch characteristics. Sporadically they contain thin layers of coral limestone, which indicates major alterations in the sedimentation process. The following lithologic members have been identified: fine-grained calcified sandstones, clayish and calcified siltstones, marlylimestones and claystones.

The fine-grained calcified sandstone occurs in the form of strata of 5 to 50 m in depth, yellowish in colour, and very friable at the surface. By percentage, their most dominant component is quartz, while feldspar and micas are common.

Clayish and calcified siltstones differ from each other by the type of cement. The clastic grains are represented by quartz, feldspar and mica.

Marly limestones are frequent in the series and they occur in the form of 2 to 10 cm thick sheets. Due to their relative resistance to erosion compared to the adjacent sandstones, they are prominent in relief.

In close proximity to Vojnik village (in the South), on the right riverbank of the Kriva river before its confluence with the Pcinja river, there are shoal limestones. They are grey-white bank-like limestones, very rich in flora and fauna. They contain corals, pectens, gastropods, algae and rare nummulites (*Dictyaraea actopartita, Rhabdophyllia tenuis, Ostraea plicata*).

Neogene Sediments

Upper Pliocene

Sandy-Clayish Series (Pl_3?)

This is a sedimentary series comprising clastic unbound rocks with scarcely manifested stratification. The series is composed of the following: sands, clays, sandy loams, clay-loams, lenses of sandstones and tufa limestones coupled by thick gravel masses. The final level of the series consists solely of loosely bound gravels with rare sandy components. The sands are grey-white to yellowish in colour, and they are fully unbound, except for the levels where there is a higher percentage of $CaCO_3$, which binds them but it does not yield any stratification whatsoever because the carbonate concentration is not uniform. The current series is distributed in a broad belt on the right side of the Pcinja river valley, from Supli Kamen in the north towards Mlado Nagoricane.

Tufa Limestones (Pl_3?)

Tufa limestones occupy the upper sections of the sandy-clayish series, and once they used to be a single slab, which was later divided into a number of isolated slabs via erosion, and on most of the terrain it is completely eroded. The biggest slabs of this kind have been noted east of Mlado Nagoricane and in the surroundings of Supli Kamen. The limestones are thin and slab-like, with total thickness of approximately 10 m.

Volcanic Breccias (ώ)

Volcanic breccias overlie andesitic tuffs or lie directly on the older effusive and other rocks, in the areas where tuffs are not developed. Breccias' composition includes unprocessed andesite debris solidified by tuff material.

Ignimbrites of Andesite Composition ($\Theta\alpha$)

They cover the parts of the effusive complex. They overlie the formerly described volcanic breccias or the upper slab of tufa limestones while underlying the andesite sheets. Ignimbrites are rocks of uniform structure, which impedes their field segregation. They are disseminated in the lower catchment of the Kriva river in the surroundings of Beljakovce. One of their features is larger presence of debris from the related rocks (lithoclasts) in the shape of irregular, angle-like fragments, with dimensions ranging from 0.1 cm to 20 cm in diameter. Both lithoclasts and the basic mass have identical crystaloclastic micro-structure, and they are composed of 40-60 % plagioclases, 20-30 % coloured minerals and 5-10 % quartz. The basis mass also comprises particles of secondary minerals such as oxides and hydroxides of iron, chlorite and calcite.

Andesites (α)

Andesites as effusive rocks occur in the form of thick sheets overlying the ignimbrites described above or directly overlying volcanic breccias. Only rarely do they appear as lava catchments of minor dimensions within the breccias. They are characterized by parallelepiped exuding down the vertical cracks, which are primarily oriented in the east-west and north-south direction. Andesites are compact rocks, and grey-green to green in colour. Their structure is porphyritic with phenocrystals of plagioclase.

Stratified Tuffs (Θ)

Stratified tuffs overlie ignimbrites and andesites in the form of a mildly displaced sheet. Tuffs are white to pale yellowish in colour. Their basic mass consists of volcanic ash with a high percentage of volcanic glass.

Quarternary

The young Quarternary deposits occur in a number of genetic types: river terraces, diluvial material and contemporary alluvial deposits.

The lower river terraces are best developed in the lower courses of the rivers Pcinja and Kriva river. They stretch 5 to 20 m above the current level of the rivers.

The contemporary alluvial deposits are mainly represented by gravels, whose particles are rarely in excess of 5 cm in size.

Section 2: Beljakovce-KrivaPalanka

Precambrian

The Precambrian rocks are developed on both sides of the Duracka river, a left tributary to the Kriva river. They are manifested by gneisses and micaschists with layers of quartzites and lenses or layers of amphibole rocks and metabasites.

According to their textural features, gneisses are divided into striped and ocular-striped, and granular-porphyritic. They are all bi-mica and metasomatically enriched by feldspars. Striped and ocular-striped gneisses are present in this section of the track.

Striped gneisses (Gmb) are fine-grained, grey to white in colour, and with a distinct striped texture. They occur in association with ocular-striped gneisses and micaschists, to which they are always bound with a gradual transition vertically and laterally. Among striped gneisses there are also gneisses not affected by metasomatic processes but identical by appearance, which is the reason why they cannot be differentiated macroscopically. They often contain layers or larger parties of micaschists and rarely layers of amphibole rocks and metabasites.

Ocular-striped gneisses (Gmb), according to distribution,are detached in the form of a long zone with a northwest (the lower catchment of the Duracka river near Kriva Palanka) to southeast stretch towards BabinaCesma, Kitka and further to Cera village, where it subsides. They are most commonly found in micaschists. They differ from fine-grained striped gneisses only by texture and content of coarse-grained feldspars in the shape of elongated eyes up to 7 cm in size.

Striped and ocular-striped metasomatic gneisses have identical composition: feldspars (around 50 %), quartz (around 50 %) and mica (around 15 %).

By appearance *micaschists(Sm)* are yellowish to brownish rocks with prominent shale-like structure and content of large mica scales. Most commonly they are composed of quartz (20-50 %) and micas (30-40 %) as core components. At certain spots in the composition of micaschists, granite or albite occurs as a core component and ortite as a secondary component.

Quartzites (Q)

They occur on the left riverbank of the Kriva river near Kriva Palanka. They are found in the micaschists composition in the form of layers of up to a few hundred meters in length and up to a few tens of meters in depth.

Riphean-Cambrian

The major part of this section of the railway line track consists of low-grade metamorphic shales with a vivid green colour, which is the reason why in literature they are known as the green series. The shales building this series lie concordantly or they are in tectonic relationship with the rocks of the gneiss-micaschist series.

The following groups of shales occur in this section of the track:

- albite-epidote-chlorite and albite-chlorite shales
- albite-biotite-chlorite shales
- quartzites

- amphibole rocks and metabasites

Albite-epidote-chlorite and *albite-chlorite shales (Sep)* are the most permanent lithologic members of the series. They are distributed on both sides of the Kriva river on the southwestern slopes of German Mountain and the northern slopes of Osogovo. They have a distinctively green colour, and are shale-like in texture with dense dots (balls) of feldspar (up to 3 mm). They contain albite, chlorite, epidote, quartz and albite-chlorite.

Albite-biotite-chlorite shales (Sabb) have texture features similar to the former ones but they are less represented on the terrain given that they occupy a small area in the Domacki Dol catchment on the right side of the Krivariver valley. They are composed of albite (30 % - 35 %), biotite (25 % - 30 %), quartz (10 % - 25 %) and accessories (up to 13 %). Their structure is lepidoblastic and porphyroblastic.

Albite-quartz-muscovite shales (Sabb) differ from the aforementioned shales by composition and by the vivid yellowish or brownish colour. They are comprised of quartz (40-50 %), muscovite (25 % - 35 %), albite (10-20 %) and accessories (3-7 %). They occur on both riverbanks of the Kriva river before the entry to the SlaviskaKotlina basin.

Quartzites (Q) are very seldom found in shales, taking the shape of thin strata. They are solid rocks constituted by approximately 80 % quartz, thin layers of muscovite and rarely of fine-grained albite.

Amphibole rocks and metabasites (Sam) are characterised by shale-like or massive texture and vivid green colour, which clearly differentiates them from other rocks. Amphibole shales occur as layers of up to a few hundred meters in length and a few tens of meters in thickness. The contact with the adjacent shales is gradual and rarely sharp. They consist of amphibole, albite and quartz, while epidote, swanstone, rutile and granite are secondary components. The series is approximately 3,600 m in thickness.

Tertiary-Quarternary Volcanic Complex

Volcanic rocks are relatively represented in the current section of the railway line track, and they cover the northern parts of the Kratovo-Zletovo volcanic area. They are developed from the northern parts of SlaviskaKotlina basin then downstream on both sides of the Krivariver towards Beljakovce.

The complex comprises tuffs, clays, sand and gravels, hornblende-augite-biotiteandesites, andesite-volcanic breccias, augite-hornblende-biotite andesite, ignimbrites of andesitic composition, hornblende-augiteandesites and hyaloandesites, hyaloandesitic tuff and opalitebreccias.

Tuffs, volcanic breccias and ignimbrites are predominant on the terrain.

Tuffs (ϴ) are extensively represented on the terrain around DolnaKuklica, and they overlie Miocene sediments (marlstones, tuff sandstones, claystones with bituminous claystone strata, breccias of andesitic composition, etc.). Volcanic breccias, Pliocene sediments and other volcanic rocks (hornblende-augite-biotiteandesites, augite-hornblende-biotiteandesites and ignimbrites of andesite composition) overlie them. The average thickness of the tuffs is 300 m, and, in general, they are well-stratified. They contain a high percentage of terrigen material; therefore, they are considered to have been deposited in an aquatic environment. In the lowest horizons, tuffs are commonly coarse-grained, while those in the upper horizons are fine-grained to pelitic. Tuffs are grey-yellowish, pinkish to green in colour. They are intensely degraded, kaolinized, limonitised and even silicified. Silicified tuffs are compact, slab-like rocks. Within the tuffs there is a common occurrence of dot-like degradation in the form of symmetrical concentric balls with a size of 0.5 to 1 m. In their basic mass, tuffs contain volcanic ash and chipped grains of plagioclases, biotite, less often pyroxene, amphibole, magnetite and debris of andesite. They often contain chlorite, limonite and opalite matter. Their average modal composition includes plagioclases ranging from 17.5 to 23.5 %, coloured minerals 2-5 %, basic mass 71 – 74 % and other up to 1 %.

Figure 5-10 Tuffs at Dolna Kuklica locality with andesite fragments (debris)

Clays, Sand and Gravels (Pl)

Pliocene sediments are represented by freshwater sediments. According to the character and the superposition order, two levels could be differentiated: lower – built of clayish-sandy sediments, and upper - built of coarse-clastic sediments. The clayish-sandy sediments are found along the deep brooks and dales in the northern parts of Slaviska Kotlina basin in the surroundings of the villages of Rankovci, Ginovci and Ljubanci. They are as follows: clays, clayish sands and sands with layers or jets of gravels.

Hornblende-augite-biotite andesites (αhb), with thickness ranging between10 and 100 m, are found in the deepest profiles revealed by river erosion. They directly overlie the tuffs. They are mostly covered by volcanic breccias, and less often by younger effusive rocks. Their nature resembles spill-over slabs and masses. Andesites are solid rocks of grey-greenish to dark-greenish colour, conditioned by the alteration of coloured components. Their structure is holocrystal and porphyritic. The basic mass is composed of fine grains of plagioclases and less rarely of magnetite, limonite, volcanic glass and calcite. The basic mass additionally contains idiomorphic phenocrystals of plagioclase, hornblende, augite and limonitisedbiotite.

Andesite-volcanic breccias (ω) overlie tuffs, hornblende-augite-biotite andesites or older sediment and metamorphic rocks, while breccias themselves underlie augite-hornblende-biotite andesites, ignimbrites of andesite composition and hornblende-augite andesites. The composition of breccias (as pyroclastic material) includes andesite debris solidified by tuff material. Their basic mass is made of feldspar fragments and altered plagioclases. Breccias are well-stratified, and they are 200 m in thickness. They are created in an aquatic environment.

Augite-hornblende-biotite andesites (αah) are found in andesite breccias in the form of slabs and catchments. They overlie hornblende-augite-biotiteandesites or less commonly they incise older rocks. Augite-hornblende-biotite andesites have holocrystal structure. The basic mass comprises fine grains of plagioclase including phenocrystals of zonal plagioclases (oligoclase - andesine), hypidiomorphic and alotriomorphic augite grains along with hornblende and biotite.

Ignimbrites of andesite composition ($\Theta\alpha$) are 200 to 300 m in thickness. They are found at the floor of hornblende-augite andesites while constituting the cover of andesite breccias elaborated above. They are primarily massive and less stratified at the contact points with breccias. Their colour is variable, ranging from grey white to reddish and greenish. Ignimbrites incorporate larger debris of volcanic rocks in the shape of irregular, angle-like joints, most commonly 2 to 5 cm in size. Their structure is crystaloclastic, whereat phenocrystals and phenoclasts contribute with 20 % and 50 % respectively. Most commonly, phenocrystals are fused with the adjacent aggregate, and locally also there are glassy structures in the form of jets, often oriented in parallel.

Hornblende-augite andesites(αha) are 20 to 200 m in thickness, and they overlie ignimbrites of andesite composition as well as other older volcanic rocks. These are very solid, fine-grained rocks with holocrystal porphyritic structure. They break up into shell-like forms. They are dark green to black in colour. The basic mass is of hypocrystal structure of turbid alkali feldspar, metal minerals and products of coloured components alteration.

Opalite breccias(ω'or) occur in the zones of tectonic movement, and they are up to 300 m in thickness. They have originally been recrystalized under the effect of pressures, and subsequently silicified by hydrothermal processes. They are red in colour.

Quarternary Sedimentary Deposits

Upper River Terrace (t_2)

It extends along the Kriva river valley at an elevation of 510 m, with a total depth of approximately 30 m. It consists of clayish matter, clay, clay-loam and sands, which constitute arable land.

Lower River Terrace (t_1)

It also mainly extends along the Kriva river valley at an elevation ranging between 480 and 510 m. It is composed of clayish matter, mixed with gravel and sand.

Proluvium (pr)

The proluvial sediments occur along the Kriva river valley and they are chiefly reddish in colour. The sediments are composed of scantily workable fragments of various rocks with clayish-sandy material.

Diluvium (d)

Diluvial sediments are found on the slopes north of the Krivariver (Radibus, Ginovci), and they mildly descend towards the river. They are made of coarse, unworkable material originating from adjacent rocks, mixed with clayish-sandy material.

Alluvium(al)

It occurs from Slaviska Kotlina basin then downstream along the Kriva riverbed. It is represented by typical alluvial sediments (sand, gravel). In the upper segments it is more coarse-grained whereas in the lower ones it is processed.

Section 3: KrivaPalanka – Deve Bair

Riphean-Cambrian

In this section of the track, the Riphean-Cambrian formations are represented by albite-quartz-muscovite shales, amphibole rocks and metabasites, and quartzites. Albite-quartz-muscovite shales (Sab) are found on both sides of the Kriva river valley in the vicinity of Zidilovo and Krklija. Amphibole rocks and metabasites (Sam) are developed in the lower catchment of the Kiselicka river before its confluence with the Kriva river, and downstream along the Kriva river towards Kriva Palanka. Quartzites (Q) occur on the left side of the Kriva river valley near Kostur.

Palaeogene Sediments (Upper Eocene)

In the area of the current section of the track, Palaeogene sediments are found in the part of the Deve Bair border crossing (Deve Bair Crest, which occupies the area along the state border with Bulgaria). They are developed in the volcanogenic-sediment facies with share of volcanogenic sediments. The series begins with breccias and conglomerates (1E3) with layers of sandstones, siltstones, claystones, and tuffogenic sandstones. They are purple, red and grey in colour. Breccias and conglomerates are comprised of debris from crystalloid shales up to 1 m in size. Sandstones are coarse-grained to medium-grained and fine-grained. The volcanogenic-sediment series (2E3) is found in the upper part, and it shows certain flysch features. According to their composition and structure, the volcanogenic sediments belong to the following groups: tuffites, lythocrystaloclastic and crystaloclastic tuffs and tuffogenicclaystones. The basic mass of tuff rocks is built of pyroclastic material. The depth of the volcanogenic sediment series is approximately 1,300 m.

Tertiary – Quarternary Volcanic Complex

Within the present complex, quartz latites occur in the area of the current track section (xa). They appear along the state border with Bulgaria (Deve Bair) in the form of necks through shales and Upper Eocene sediments. They occur in the form of veins, dikes and effusions above the aforementioned rocks. Quartz latites are incised by younger effusive rocks – dacites and andesites. In the area they evidently differentiate from other rocks by their gray or dark greenish colour.

GEOMORPHOLOGY

From a geomorphological point of view, most of the railway corridor runs along river valleys, those of the Kumanovska and Pcinja rivers in Section 1, the Pcinja and Kriva rivers in Section 2, and the Kriva river in Section 3. The western area of the corridor is part of the Ruen structural block, whereas the eastern area is part of the Osogovo block.

In the broader area of the railway corridor the structural (primary) relief comprises: on the northern side, the Ruen mountains (Kalje, 968 m), the Kozjak mountains (Tabla, 1,355 m),the German mountains (ModraGlava, 1,390 m) and the Bilino mountains (CupinoBrdo, 1,703 m); on the southern side, the Osogovo mountains (Ruen, 2,225 m), and Mangovica and GradistanskaPlanina mountains; on the western side, the KumanovskaKotlina basin; and on the eastern side the SlaviskaKotlina basin.

During the Pliocene and at the beginning of the Quarternary period, a strong volcanic activity was present in the Kratovo-Zletovopaleovolcanic area. Evidence of that is the significant number of paleovolcanic landforms, which are conical hills of andesite rocks situated between Kozjak Mt (1,355 m) in the northern part of the Kriva river valley and Crn Vrv peak (1,115 m) on the southern side.

They are fossilised volcanic cones, parts of craters destroyed by exogenic processes, or hills protruding in the relief as a result of selective erosion while being dissected and divided by minor river courses – the Kriva river tributaries (Povisnica, etc.). Due to the younger tectonic movements and the effect of the fluvial-denudation processes for a long period of time, the volcanic cones are markedly eroded and reduced in size. Figure below shows an example of such volcanic formation.

Figure 5-11 Conical hill as a result of volcanic activity near Ivankovci village – K.P. 52.5.

From the lowest elevation - the Kriva river valley - they gradually connect to Kozjak Mt in the North. Those are the conical hills Vidim (825 m) on the western side of Kuklica locality, Nepci (938 m) etc. To the South and Southeast of the Kriva river valley, the conical hills formed via volcanic activity are more imposing. They are as follows: Jelenac (567 m), Lipec (817 m), Zabel (660 m), Borovic (664 m) and so forth. The Kriva river valley flows through volcanic soil and, in all likelihood, it incises a number of old craters, in particular in the vicinity of Konjuh and Sopsko Rudare villages. In this area, its left tributary, Povisnicariver, is the most important one, whose source is in the northern slopes of CrnVrv peak (1,115 m) in the vicinity of Turalevo village. This source area resembles an eroded crater that has been incised by the Povisnicariver. Beneath the catchment of the Povisnicariver, downstream, the Kriva river flows through andesite soil (augite-hornblende-biotiteandesites and hornblende-augite-biotiteandesites) that belong to the Kratovo-Zletovo volcanic area. In this stretch, the Kriva river penetrates numerous paleovolcanic cones arranged in a manner that gives an impression of craters ruined by destruction. This is especially the case within the area closest to Sopsko Rudare village.

In addition to eruptive volcanism, in the area referred to as Mlado Nagoricane, north of the Kriva river, there are occurrences of latent volcanism, which is the final phase of volcanic activity in Kratovo-Zletovo volcanic area. Those are young effusive rocks, which according to their geological content are trachybasalts. Necks and effusions are related to Quarternary tectonics, currently surrounded by degraded surface material of Upper Pliocene sediments. Four of the five slabs present in this area are positioned in a single row and they stretch in a Meridian direction (NNW-SSE), bar the fifth slab – Zebrnjak, which lies further to the West. Initially, the five conical hills with a relative elevation in relation to the nearby landforms of 50 to 100 m, used to be a single slab, which, with the neotectonic movements and the exogenic processes, was later divided into four parts (see figure below).

Figure 5-12 Paleovolcanic landforms near MladoNagoricane village (KostoperskaKarpa rock, part of the single volcanic slab)

A characteristic of the paleovolcanic area is the occurrence of micro-denudation forms, manifested by minor, shallow indentations in the rock mass, formed by a combined action of physical weathering of the rock surface softer parts, on the one hand, and wind erosion, on the other hand, and to a minor extent by chemical corrosion of atmospheric water. The most common forms of this type are hollows, footprints and troughs, as the biggest microforms in rock indentations (see ***Error! Reference source not found.***). Such instances can be found on the basalt slabs in the vicinity of Mlado Nagoricani, at Velja Strana locality (811 m) or Ploce-Litotelmi locality, where during rainy weather the crevices that are filled in with water are inhabited by a rare animal species of fairy shrimp (*Tanymastixstagnalis*). This is the sole locality in Macedonia and in the Balkans where the population of this species grows. These localities are worth mentioning, but are located far away from the railway alignment (>5km).

Figure 5-13 Small denudation forms at Ploce-Litotelmi locality: troughs in andesite rocks

Another area where forms of degradation and destruction of rock masses occur is Bislimska Klisura ravine on the Pcinjariver. Here there are grinders as erosive forms descending as accumulative material to the bottom of the Pcinjariver in the form of rock creeps. Most of these grinders and rock creeps occur near Tikijarnica locality (497 m) on the right bank of the Pcinjariver. In Bislimska Klisura ravine there are also pointed rocks with interesting forms created as a result of selective rock erosion, along with natural windows formed by degradation of less resistant parties of limestone masses.

In the area there are also erosive forms created by surface and vertical aquatic erosion. Erosive pavements are forms created by surface erosion. They occur under the impact of pluvial erosion and surface washing; where, as the mechanical structure of the gently sloping parts of the terrain is disrupted, the soil erodes, and the rock foundation is exposed. This type of erosive forms is present on the valley sides of the Petrosnica river, a left tributary to the Pcinjariver, and Zivusa and Drzava rivers, right tributaries to the Kriva river.

The vertical erosion forms are morphologically more prominent and more versatile. Those are gullies and dales of different sizes, ranging between a few meters and a few hundred meters. They are most common in the lower basin sections, built of clastic sediments, degraded shales, tuffs, etc. In the close vicinity of the railway line, such forms occur at the confluence of the Povisnica and Zivusarivers (see Figure below). They develop by surface outflow of atmospheric water through bare and unprotected erosion-prone terrains.

Figure 5-14 Young dales in rocks of volcanogenic origin at the Zivusa river catchment

Earth pyramids are some of the more distinctive erosive forms occurring in the study area (*Figure 5-15* and *Figure 5-16*). They are found in the paleovolcanic section of the Kriva river (near Kuklica locality) and the Povisnica river valley. Most frequently they are in the shape of pillars up to several meters in height, with a protection cap of a rock block on their top. They developed under the influence of pluvial erosion and intensive washing of volcanic tuffs.

Figure 5-15 Process of creation of earth pillars with vertical aquatic erosion of the land

At the spots where a small rock block overlies the tuffs, washing does not have the capacity of eroding the underlying material (the tuff); thus pillars in the form of earth pyramids develop in the relief.

The most remarkable forms of this kind can be found in the vicinity of Kuklica locality on the right bank of the Kriva river. This locality is reached via the six-km-long access road, which diverges from the road to Kratovo in close proximity to Levkovci village. In this area, in the immediate vicinity, there are two localities with this type of relief forms.

Figure 5-16 Volcanic tuffs covered by andesite ignimbrites as protection caps, 2 km away to the North from K.P 42.5.

The first locality is near Kukle locality, at an altitude of approximately 400 m, and it occupies the southern slopes of Dubica hill. Here, the earth pyramids have remarkable forms. The local population have given different names to some of them, and they have called the entire phenomenon 'Merry Wedding'. The most impressive forms reach up to 8 meters in height, with circumference at the base of up to 5 meters.

The second locality is situated circa 600 m further to the west from the first one. It is positioned beneath a vertical escarpment, in a deeply incised amphitheatric depression developed by erosion of the adjacent land. The whole area is full of impressive pillar-like forms of up to 20 m in height.

Earth pyramids are very rare forms in the relief. They develop in soft, friable soil where there are large rock blocks in the form of fragments, most often of volcanic provenance, as is the case with Kuklica, which protect the underlying foundation from destruction and dispersion due to the effect of precipitation. The land underlying the rock blocks, which have the function of a protection cap, is protected from dispersion and lags behind in the shape of earth pillars or earth pyramids. In view of the fact that each earth pillar finishes with a large rock block on its top, which is reminiscent of a head, they are called the large-headed.

From a geological aspect, the terrain where the earth pyramids are located, which is essentially an eroded section of the Kriva river terrace, is built of rocks of Kratovo-Zletovo volcanic area. Taking into account the erosion intensity, it is assumed that a period of approximately 5,000 to 10,000 years was necessary for the creation of the earth pillars near DolnaKuklica.

Due to the different resistance of the rock masses, the occurrence of selective erosion is also distinctive in the study area. Hence, huge pillars of andesite-ignimbrite rocks are found in certain parts of the area. Figure below shows one of these pillars, located in the area of Shopsko Rudare (K.P. 37.7 - 40.0).

Figure 5-17 Denudation landform created by selective land erosion in the area of ShopskoRudare (K.P. 37.7 - 40.0)

Another geomorphological feature found in the study area corresponds to karst phenomena. They are most prominent in Bislimska Klisura ravine, where the karst process is extensively developed and it is characterised by numerous surface and underground karst landforms (*Figure 5-18*). The following surface karst landforms are represented in this area: netlike crevices, shallow bowl-like sinkholes, groot and karst valleys. They are distributed on both sides of the Pcinjariver, where there is an erosive extension at an elevation of 480-520 m. The underground karst landforms are represented by caves and pit caves, which occur on both sides of the ravine. On the basis of the studies to date, around thirty caves have been recorded and studied in the so-called karst oasis of Bislimska Klisura ravine. Eight caves with more than 10 meters in length and channels totaling 231 m in length, and four pit caves more than 10 m in length, channels totaling 183 m in length and a total depth of 88 m have been partially or fully observed and studied.

Figure 5-18 Entry to one of Bislimska Klisura ravine caves

Caves primarily consist of a single channel that at the end usually finishes with a crevice. The longest cave that has been studied is Studen Pester cave, with 72 m in total length. In addition, a complex cave has been studied – Liskov Pester cave and the distinctive cave system of Studen Pester cave. Of the studied caves that exceed 10 m in length, four are situated on the right side and four on the left side of thePcinja river valley. The total length of the caves on the left side is 123 meters, and that of the caves on the right side is 108 meters.

The main feature of the caves in BislimskaKlisura ravine is that they are short, with narrow channels of significantly variable directions. The majority of the channels end in a small circular hall. Apart from Laskov Pester cave, the other caves lack a hydrographic function. Likewise, except for Laskov Pester cave, which distinguishes with its cave ornaments – stalactites, stalagmites, pillars, curtains, etc. – the other caves lack underground accumulative forms. In certain caves (Gradiski and Liskov Pester) there are remnants of human activity from the past.

Only two of the four pit caves in BislimskaKlisura ravine have been fully studied: the Big and the Small GradiskaPropast pit caves. One of them, the Big GradiskaPropast pit cave, is 22 m in depth and belongs to the type of round-bottomed shafts. The second pit cave is composed of nearly vertical channels expanding at the bottom and joining into a small hall at a depth of 12 meters. The entries to the pit caves are at a higher elevation than the riverbed and they are difficult to find given that they are of small dimensions and hidden by limestone rocks.

As part of the karst landforms, there are also net like crevices and shallow bowl-like sinkholes in BislimskaKlisura ravine.

Karst landforms also occur in the area of the Orlovec marble massif situated on the left side of the Pcinja river between the villages of Klecovce and Supli Kamen. On the sides of Orlovec hill (397 m) there are short caves of up to 12 m in length.

Figure 5-19 View of Orlovec marble massif (397 m)

SOILS

Taking into account the genuine substratum of the area over which the railway alignment is located, there are three main types of soil that can be encountered along the alignment. These are:

- rendzina soils or carbonate virgin soils on lime rocks in the higher altitudes;
- diluvial and coluvial soils in the hillside situations; and
- alluvial soils or gleys in the marshlands and along the riverbeds.

Rendzinas on hard limestones and dolomites are found on all the mountains of appropriate substratum: calcitic limestone, calcitic marble, dolomites, dolomitic marble and calcitic-dolomitic marble. The soils are relatively rich in clay owing to the high content of clay in the silicate residuum. The average clay content amounts to 11% in the organogenic soils, 18% in the organomineral soils and 26% in the brown rendzinas. The humus content is highest in the organogenicrendzinas (19%), whereas the other subtypes contain on average 10% of humus.

The highest pH values have been recorded for the organogenic soils (an average of 7), followed by the organomineral (6.9); the brown rendzinas are the most acid (pH 5.8). The soils are characterised by high cation exchange capacity (an average of 51eqmmol/100g soil). The base saturation percentage is high (on average 98%). The ratio of humic: fulvic acids is 0.80. There is a high content of humic acids bonded with Ca.

The average porosity values amount to 49%, the water capacity 38% and the air capacity 11%. These soils contain an average of 2.6% humus in the A horizon. In calcareous rendzinas, the A horizon contains an average of 11% $CaCO_3$ and the C horizon 25% $CaCO_3$. The average pH of the A horizon is 7.8. The cation exchange capacity amounts to an average of 25.0eqmmol/100g of soil, and the base saturation percentage in non-calcareous rendzinas amounts to 96%.

Rendzinas are mainly under forests and pastures.

Colluvialand diluvialsoils are intensively used in agriculture. They have very heterogeneous texture. On average, these soils contain: 10% coarse fragments, 10% clay, 20% silt and thus sand dominates (70%). The average value for porosity is 44%, for water capacity 34%, for air capacity 10%, for wilting point 11% and for available water 23%. They are also heterogeneous in their chemical properties.

Alluvial soils or gleys are undeveloped hydromorphic soils formed by loose, unconsolidated sediments transported by the rivers and the streams existing in the area. They are made of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. Like colluvial anddiluvial soils, alluvial soils are often used for agricultural purposes (arable land and pastures).

Colluvial, diluvial and alluvial soils are present along section 1, up to approximately km 28. In section 2 most of the soils in the railway alignment would correspond to rendzinas, except between K.P. 53 and K.P. 61, where the soils would mainly correspond to colluvial and diluvial soils, and the crossings of riversand streams, where there are alluvial soils. Most of the soils in section 3 would correspond to rendzinas.

5.1.3 HYDROLOGY (SURFACE WATER) & HYDROGEOLOGY (GROUNDWATER)

5.1.3.1 STUDY AREA ('INVESTIGATION AREA')

The analysis of the hydrography for this ESIA covers the surface water and groundwater resources of the north-eastern region of the Republic of Macedonia, and more specifically the water catchment basins of the Pcinja and Kriva rivers.

In this chapter, the main watercourses, their capacity, water quality, and intersection with the railway alignment are described providing a summary of the state of the surface and ground waters in the region. The main focus is on the two larger rivers in the area (Kriva and Pcinja rivers) and their tributaries. These watercourses form the main water supplies for the several municipalities, four of which are relevant to this ESIA.

5.1.3.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The most important aspects of legislation of the Republic of Macedonia in the field of water management are already established within the horizontal environmental legislation and the Law on Waters (Official Gazette no. 87/08, 6 / 09, 161/09, 83/10, 51/11). At this point it is very important that legislation in the field of water management, which is already or will be transposed is in compliance with the European Union water legislation.

In the field of water management, the main competent authority ensuring the implementation and adoption of the European legislation is the Ministry of Environment andPhysical Planning (MoEPP).

The national legislation on water management includes:

1. Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08, 48/10, 124/10, 51/11);
2. Law on Waters (Official Gazette No. 87/08, 6 / 09, 161/09, 83/10, 51/11);
3. Law on Water Management (Official Gazette No. 85/03, 95/05, 103/08);
4. Law aquatic communities (Official Gazette No. 51/03, 95/05 113/07);
5. Decree on classification of waters (Official Gazette No. 18/99);
6. Regulation on categorization of water streams, lakes, accumulations and groundwater (Official Gazette No. 18/99, 71/99);
7. Rulebook on monitoring of sediment in reservoirs (Official Gazette No. 4/99);
8. Rules for reporting on the state level and quantity of water accumulated in reservoirs, and the amount of water released by them (Official Gazette No. 8 / 99);
9. Rulebook on the content and method of preparing management plans for river basins (Official Gazette No. 148/09);
10. Regulation on methodology for assessment of river basins (Official Gazette No. 148/09);
11. Rulebook on the content and method of preparing the program of measures (Official Gazette No. 148/09);
12. Rules for special security requirements for natural mineral water (Official Gazette No. 32/06);
13. Rulebook on determination and maintenance of protective zones around sources of drinking water (SFRY Official Gazette No. 17/83);

14. Rules Amending the Rules of the manner of determination and maintenance of protective zones around sources of drinking water (SFRY Official Gazette No. 15/89);
15. Rules for water safety (Official Gazette No. 46/08);
16. Law on ratification of the convention for assessing environmental impacts in a trans boundary context (Official Gazette No. 44/99).

The EU Directives related to water management already transposed into the national legislation include:

- EU Directive 2001/60/EC – Water Framework Directive and Decision 2455/2001/EC establishing the list of priority substances in the field of water policy;
- EU Directive 2008/105/EC on environmental quality standards in the field of water policy;
- EU Directive 2006/11/EC – on pollution caused by certain dangerous substances discharged into the aquatic environment;
- Urban Wastewater Treatment Directive (91/271/EEC);
- Nitrates Directive (91/676/EEC);
- Dangerous Substances to Water Discharges Directive (76/464/EEC) as emission control oriented legislation;
- Directive 98/83/EEC on the quality of water intended for human consumption;
- Directive 1991/271/EEC concerning urban waste water treatment;
- Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances.

The determination of the water quality status of the main surface watercourses is prescribed by the Law on Water (Official Gazette No. 87/08, 6 / 09, 161/09, 83/10, 51/11) and Decree on classification of waterways, lakes, accumulations and ground waters (Official Gazette No.18/99, 71/99). As established in the national legislation, the list of parameters below shall be analysed, and reports prepared annually by the Ministry of Environment and Physical Planning. The following indicators are relevant for water quality and classification of waters:

a) Organoleptic indicators (visible colour and colour, notable smell, turbidity and transparency, tasting of water sample-taste, colour, odour and feel);
b) pH - acidity;
c) Dissolved oxygen;
d) Mineralization (Suspended matters, total dry residue after filtration, total dissolved solids);
e) Eutrophication (Total phosphorus, total nitrogen, chlorophyll “a”, primary production, saprobe index, level of biological productivity);
f) Microbiological pollution (Most probable number of thermo-tolerant coliform bacteria);
g) Radioactivity; and
h) Hazardous substances (Metals and their compounds, other inorganic parameters, phenols, hydrocarbons, halogenated hydrocarbons, nitrated hydrocarbons, pesticides, other organic compounds).

According these indicators, surface waters are classified into five classes (Class I is the best quality water, Class V is the worst one). The definition for all five classes of water quality given in the Decree on classification of waterways, lakes, accumulations and ground waters (Official Gazette No.18/99, 71/99) is presented in table below.

Class I	This is very clean, oligotrophic water, which in its natural state can, with possible disinfecting, be used for drinking and production and processing of food products and is suitable for mating and cultivation of noble types of fish – salmonides. The buffering capacity of the water is very good. It is constantly saturated with oxygen, with low content of nutrients and bacteria, contains very slight, occasional antropogenic pollution with organic matters (but not with inorganic matters).
Class II	This is a very clean, mesotrophic water, which in its natural state can be used for bathing and recreation, water sports, production of other types of fish (ciprinides), or which can be used - after usual methods of purification (coagulation, filtration, disinfection, etc.) - for drinking and production and processing of food products. The buffering capacity and oxygen saturation present throughout the years are good. The loadings may lead to slightly increased primary productivity.
Class III	This is a moderately euthrophic water, which in its natural state can be used for irrigation, and after usual purification methods (conditioning) for industries which do not require drinking water quality. Buffering capacity of the water is low, but it maintains the (pH value) acidity at a level still suitable for most fish. In hypolimnion occasionally oxygen deficit occurs. The level of primary production is considerable, and some changes in community structure, including fish species can be observed. The load of harmful substances is evident as well as microbial pollution. The concentration of the harmful substances varies from natural levels to levels of chronic toxicity for aquatic life.
Class IV	This is a strongly euthrophic, polluted water, which in its natural state can be used for other purposes only after certain processing. The buffering capacity is exceeded, which leads to higher levels of acidity, and which affects the development of the offspring. In the epilimnion there is oxygen saturation, and in hypolimnion there is oxygen deficit. Algal blooming is common. Increased decomposition of organic matter simultaneous with water stratification can cause anaerobic conditions and pestilenceof fish. Mass occurrences of more tolerant species fish populationsmay happen and benthic organisms can be affected. Microbiologic pollution does not allow the water to be used for recreation. Harmful substances emitted or released from the sediment (deposits) can affect the quality of the aquatic life. The concentration of harmful substances can vary from levels of chronic to acute toxicity to aquatic life.
Class V	This is a severelypolluted, hiperthrophic water, which in its natural state can be used for other purposes. The water has no buffer capacity and its acidity (pH value) is harmful for many fish species. Large problems occur with the oxygen regime, namely saturation in hipolimnion; absence of oxygen leads to anaerobic conditions in hipolimnion. Decomposers dominate over producers. Fish and benthic species are systematically not present. Concentration of harmful substances exceeds acute toxicity levels for aquatic life.

Table 5-2 Definition of water classes

Environmental and social policy, EBRD 2008

The EBRD Environmental and Social Policy from 2008 requires ten Performance Requirements (PRs), including the implementation of the pollution prevention and abatement measures.

The various environmental related principles should be applied (precautionary and prevention principle, “polluter pays” principle, minimization of waste, re-use of waste, selection of waste at source of origin, ensuring good ecological status of surface and ground waters and others) as well as environmental standards on air quality, water quality, soil quality and compliance with occupational health and safety standards. The project needs to be in line with relevant EU standards related to the emissions into air and air quality, emissions into water and water quality, generation of waste and its management, nature protection, standards on exposure to noise and vibrations and OH& S standards.

EIB Environmental and Social Practices Handbook, 2010

The environmental standards of the EIB are intended to protect and enhance the natural environment, to improve the quality of life, economic development and social-being. The Bank requires its promoters to apply point source-specific emission standards according the IPPC Directive and sector-specific Directives (e.g. the Water Framework Directive). The ambient standards that relate to accumulated pollution in air, water and soils are also determined by the requirements of EU Directives and the projects should meet the relevant ambient standards. The procedural standards that are broadly defined as the management and administrative requirements related to the protection of the environment should be fulfilled as well (the Water Framework Directive is one of these EU Directive that contains these kind of standards).

IFC EHS General Guidelines, April 2007

General EHS Guidelines apply to projects that have either direct or indirect discharge of process waste water, wastewater from utility operations or storm water to the environment. Projects with potential to generate process wastewater, sanitary (domestic) sewage or stormwater should incorporate the necessary precautions to avoid, minimize and control adverse impacts to human health, safety or the environment. The wastewater management including water conservation, wastewater treatment, stormwater management and waste water and water quality monitoring are also required to be met.

IFC Environmental Health and Safety Guidelines for Railways (water), April 2007

The EHS Guidelines for Railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. The document targets mainly rail operations, covering construction and maintenance of rail infrastructure as well as operation of rolling stock, such as locomotives and rail cars; and locomotive maintenance activities, including engine services, and other mechanical repair and maintenance of locomotives and railcars. In this document all the environmental issues are elaborated and guidelines for minimizing the potential impact to the environment are explained. The Guidelines recommend measures to prevent, minimize or control wastewater effluents coming from passenger terminals and from passenger rail service.

5.1.3.3 DATA SOURCES

The data used in this chapter to describe the baseline conditions in terms of hydrography, surface water quality, water supply, and conditionof water courses, hydrogeology and other required information relevant to the railway project was obtained from the following data sources:

- Program for development of the North-Eastern region of Republic of Macedonia, 2009-2014, 2009;
- Local Environmental Action Plan of Municipality Kumanovo, 2004;
- Local Environmental Action Plan of Municipality Rankovce, 2008;
- Local Environmental Action plan of Municipality Kratovo, 2006;
- Local Environmental Action plan of Municipality Kriva Palanka,2005;
- Water strategy for the Republic of Macedonia, Ministry of Environment and Physical Planning 2010;
- Strategic Environmental Assessment Report (2009-2014), Ministry of Environment and Physical Planning 2009;
- Annual report of theprocessed data onenvironmental quality assessmentfor 2010;
- Annual report of theprocessed data onenvironmental quality by the Ministry of Environment and Physical Planning for2010/WATER;
- Feasibility Study for Railway link Macedonia – Bulgaria, 1995;
- Annual Reports from the National Hydrological and Meteorological Services, Republic of Macedonia, 2010;
- National Environmental Action Plan II, Ministry of Environment and Physical Planning,2006;
- The hydro geothermal potential of the Vardar zone and Serbo-Macedonian mass andenergy valorization of the available geothermal resources at the territory of theRepublic of Macedonia, E. Micevski et al., European Geothermal Congress 2007, Unterhaching, Germany, 30 May-1 June 2007;
- Overview of geothermal resources and geothermal energy application in South East European Countries, K. Popovski Duvrovnik, Interactive Seminar – Workshop 26: Geothermal Fields

Development, Inter-University Centre Dubrovnik – Croatia, Petroleum Engineering Summer School, June 9-13 2008.

5.1.3.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

The baseline methodology utilise relevant information and data from available official strategic documents adopted at the national, regional and local levels (water demand and water supply, water quality, irrigation practice, wastewater quality and treatment, floods, etc.). This was supplemented by several field visits, organized from June to August 2011. The aim of the field work was to visually check the current situation of the rivers potentially affected by the railway project, and any features (e.g. illegal dumps) in the surrounding areas that could have an influence on water quality.

During the field visits, several stakeholders meetings were organized, and interviews with local environmental officers, environmental inspectors and communal inspectors within the municipalities were conducted. The objective of these was to understand existing challenges with regards to water issues and to identify any water related aspects that need to be analyzed in more detail in the ESIA study.

Also, several meetings with Public Utility Enterprises for communal works in each municipality related to the water management, water supply, condition of watercourses were organized, and relevant information collected.

5.1.3.5 BASELINE ASSUMPTIONS & LIMITATIONS

There is still a lack of secondary legislation in line with EU environmental legislation, mainly in the water sector to be prepared by the middle of 2012 with legal base into the Law on Waters (Official Gazette No. 87/08, 6 /09, 161/09, 83/10, 51/11), namely:

- Degree on criteria for the determination of the good ecological status of the surface waters – physical/chemical, biological and morphological conditions;
- Degree on criteria for the determination of the good ecological status of the groundwaters – physical/chemical, biological and morphological conditions;
- Rulebooks on the determination of the sensitive water zones and water bodies.

With regards to groundwater, hydrological information in the northeastern region is very scarce.

5.1.3.6 HYDROLOGY (SURFACE WATER) BASELINE CONDITIONS

There exist three major catchments in the Republic of Macedonia, namely the Vardar river catchment, flowing south to the Aegean Sea and covering 80% of the territory, the catchment of the river Crni Drim, comprising also the Prespa and Ohrid lake catchments flowing to Adriatic Sea, and the catchment of Strumica river (flowing to the Aegean Sea). Negligible parts of the Macedonian territory drain to the Danube river catchment.

The easternpart of Railway Corridor VIIIis located in the northeastern region of the Republic of Macedonia, where the rivers are part of the Vardar river catchment.

Specifically, the railway corridor stretches along the Pcinja and Kriva rivers, and their tributaries. On its way, the railway approaches and oftenruns overthe two majo rrivers and their tributaries that are of either an intermittent or a permanent nature.

The hydrology of the areais well developed and widely ramified. The main water artery in the area, which gives the general physiognomy of the landscape, is the valley of river Kriva river, which receives water from the watersheds of the Osogovo Mountains and Mount German.

The broad hydrographic area in the northeast of the Republic of Macedonia where the railway will be located is shown in figure below.

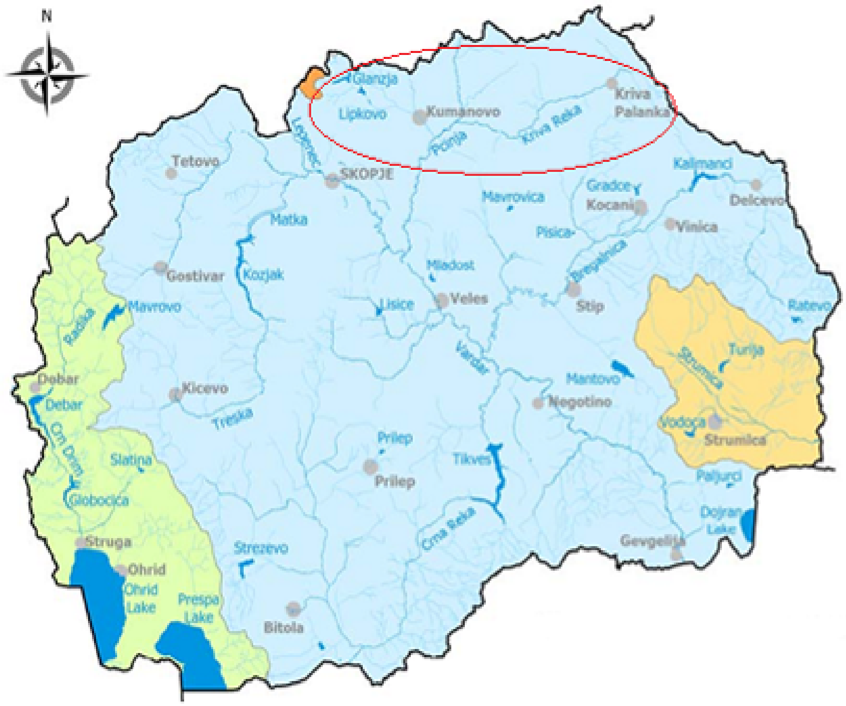


Figure 5-20 Hydrography network of the Republic of Macedonia

The spring of the Kriva river is in the Osogovo Mountains, north of Carev Vrv peak (2,085 m), at an elevation of 1,932 m. It flows into the river Pcinja near Klecovce village, at an elevation of 294 m. The Kriva river valley mostly stretches in an East to West direction in the entire North - Eastern region where the Corridor VIII takes place. From the source area to the confluence with the Kiselicka river (18 km away from the source), the Kriva river first flows northerly and northwesterly, then abruptly changes its direction and continues flowing southwesterly.

The composite character of thevalleyis due to the fact thatalongits course, it passes through four gorges (Zidilovsko – Palanecka, Psacka, Markova and Vakuvska Klisura), threeerosiveextensions (Uzemsko, TrnovechkoandSredorechko), and two valleys (Slavishka and Kumanovo).Thephotos below showthe layout of river Kriva river inZhidilovsko-Palanechka ravineand at the exit of Slavishka area.

Figure 5-21 View of Zhidilovsko - Palanecka Klisura ravine and the Kriva river valley at the exit of the Slavishka basin

The Kriva river network comprises 620 watercourses (permanent, periodic and temporary), with a total length 1,404.8 km. The right bank tributaries of the Kriva river are: Kiselicki, Gaberska, Raska river, Rankovechka river, Vetunichka river, Drzava and Zhivusha, while the left bank tributaries are: Durachka river, Kratovska river, Povishnica and Vrlej. With the exception of the Kratovska River, which flows through a terrain composed of volcanic rocks, the other left bank tributaries flow in fairly forested areas and have substantive flows all year. The right bank tributaries come from the German, Kozjakand Belino mountains, and because of the poorly forested terrain over which they run, they have variable flows and often dry out during the summer period.

The western area of the hydrological networks is defined by the lower river flows of the rivers Kumanovska and Pcinja.

The valley bottom of the Pcinja river is represented by a broad alluvial plain. Between the villages of Klecovce and SupliKamen, the river Pcinja is cut through the Orlovac marble massif, where it forms a peculiar epigenetic phenomenon (testaepigenia), 20 m in height and 100 m in length.

The second ravine of the River Pcinja is formed downstream from the confluence of the river Kumanovska and the river Pcinja. It extends up to Pcinja village; it is 7 km in length, and it is known as Bislimska ravine.

Figure 5-22 Bislimska ravine on the river Pcinja

In this stretch, the Pcinja River has cut its valley into compact Jurassic limestone, which is the reason why the valley sides have a prominent steep slope and at certain points they resemble a canyon.

The relatively short valley of the Kumanovska river (12 km) begins at the confluence with the rivers Lipkovska and Konjarska near the city of Kumanovo. Because ofthe large differences in the geological composition on both sides of the valley, it has an asymmetric appearance. On the right side of the Kumanovska river valley, where a massive limestone called Krasta extends, river terraces are formed. Downstream from the village of Dobroshane the valley gradually opens to the abroad alluvial river plain of the Pcinjain valley.

The overall quality of the main watercourses along the railway corridor, as prescribed in the Decree of Categorization of Water Courses, Lakes, Accumulations and Ground Waters under the Law of Waters (Official Gazette No. 18/99), is Class II and II as illustrated in table below.

River	Class
Pcinja	II
Kumanovska	III
Kriva	II
Konjarska	III
Lipkovska	II
Kiselicka	III

Table 5-3 Categorization of the watercourses

A more detailed description of the rivers, streams (seasonal and permanent) and other water accumulations along Section 1, 2 and 3 follows of the railway corridor VIII is presented below. The locations of the most relevant rivers in the region are shown in Figure 5-23, including those directly or indirectly affected by the railway alignment. These rivers are:

Section 1: Kavardzik, Konjarska, Lipkovska, Kumanovska, Pcinja, Kriva, BabinDol, Bara, Zivusa.

Section 2: Drzava, Korija, Kriva, Vakuf reservoir, Kratovska, Krva, Vetunicka, Rankovska, GinovskiDol, Zavartce, Buina Bare, CvetinVir, Golem Dol, reservoir of Raska and Kriva river, Raska, SewiDol, Gabarska.

Section 3: Gradecka, Randel, DomackiDol, Kriva, Krkljanska, Uti.

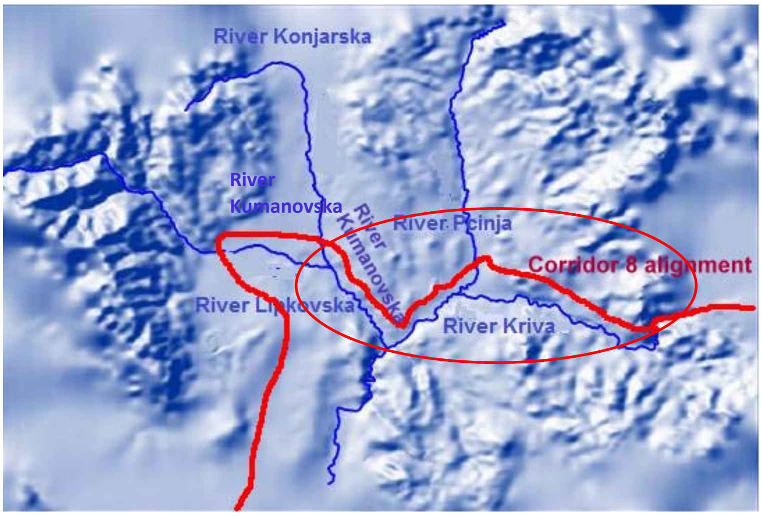


Figure 5-23 Rivers in the railway corridor

Hydrology of Section 1: Kumanovo to Beljakovce

Section 1 of Project Railway Corridor VIII - Eastern Section starts at K.P. 0.400 km in the municipality Kumanovo and ends at K.P. 30.502 near Beljakovce in the same municipality. In this section, the surface water of any form (river, stream, seasonal stream or drain) directly intersects with the railway, and therefore it is important to acknowledge the current condition of the hydrology in this area.

The hydrological network in the area of Kumanovo consists of the middle and lower courses of the rivers Pcinja, Kumanovska river and Kriva river, and some smaller water courses that are tributaries in the river basin of the Pcinja river. The Pcinja river is the largest and most important river in Section 1, arising at its source in the Dukat Mountain (1,660 m), and flowing into the Vardar river at an altitude of 191 m. Its tributaries are: Kumanovska river, Kriva river, Kratovska river, Konjarska river, Lipkovska river. Major floods occur in the area of Dobroshane and Banevo Trlo, because the Pcinja river flow is not regulated.

Table below presents a list of all the water courses in section 1 of the railway that are intersected by the alignment.

Name of the surface water course	Type of the surface water course	Running km at which the surface water course is crossed
unnamed	seasonal small stream	0.355 – 1.866 (5 times)
Kavardzik river	small stream	2.771
Lipkovska river	small river	3.125
unnamed	seasonal stream	3.452 - 5.095 (2 times)
Konjarska river	small river	7.412
unnamed	seasonal small stream or drain	8.161 – 16.538 (20 times)
BabinDol	small stream	17.379
unnamed	seasonal small stream	18.119 – 18.816 (2 times)

Name of the surface water course	Type of the surface water course	Running km at which the surface water course is crossed
Bara	small stream	19.550 – 20.310 (3 times)
unnamed	seasonal small stream	21.524 – 24.325 (6 times)
Pcinja river	river	24.500
unnamed	small seasonal stream or drain	24.784 – 26.725 (5 times)
Zivusa	small stream	27.466
unnamed	small seasonal stream or drain	27.739 – 29.309 (7 times)

Table 5-4 Section 1, Watercourses that intersect with the railway alignment (K.P:0.000 – 30.502)

A detailed hydrological map of section 1 showing the watercourse listed in *Table 5-4* and their intersection with the railway alignment is presented in *Figure 5-30*.

Figure 5-24 Hydrologic map of Section 1

Hydrology of Section 2: Beljakovce to KrivaPalanka

Section 2 of the railway starts at K.P. 30.502 in the municipality of Kratovo and ends at K.P. 66.500 in the municipality of Rankovce, in Slavishko. In these two municipalities the hydrology network is widely branched and consists of all forms of surface water bodies like rivers, springs, artificial lakes, reservoirs, streams, seasonal streams and drains.

The larger watercourse in the territory of Kratovo and Rankovce is the Kriva river. The tributaries of the Kriva river are the Kiselicka, Kriljanska Durachka, and Vetunica rivers. From its source to the village of Psaca, the Krivahas river is a curving river with a narrow bed, until it enters the territory of the Municipality Rankovce, in Slavishko field.

Other major waterways in the territory of the municipality, which provide water supply or are in other way relevant for the region (some of them do not intersect with the railway alignment and are not relevant to the railway project) are: Mastenica river (8km long, originates under the Lisec peak, and flows into the Kriva river, near the village of Psaca)and the Raska river (near the village Petralica), which is 12 km long.

The Rankovecka river is distinctive because it occurs when the Odrevica and Krvikamenska rivers merge near the village of Rankovce. The Rankovec river is 22 km long, and flows into Kriva river near the village of Opila.

River Vetunicahas its spring in the village of Paklishte, at an altitude of 1200 m, and flows into the Kriva river near the village of Vetunica, at an altitude of 500m. This river is 15km long and collects all the smaller streams from the village of Otoshica. A particular feature of this river is the artificial reservoir near the village of Otoshnicat, used for the irrigation of the SlavishkoField, as an extension of the future Vakuf reservoir. Other artificial lake that will be constructed on the territory of section 2 along the railway alignment is the artificial lake positioned on the rivers Raska and Kriva. This is a water reservoirplanned to be constructed after year 2020 (Source: Water Strategy 2011 – 2041, Republic of Macedonia 2011); no further information about the capacity of this water accumulation or the purpose of usage of the water has yet been defined and explained.

It is important to mention for this section, that the railway project takes into consideration the planned Vakuf Dam, positioned from K.P.42.067,23 to K.P. 49.824,13 along the railway alignment. This water reservoir in the Kriva river, which belongs to the Water Management Basin of Pcinja river, is already identified into the Spatial Plan of the Republic of Macedonia (2002-2020). The volume of the reservoir is 146 million cubic meters and it is planned as a multipurpose reservoir for water supply, irrigation, and energy supply and flood protection. The location of the Vakuf Dam will be near the village of Ketenovo (near Kratovo), and the water impoundment surface will cover 630 ha, flooding agriculture areas, housing and plants in the industrial zone of Ketenovo, which will need to be displaced.

The railway alignment has been designed to run along the southern shore of the reservoir, at a higher altitude than the maximum level of impoundment (see *Figure 5-31*).

The quality of surface water of Kriva river has been analyzed in the village of Trnovec at the exit of the Municipality of Rankovce as one of the 20 measurement points of the RIMSYS (River Monitoring System) network managed by the National Hydrological and Meteorological Service (NHMS). At the exit of the Municipality of Rankovce, the Kriva river belongs to a watercourse with class I and II, with the exception of three parameters (nitrite, Cd ions and BOD). Beside these measurements made by the NHMS, the measurements of the water quality of the Kriva river at the entrance and exit of Kriva Palanka are made by the Public Health Institute in Kumanovo. The analyses show that the water quality of Kriva river at the entrance of Kriva Palanka is of classI, while at the exit, the presence of ammonia concentrations makes it of class V, and increased turbidity and high concentrations of iron lead to classify the watercourse as class III-IV. The inferred source of this pollution is the surrounding households, mining, industry and illegal dumps.

Thus, the Kriva river, at the entrance in the Municipality of Rankovce, enters polluted. However, it manages to self-purify through the tributaries flowing into it and exits the municipality with quality of class I-II, according to data obtained by the Public Health Institute in Kumanovo and presented in Local Environmental Action Plan for Municipality of Rankovce.

Chemical-biological analyses ofthe water quality of the Kratovska river show that the water belongs to class I and II upstream from the urban area of Kratovo town and class III and IV at several spots downstream from the town.

There are several springs in the area, which are important in the development of agriculture in the belt of high mountain pastures. The most important spring is Turanichki, located at an altitude of about 1800 m. Other springs with similar yields in the area are Carev Vrv peak, Bela Voda, Kalin Kamen.

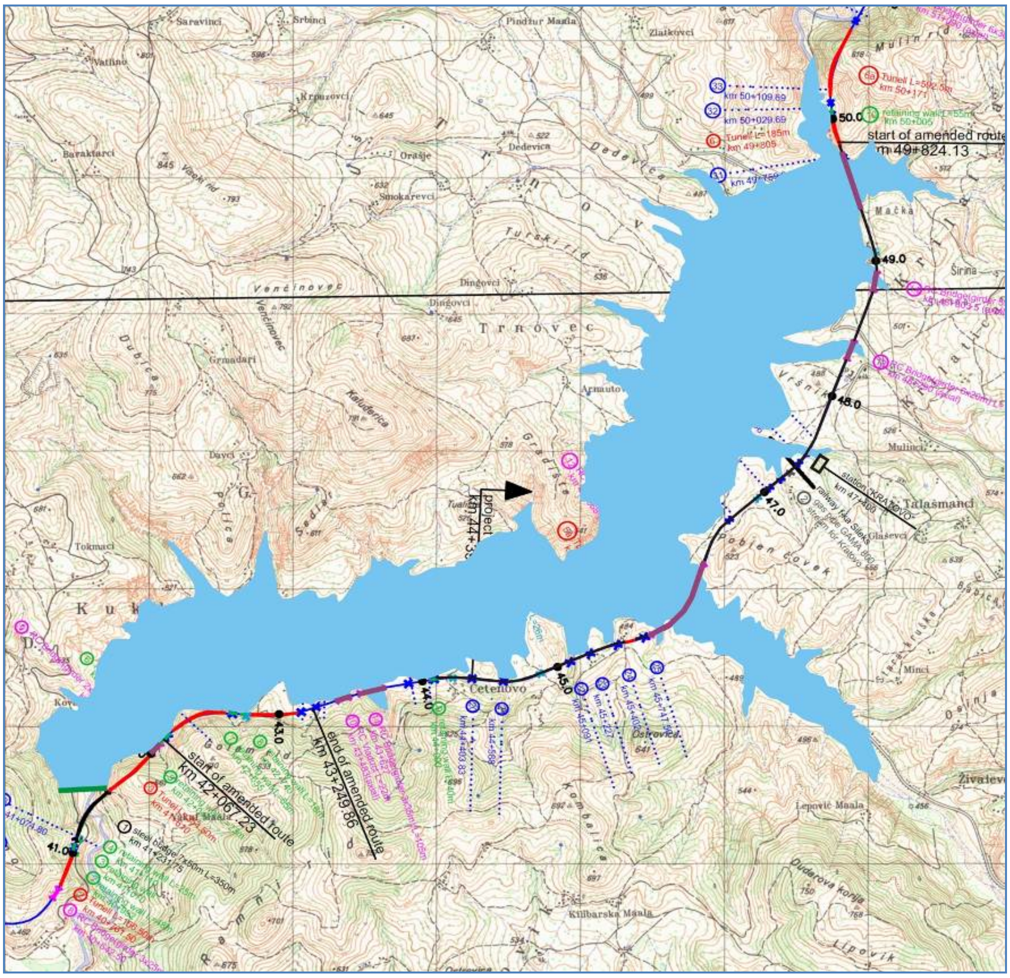


Figure 5-25 Planned Vakuf Reservoir

All the water level in the rivers in Section 2 are highest in April and May and lowest in July and August. High water levels in spring are due to melting snow and increased precipitation together with low evaporation rates. The rivers of the Osogovo area are characterized by numerous torrents. Torrents are the result of unorganized deforestation, which cause major damage to cultivated areas. Arable land is mainly irrigated from the rivers and springs nearby with a primitive water system built exclusively for that purpose.

The following table presents the intersection of the surface water courses and the railway alignment in Section 2.

Name of the surface water	Type of the surface water	Running km at which the surface water is crossed
unnamed	seasonal small stream	29.900 – 33.300 (8 times)
Drzava	small stream	33.830
unnamed	seasonal small streams or drain	34.900 – 37.870 (9 times)

Name of the surface water	Type of the surface water	Running km at which the surface water is crossed
Korija	small stream	38.690
unnamed	small seasonal streams or drain	38.950 – 40.700 (5 times)
Kriva river	river	41.350
Vakuf reservoir	planned artificial lake	42.067,23 – 49.824,13
unnamed	seasonal small streams	42.00 - 45.870 (11 times)
Kratovska river	small river	46.050
unnamed	seasonal small streams	46.700 – 51.730 (10 times)
Krvareka	river	58.850
Vetunicka river	small stream	51.110
unnamed	small seasonal stream	51.730 – 53.290 (4 times)
Rankovska river	small river	53.700
unnamed	small seasonal streams	54.300 – 56.260 (5 times)
Ginovski Dol	small stream	56.968
Zavartce	seasonal stream	57.230
Buina Bare	seasonal stream	57.970
CvetinVir	seasonal stream	59.310
unnamed	small seasonal streams	59.700 – 59.990 (2 times)
Golem Dol	seasonal stream	60.470
without name	small seasonal streams	60.720 – 62.320 (6 times)
reservoir of Raska and Kriva river south of Kriva Palanka	planned artificial lake	62.450 – 67.300
Raska river	seasonal river	62.630
unnamed	small seasonal streams	63.060 – 63.970 (3 times}
SewiDol	seasonal stream	64.490
unnamed	small seasonal streams	64.880 – 65.160 (2 times)
Gabarska river	seasonal river	66.010

Table 5-5 Section 2, surface water courses that intersect with the railway at K.P. 30.502-66.500

A detailed hydrological map of section 2 showing the streams and rivers intersected by the railway alignment is presented in figure below.

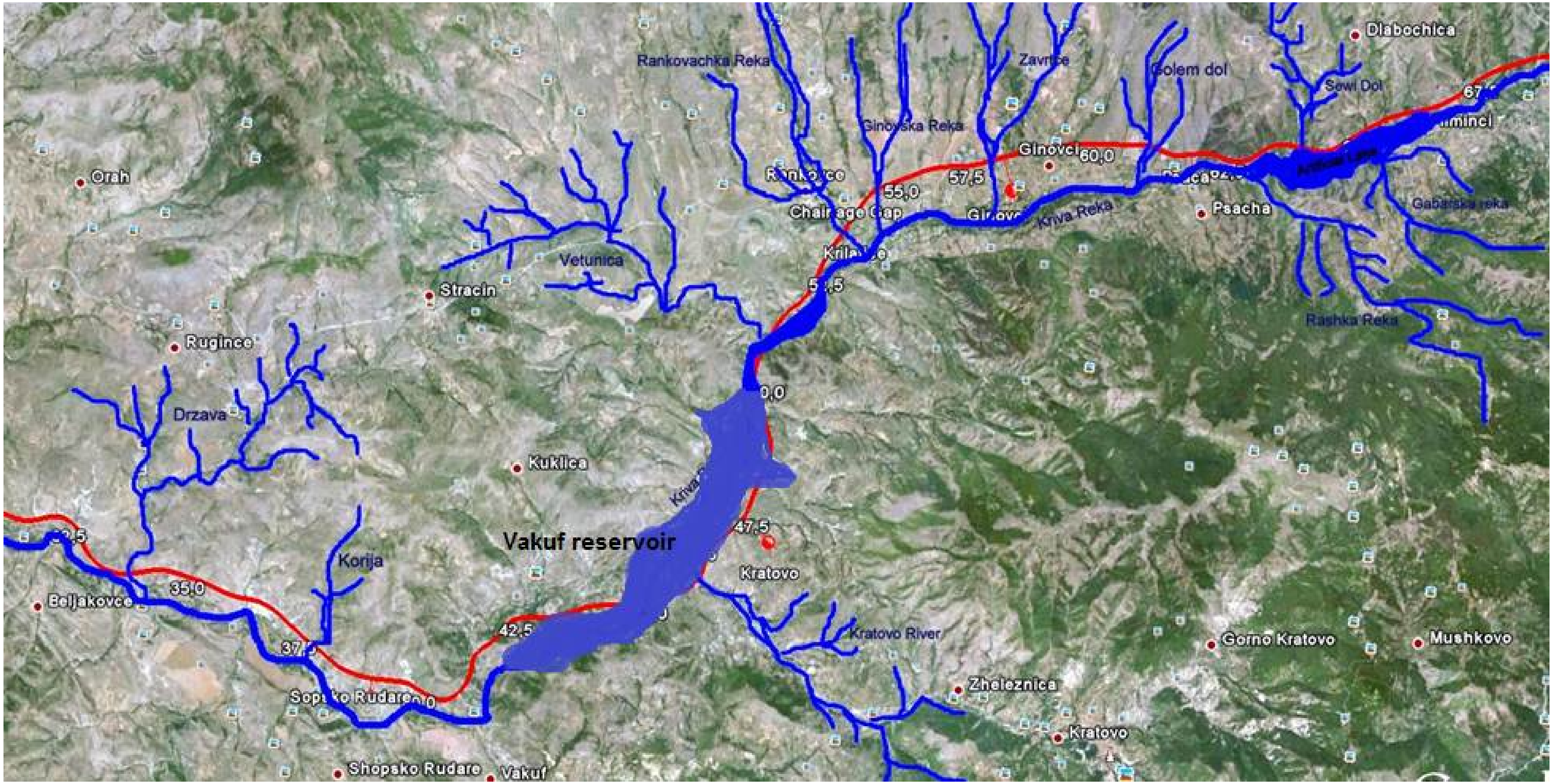


Figure 5-26 Hydrological map of Section 2 (including Planned Vakuf Reservoir)

Hydrology of Section 3: KrivaPalanka to Bulgarian Border (Deve Bair)

Section 3 spreads over the territory of the Municipality of Kriva Palanka, starting at K.P. 66.500 and ending at K.P. 89.00 km in the same municipality at the border of the Republic of Macedonia with the Republic of Bulgaria. In this area, the hydrology is not very extensive, comprising a network of rivers, small rivers, and seasonal streams which are tributaries to the Kriva river.

The town of Kriva Palanka is supplied with spring water from the locality of Kalin Kamen through the city's water supply system built in 1988, made out of the impoundment of 116 springs with variable yields of 25 to 100 l/s. As for the water consumption from the city's water supply, 80% is consumed by households and 20% by industries and small businesses in the municipality. The current yield of the sources of water supply provides 113 liters/person/day.

A constant control in the water supply of this municipality is performed by the State sanitary and health inspection body, through regular controlsof the impoundments, water lines, storage tanks, and chlorination systems.

As all the watercourses in this area are sourced from mountain springs, they have the highest water quality belonging to class I-II. These water courses include Kriva riveritself and all the tributaries: Gradishka, Durachka and JamackiDol (which donot intersect with the railway alignment, but are relevant for the settlements of the section), Randel, Domackidol, Krkljanska. The primary source of surface water pollutants in the area is sewage from the settlements nearby the water streams.

The following table presents the intersections of the surface water courses and the railway alignment in section 3.

Name of the surface water	Type of the surface water	Running km at which the surface water is crossed
Gradecka river	seasonal river	66.460
Randel	seasonal river	67.510
unnamed	small seasonal streams	67.940 – 71.130 (11 times)
Randel	seasonal small river	71.450
unnamed	seasonal small streams	71.950 – 72.630 (3 times)
Domack iDol	seasonal small river	73.930
unnamed	small seasonal streams	73.430 – 74.640 (5 times)
Kriva river	river	74.910
unnamed	seasonal small streams	75.360 – 78.620 (7 times)
Krkljanska river	small river	79.280
unnamed	small seasonal stream	79.710 – 80.180 (3 times)
Uti river	seasonal stream	80.700
Kriva river	river	82.290
unnamed	seasonal stream	83.640

Table 5-6 Section 3, surface water courses that intersect with the railway at K.P. 66.500-89.000

A detailed hydrological map of section 3 showing the streams and rivers intersected by the railway alignment is presented in **Error! Reference source not found.** below.

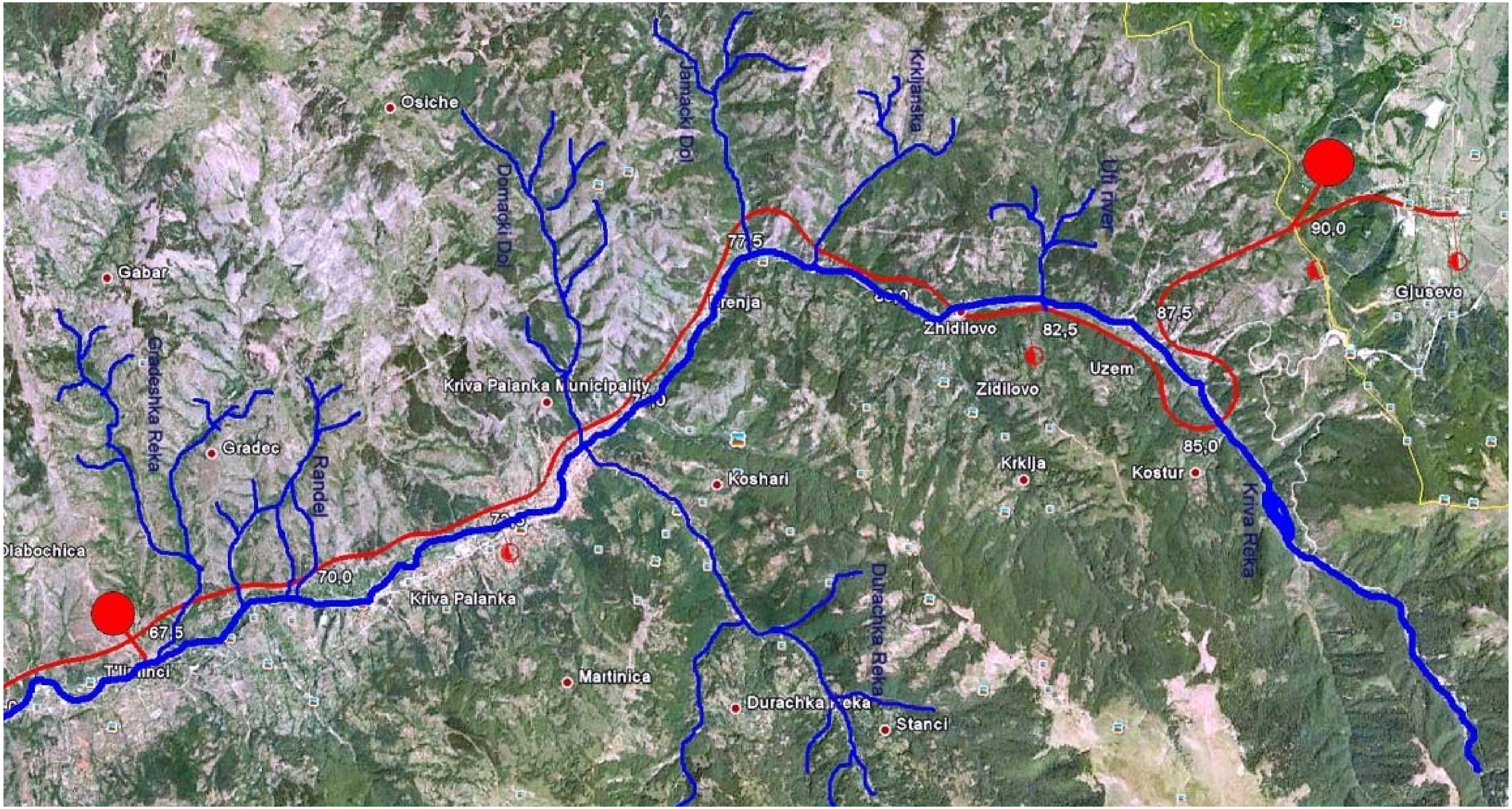


Figure 5-27 Hydrological map of Section 3

Taking into consideration the profile of Corridor VIII and the geological characteristics of the terrain, using the geological maps obtained and relevant to the ESIA, the sensitivity of the surface waters has been assessed along the route, and the results are presented in the following table.

Name of the surface water course	Type of the surface water course	Running km at which the surface water course is crossed	Sensitivity Criteria	Sensitivity to water pollution
Section I				
unnamed	seasonal small stream	0.355 – 1.866 (5 times)	quartz, clay and limestone	low
Kavardzik river	small stream	2.771	decomposedsurfacematerial, feldspate and clay	low
Lipkovska river	small river	3.125	alluvium surface	high
unnamed	seasonal stream	3.452 - 5.095 (2 times)	quartz, clay and limestone	low
Konjarska river	small river	7.412	alluvium surface	high
unnamed	seasonal small stream or drain	8.161 – 16.538 (20 times)	alluvium surface, quartz, clay and limestone, some schist areas	high
BabinDol	small stream	17.379	alluvium surface, some coil surface	high
unnamed	seasonal small stream	18.119 – 18.816 (2 times)	coil surface and alluvium surface	high
Bara	small stream	19.550 – 20.310 (3 times)	alluvium surface	high
unnamed	seasonal small stream	21.524 – 24.325 (6 times)	alluvium surface	high
Pcinja river	river	24.500	alluvium surface	high
unnamed	small seasonal stream or drain	24.784 – 26.725 (5 times)	clay, limestone, sediments, quartz	low
Zivusa	small stream	27.466	clay, limestone, sediments, quartz	low
unnamed	small seasonal stream or drain	27.739 – 29.309 (7 times)	Stratified tuff	medium to high
Section II				
unnamed	seasonal small stream	29.900 – 33.300 (8 times)	Stratified tuff	medium to high
Drzava	small stream	33.830	stratified tuff	medium to high
unnamed	seasonal small streams or drain	34.900 – 37.870 (9 times)	Stratified tuff, volcanic rock	low to medium
Korija	small	38.690	magmatic rock	low

Name of the surface water course	Type of the surface water course	Running km at which the surface water course is crossed	Sensitivity Criteria	Sensitivity to water pollution
	stream			
unnamed	small seasonal streams or drain	38.950 – 40.700 (5 times)	volcanic rock	low
Kriva river	river	41.350	alluvium surface and biotite, andenzite and auguite	high
Vakuf reservoir	planned artificial lake	42.067,23 – 49.824,13	alluvium surface and biotite, andenzite and auguite, volcanic rock, magmatic rock, alluvium rock, schist	high to medium
unnamed	seasonal small streams	42.00 - 45.870 (11 times)	alluvium surface and biotite, andenzite and auguite, volcanic rock,	high to medium
Kratovska river	small river	46.050	volcanic rock,	low
unnamed	seasonal small streams	46.700 – 51.730 (10 times)	volcanic rosk, magmatic rock and schist,	low to medium
Kriva river	river	50.850	schist surface	medium
Vetunicka river	small stream	51.110	alluvium surface	high
unnamed	small seasonal stream	51.730 – 53.290 (4 times)	schist and volcanic rock	medium to low
Rankovacka river	small river	53.700	volcanic rock	low
unnamed	small seasonal streams	54.300 – 56.260 (5 times)	alluvium surface and quartz, clay and limestone	high
GinovskiDol	small stream	56.968	quartz, clay and limestone	low
Zavartce	seasonal stream	57.230	quartz. clay and limestone	low
Buina Bare	seasonal stream	57.970	quartz, clay and limestone	low
CvetinVir	seasonal stream	59.310	quartz, clay and limestone	low
unnamed	small seasonal streams	59.700 – 59.990 (2 times)	quartz, clay and limestone	low
Golem Dol	seasonal stream	60.470	quartz, clay and limestone	low
unnamed	small seasonal streams	60.720 – 62.320 (6 times)	quartz, clay and limestone, and some schist surface	low
Reservoir of Raska and Kriva river south of Kriva Palanka (planned after 2020)	planned artificial lake	62.450 – 67.300	schist surface and some alluvium surface	medium to high
Raska river	seasonal river	62.630	schist surface	medium
unnamed	small seasonal streams	63.060 – 63.970 (3 times}	diluvium and schist surface	medium

Name of the surface water course	Type of the surface water course	Running km at which the surface water course is crossed	Sensitivity Criteria	Sensitivity to water pollution
SewiDol	seasonal stream	64.490	schist surface	medium
unnamed	small seasonal streams	64.880 – 65.160 (2 times)	schist surface	medium
Gabarska river	seasonal river	66.010	schist surface	medium
Section III				
Gradecka river	seasonal river	66.460	schist surface	medium
Randel	seasonal river	67.510	schist surface	medium
unnamed	small seasonal streams	67.940 – 71.130 (11 times)	schist surface and some alluvium surface	medium to high
Randel	seasonal small river	71.450	schist surface	medium
unnamed	seasonal small streams	71.950 – 72.630 (3 times)	schist surface	medium
DomackiDol	seasonal small river	73.930	schist surface	medium
unnamed	small seasonal streams	73.430 – 74.640 (5 times)	schist surface	medium
Kriva river	river	74.910	schist surface	medium
unnamed	seasonal small streams	75.360 – 78.620 (7 times)	schist surface	medium
Krkljanska river	small river	79.280	schist surface	medium
unnamed	small seasonal stream	79.710 – 80.180 (3 times)	schist surface	medium
Uti river	seasonal stream	80.700	schist surface	medium
Kriva river	river	82.290	schist surface	medium
unnamed	seasonal stream	83.640	schist surface	medium

Table 5-7 Sensitivity criteria of the surface waters and sensitivity values to water pollution

Monitoring of surface water quality

The monitoring of surface water quality in the Republic of Macedonia is provided by the National Hydrological Metrological Services (NHMS) through the program River Monitoring System, and the collected data is processed by the Ministry of Environment and Physical Planning. The natural and artificial surface water bodies as well as ground waters are classified according to their quality status following the water classification system set in Decree on classification of waterways, lakes, accumulations and ground waters (Official Gazette No. 18/99).

NHMS implements the quality control measurements in 20 measurement points for surface water control in Macedonia. In this particular region corresponding to the eastern section of Railway Corridor VIII, there are three measuring points, 1 on river Kriva and 2 in river Pcinja, at the following locations (see also *Figure 5-34*):

1. Measuring point Trnovec on the river Kriva.
2. Measuring points on the river Pcinja -Pelince and Spa Katlanovska.

For the tributaries of these two main water arteries in the area (Pcinja and Kriva rivers), the quality control is provided by the Public Health Institute of Kumanovo, the Central Environmental Laboratory in the MOEPP, Public Communal Enterprise "Vodovod I Kanalizacija".

The locations of the measurement points where the surface water quality is monitored by the National Hydro Meteorological Service of the Republic of Macedonia are presented in the map of *Figure 5-34*, represented as blue circles.

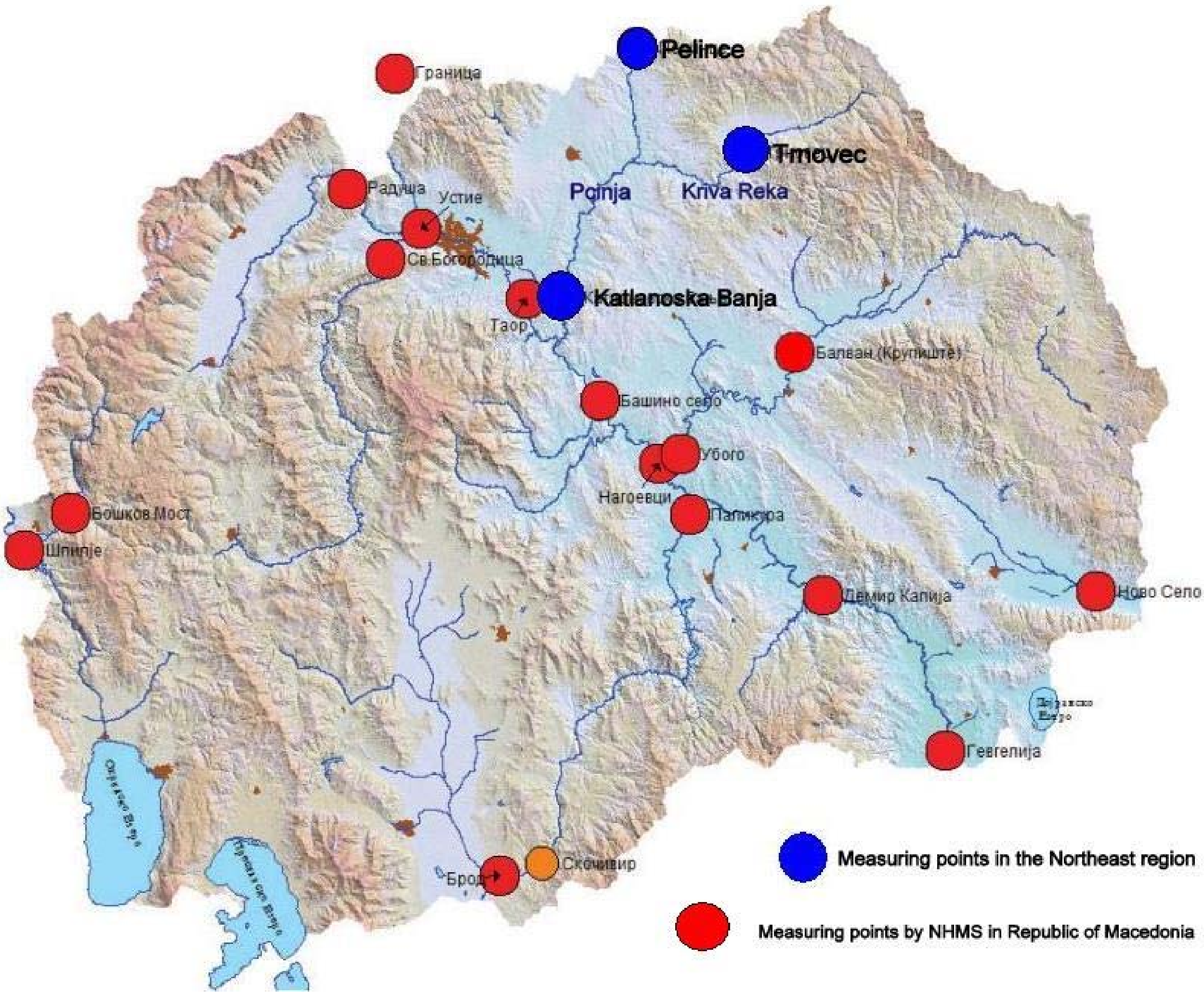


Figure 5-28 Surface water quality measurement points in Macedonia

The results of the water quality analyses for the river Krivaat the monitoring point in the village of Trnovec (at the very exit of the Municipality of Rankovce) shows that the water is classified into class I and II, with the exception of three parameters: nitrites, cadmium ions and BOC_5, the reason why the overall water quality classification is class III and IV.

According the Annual Report on Surface Water Quality issued by the Ministry of Environment in 2010, this situation has improved, as can be observed in table below.

Parameter	Class of water
Dissolved oxygen (mg/l)	I
Five-daily biochemical oxygen consumption (mg / l)	I
Chemical oxygen demand (mg/l)	I
Fe, Mn, Zn, Ni, Cu, Cr^{6+}, Pb ions (µg/l)	I – II
Cd ions (µg/l)	I
Nitrate (µg/l)	I
Nitrite (µg/l)	I
Bio monitoring	96% of the analyzed samples are ranked in class I, 4% of the analyzed samples are ranked in class II

Source: Annual Report on Surface WaterQuality, Ministry of Environment andPhysicalPlanning (2010)

Table 5-8 Surface water quality of river Kriva, at the measurement point Trnovec (2010)

In river Pcinja, there are two monitoring measurement points: Pelince and KatlanovskaBanja. According to Decree setting the classification of waters (Official Gazette No. 18/99), Pcinja river is classified as class III. The quality data obtained for this river is presented in the Table 5-9 below.

Parameter	Class of water	
Measurement point	Pelince	KatlanovskaBanja
Dissolved oxygen (mg/l)	I	I
Five-daily biochemical oxygen consumption(mg/l)	I	II
Chemical oxygen consumption (mg/l)	I	II
Fe, Mn, Zn, Ni, Cu, Cr^{6+}, Pb ions (µg/l)	I – II	I-II
Cd ions (µg/l)	I	I
Nitrate (µg/l)	I-II	I-II
Nitrite (µg/l)	I-II	I-II
Bio monitoring	96% of the analyzed samples are ranked in class I, 4% of the analyzed samples are ranked in class II	96% of the analyzed samples are ranked in class I, 4% of the analyzed samples are ranked in class II

Source: Annual Report on Surface Water Quality,Ministry of Environment andPhysical Planning, 2010

Table 5-9 Surface water quality of Pcinja river, measurement points Pelince and KatlanovskaBanja (2010)

According to the Annual Report of Surface Water Quality of the Ministry of Environment for 2010, the surface waters in the northeastern region are classified in class I-II, which makes them suitable for use in households, industries and agriculture with only minimum disinfection or chlorination.

The quality of the Pcinja and Kriva rivers in the region has improved over recernt years because of the decrease in industrialization, as industries were shut down during the transition to privatization which started in 1993. Since the industries were closed, there has a natural self-purification process has unpolluted water from the tributaries has flowed in the main rivers.

Flooding in the region

The region where the eastern section of Railway Corridor VIII is to be built is a critical region in terms of flooding.

The monitoring for the hydro meteorological parameters and geological parameters in the region is monitored by the National Hydrological and Meteorological Service of the Republic of Macedonia. According to the map of critical flooding areas of the Republic of Macedonia (*Figure 5-29*), the stretch of the Pcinja river between the confluences with the Kriva river and the Kumanovska river is a critical flooding area. This high risk flooding area includes the stretch of the Kumanovska River upstream the Pcinja river and the stretches of the Pcinja and Kriva rivers upstream their confluence. Parts of the existing Section 1 of the railway are constructed on this flooding area.

Flooding episodes occur normally in spring under conditions of rapid snow melt and intense rainfall and they are aggravated by the fact the Kriva river is not regulated upstream and river banks at the confluences of the Pcinja and Kumanovska rivers are not regulated either.

No other flooding areas in the northeastern region where the railway alignment will be located have been identified by the National Hydrological and Meteorological service, as it can be observed in **Error! Reference source not found.** figure below.

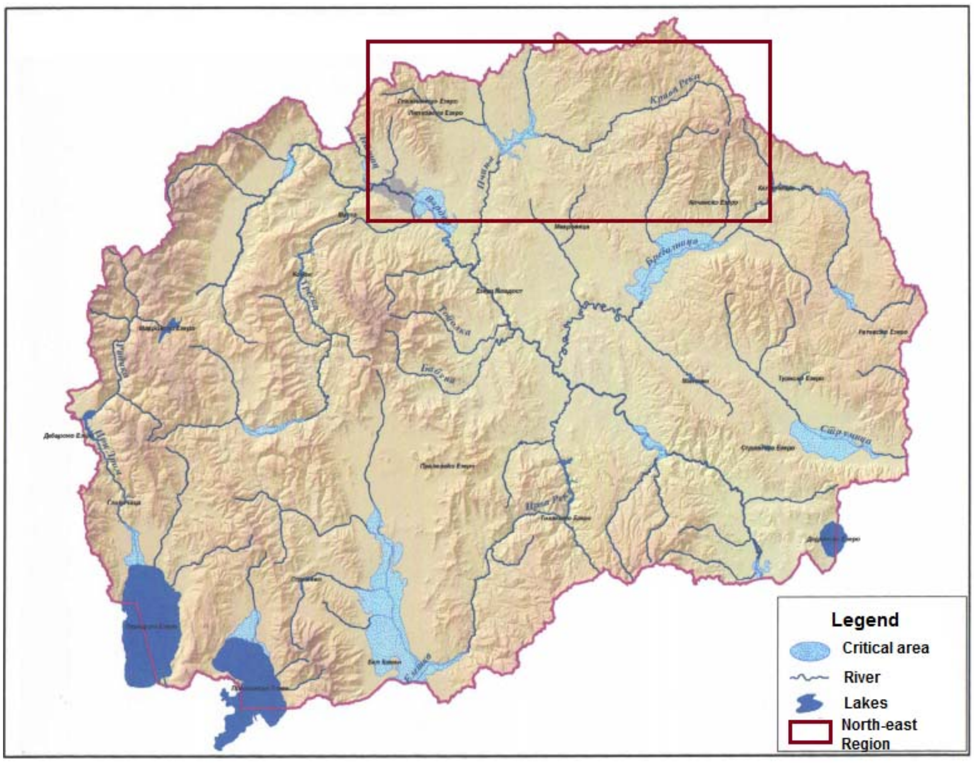


Figure 5-29 Critical flooding areas in the Republic of Macedonia. The area of the railway project is enclosed in a rectangle.

Groundwater

Groundwater in the territory of the Republic of Macedonia represents a basic resource for water supply. Public water supply from groundwater sources represents approximately 70 %, while the percentage of households using it for individual water supply is lower.

Despite groundwater sources making up a relatively high percentage supply, their potential has not thoroughly investigated and they are insufficiently utilized or protected. This is due to a lack of interest in the research on groundwater; inconsistency in the existing legislation, with a lack of clearly defined obligations and rights in the domain of research and rules on the use of groundwater; imbalances in the competences in the domain of water supply; a deficient hydro-meteorological network; a lack of hydrological detail survey, etc.

The monitoring stations for ground water of the National Hydrological and Meteorological Service of the Republic of Macedonia are presented in *Figure 5-30* below, which illustrates that there are no monitoring points in the area of the railway corridor.

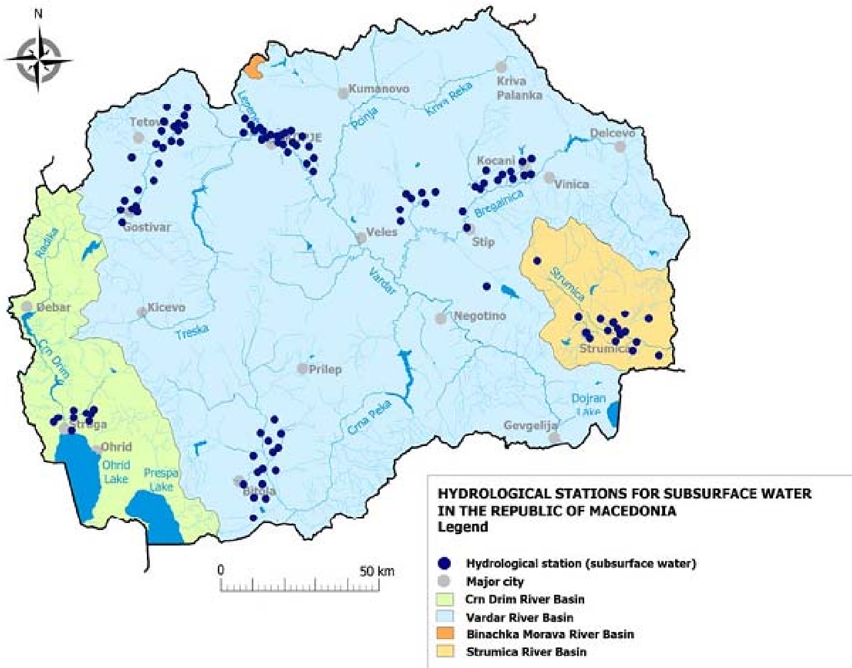


Figure 5-30 Hydrological stations for groundwater in the Republic of Macedonia

The groundwater wells and intake structures in the Republic of Macedonia have been constructed based on partial hydrological investigations. The last systematic investigation of groundwater across the country was undertaken in the period 1963-1975, one of the outputs of this work was a hydrological map of the Republic of Macedonia in scale 1:200.000 (*Figure 5-31*). The majority of the groundwater wells/intakes are located in aquifers in quaternary sandy-gravel sediments next to rivers, with some located in karstic and artesian aquifers.

In the railway corridor, there are two main aquifers consisting of unconfined alluvium aquifers of the Pcinja river (Kumanovo- Katlanovo) and the Kriva river (Kriva Palanka valley). Following the systematic regional study (1963-1975), only local detailed investigations for exploitation purposes were undertaken. Estimates of the exploitable reserves for these aquifers, based on some limited investigations , were 80-100 l/s and 75 l/s, respectively. The reported estimated static reserves for these aquifers are 114 x 106 m^3 and 675 x 106 m^3, respectively.

There are 18 geothermal known fields in the Republic of Macedonia with more than 50 thermal springs, boreholes and wells with hot water. There are two important geothermal areas in the area of the railway corridor, known as the Kumanovo and Kratovo geothermal fields (*Figure 5-32).* Referring to the paper "Inferred section of the main (low-temperature) geothermal systems in the Republic of Macedonia" – Proceeding World Geothermal Congress 2000, Kyushu-Tohoku, Japan, the Kratovo-Zletovo volcanic area belongs to the hydro geothermal systems with karst-fractured reservoirs in marble or other rocks of Precambrian or Paleozoic age. The detailed investigations about this area are lacking.

The same paper identifies several smaller systems such as Proevce at the south margin of Kumanovo valley, Sabota voda near Veles, Rakles near Radovish and etc. as Karst semi-open hydro geothermal systems with reservoirs in Paleozoic marbles. The railway corridor does not pass through either of these.

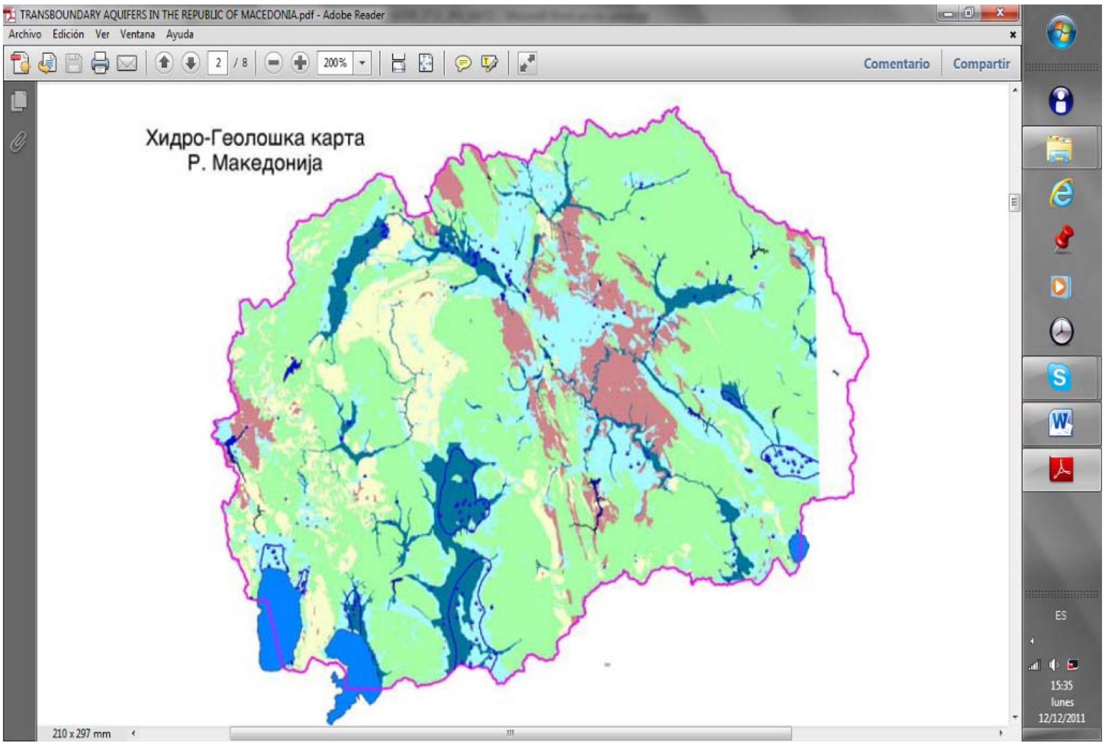


Figure 5-31 Hydrological map of the Republic of Macedonia

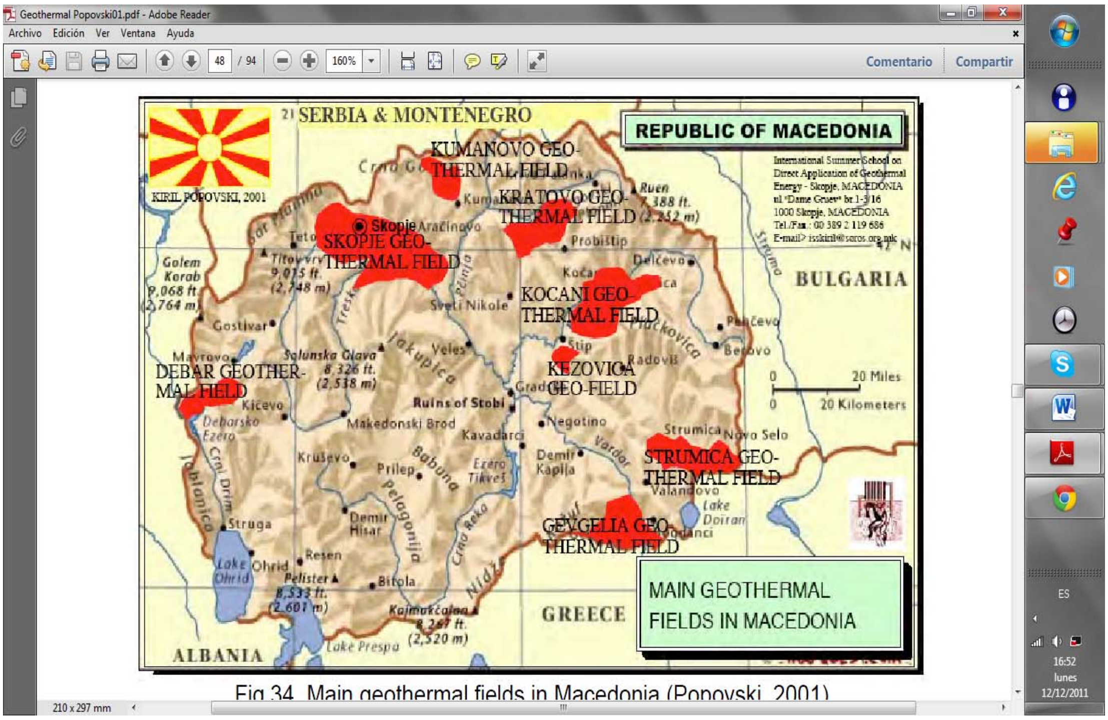


Figure 5-32 Main geothermal fields in the Republic of Macedonia

Drinking water supply in the investigation area

The drinking water supply for the municipalities within the investigation area for the railway project is sources from surface and groundwater. The primary water supplies and local population cent res in Macedonai are presented in *Figure 5-33*, including those relevant to the project.

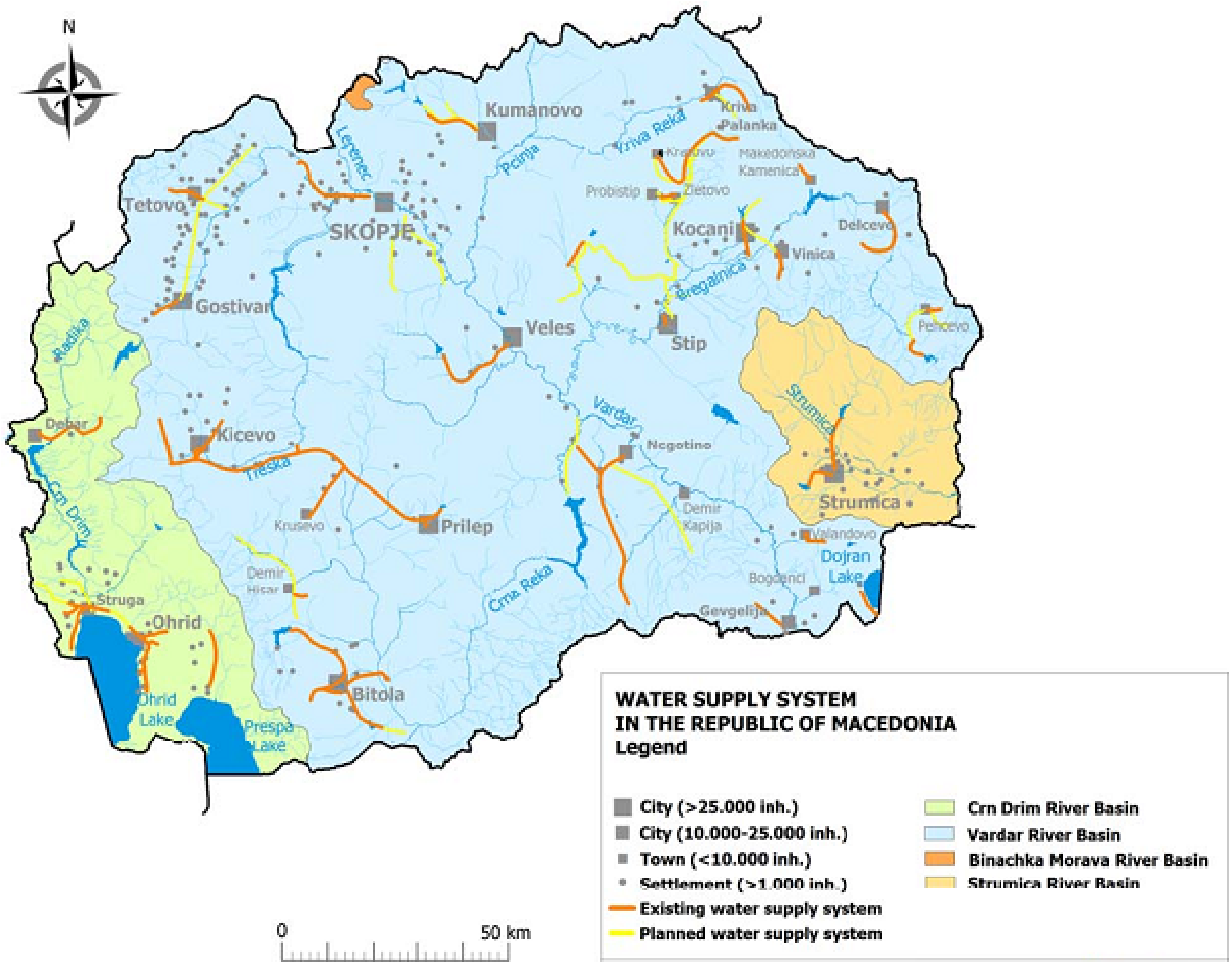


Figure 5-33 Water supply systems in the Republic of Macedonia

The Municipality of Kumanovo is supplied with drinking water from the two reservoir lakes Lipkovo and Glaznja, located to the north in the Municipality of Lipkovo. This water sypply system, which has been operative for more than 40 years, is used for irrigation around Kumanovo (around 10.000 ha), and for drinking water supply to Kumanovo and surround settlements. It is also used for industrial water supply and temporarily for the production of electricity.

These reservoirs have an average water capacity of 6.744.373 m^3, which depends on the hydrological state of the watercourses in the summer and winter periods. During the summer period, places located at higher altitudes in the municipality have no access to water.The average capacity of drinking water is 430-450 l/s, and in the summer period the capacity decreases to 300-350 l/s, since this is the limit that the Filtering station can provide. Around 97% of the total population in the municipality is supplied by these resevoirs, and the rest are supplied by private wells.

In the Municipality of Rankovce, the potable water supply is from several local springs (some of which are seasonal and run dry in the summer) and groundwater abstraction facilities at Strachka Vodenica near the Kriva river, which have no strategic significance. This potable water supply is used by several little populated settlements including the villages of Psacha, Vetunica, Ginovce, Odreno, Opila, Petralica, Radibush and Rankovce.

The water supply system for the villages of Rankovce, Petralica, Ginovce, Radibush and Psaca is operated by the Public Utility Enterprise for Communal works “Chist Den”.

The data obtained from this public company show that in some of the settlements of this municipality there is no permanent water supply; the drinking water supply in these populations comes from individual wells, village taps or small local, usually seasonal, streams. This is the case for the villages of Paklishte, Otoshnica, Milutinci, Vrazogrnce, German, Gulinci, KriviKamen, Ljubince, Baratlija and Stancha.

The annual consumption of drinking water in this municipality is 110.293 m^3, or 26.60 m^3 per person.

The water supply in Kratovo comes from river Zletovska, at an altitude of 1090 m, through the Tyrolean intake, located 26 km from the town of Kratovo, which has been operational since 1988. The water supply has a capacity 180 l/s, and provides drinking water to the city of Kratovo and surrounding rural areas. Also, the water is used for irrigation of individual agricultural areas and to maintain minimum biological flow in Kratovo river, especially in the summer period.

The town of Kriva Palanka is supplied with drinking water from the settlement of Kalin Kamen, built in 1988 by impounding 116 springs with an average water flow of 25-100 l/s. The households in Kriva Palanka consume 80% of this water, with the remaining 20% used for agriculture and small commercial objects. The total capacity of the impounded springs is 113 l/person daily. The rural settlements in this Municipality are supplied with water by individual water pumps, individual wells, village taps, etc.; the water quality is not always satisfactory because of contamination from livestock farming.

None of the rivers interacting with the railway alignment are used as a water supply source.

5.1.4 CLIMATE AND AIR QUALITY

5.1.4.1 STUDY AREA ('INVESTIGATION AREA')

The scope of baseline research in air quality and climate is the whole northern-eastern region taking into accounts the main sources of air emissions (industry and small and medium size enterprises or 'SME's, production facilities, mobile sources, commercial buildings, agriculture, etc.), their distribution within the region, and the continuous monitoring of the air quality in city of Kumanovo. Special attention was made on section 1 (Kumanovo – Beljakovce), where the railway will be operated on diesel traction during the period mid 2015 – 2018 and will have associated air emissions which will contribute to air pollution.

5.1.4.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The list of relevant national regulation and policy documents on air emission, air quality and climate change is provided in Chapter 2, which also includes relevant international environmental safeguards standards, principles and international polices of EBRD, EIB, IFC, WHO and other international organizations.

In Macedonia, the air quality regulation is provided by Law on Ambient Air Quality ("Official Gazette of the Republic of Macedonia" No. 67/04 with latest amendment No. 92/07, No. 35/10 and No. 47/11).

The main requirements of the Air Quality Framework Directive (96/62/EC) and four daughter EU Directives: a) EU Directive 2000/69/EC related on benzene and carbon monoxide limit values in ambient air, EU Directive 2002/3/EC on ozone in ambient air, EU Directive (1999/30/EC) on limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, and EU Directive 2004/107/EC on arsenic, cadmium, mercury, nickel and PAH in ambient air, have been transposed into national legislation.

Since 2004 the following secondary legislation has been adopted transposing the relevant EU Directives and technical standards:

- Decree on limit and target values for levels and type of pollutants in the ambient air, alert and information thresholds; deadlines for achieving limit and target values for specific substances; margins of tolerance for limit value and target value and long term objectives for specific pollutants (Official Gazette of RM No. 50/05);

- Rulebook on criteria, methods and procedures for evaluation of the ambient air quality (Official Gazette of RM No.82/06);
- Rulebook on inventory and determination of the levels of the pollutant emissions in the ambient air in tonnes per year, for all types of duties, as well as other data needed for submission of the Program for monitoring the air in Europe (EMEP) (Official Gazette of the RM No. 142/07);
- Lists of zones and agglomerations for ambient air quality (Official Gazette of RM no.23/2009);
- Rulebook for methodology for inventory taking and identification of the levels of emissions of pollutants in the ambient air in tons per year for all types of activities, as well as other data required to be submitted under the Program for air monitoring in Europe (EMEP) (Official Gazette of RM No.2/2010);
- Rulebook on establishing the emission upper limits on national level (Official Gazette No. 10/90);
- Rulebook for air emission limit values from stationary sources (Official Gazette No. 141/10).

The Rulebook for air emission limit values from mobile sources is not adopted yet; it is planned to be adopted next year (2012) where the limit values for diesel traction locomotives will be transposed (EU Directive 2004/26/EC on measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.

The national legislation on fuel quality is also relevant for the project taking into account that for a short period of time (3 years) the railway in Section 1 (30.8 km) will operate on diesel fuel and the railway will contribute to the air emissions from mobile sources. The diesel fuel specification has been prescribed by Rulebook on liquid fuel quality (Official Gazette of RM No. 88/2007, 91/2007, 97/2007, 105/2007, 157/2007, 15/2008, 78/2008, 156/2008, 81/2009) following the requirements of EU (Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC.

The National Action Plan for ratification and implementation of the heavy metals Protocol, POPs Protocol and Goteborg Protocol towards the Long-Range Trans boundary Air Pollution Convention was adopted in 2010. Since the middle of 2011, the National Plan for air emissions reduction has been prepared, analyzing all emissions sources and proposing measures for reduction of air emissions. There are the two National Air Emissions Inventories that have been prepared up to date (adopted in 2005 and 2009) where, using the SNAP (Selected Nomenclature on Air Pollutants)and EMEP/EEA methodology on air emissions calculations based on human activity, the total amount of air pollutants were identified and reported (SO_2, NO_x, NM – VOC, CH_4, CO, CO_2 , N_2O, NH_3, TSP) per SNAP code of activities (including the SNAP code 8 “Other mobile sources” and sub code 80200 Railways).

The limit values and alert thresholds for SO_2, NO_2, PM_{10}, CO and O_3 for protection of human health, eco systems and vegetation is prescribed in the Decree on limit and target values for levels and type of pollutants in the ambient air, alert and information thresholds; deadlines for achieving limit and target values for specific substances; margins of tolerance for limit value and target value and long term objectives for specific pollutants (Official Gazette of RM No. 50/05). A summary of these limit values is given in *Table 5-10* and *Table 5-11*.

Pollutant	Average Period	Limit value that has to be reached in 2012	Allowablenumber of bridging during the year	Margins of tolerance for 2010	Limit values for 2010	Alert threshold
Sulphur dioxide (SO_2)	1 - hour	350 µg/m^3	24	60 µg/m^3	410 µg/m^3	
	24 – hours	125 µg/m^3	3	-	125 µg/m^3	
SO_2 (ecosystems)	3 consecutive hours					500 µg/m^3
	Year Winter period	20 µg/m^3		-	20 µg/m^3	
Nitrogendioxide (NO_2)	1 - hour	200 µg/m^3	18	40 µg/m^3	240 µg/m^3	

Pollutant	Average Period	Limit value that has to be reached in 2012	Allowablenumber of bridging during the year	Margins of tolerance for 2010	Limit values for 2010	Alert threshold
NO_X (NO_2+ NO) for ecosystems	1 year	40 µg/m^3	0	8 µg/m^3	48 µg/m^3	
	3 consecutive hours					400 µg/m^3
	Year	30 µg/m^3		-	30 µg/m^3	
Particulate Matter PM_{10}	24 hours	50 µg/m^3	35	0 µg/m^3	50 µg/m^3	
	1 – year	40 µg/m^3	0	0 µg/m^3	40 µg/m^3	
Carbon monoxide (CO)	Maximum daily 8 – hour average	10 mg/m^3	0	4 mg/m^3	14 mg/m^3	

* Source: Ministry of Environment and Physical Planning

Table 5-10 Limit values for protection of human health and ecosystems

Pollutant	Average Period	Target value for 2010	
Ozone	Maximum daily 8 – hour average	Targetvalue for the protection of human health	120 µg/m^3 must not be exceeded in more than 25days in the year, with average value measured for the period of three years
	AOT40, calculated from hourly values from May to July	Target value for the protection of vegetation	18 000µg/m^3 * h,calculated averagefor the period 5 years
	Average Period	Long – term goals	
	Maximum daily8 houraverage value of concentration during the calendar year	Long term goal of protecting human health	120 µg/m^3
	AOT40, calculated from hourly values from May to July	Long term goal of protecting vegetation	6000 µg/m^3
	Average Period	Threshold	
	3 consecutive hours	Warning threshold	180 µg/m^3
	3 consecutive hours	Alert threshold	240 µg/m^3

* Source: Ministry of environment and physical planning

Table 5-11 Target values for ozone

	Averaging Period	Guideline value in µg/m^3
Sulphur dioxide (SO_2)	24 – hours 10 minute	125 (interim target -1) 50 (interim target -2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1 – year 1 – hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1 – year 24 - hours	70 (interim target - 1) 50 (interim target -2) 30 (interim target -3) 20 (guideline) 150 (interim target -1) 100 (interim target -2) 75 (interim target -3) 50 (guideline)
Particulate Matter $PM_{2,5}$	1 – year 24 – hour	35 (interim target -1) 25 (interim target -2) 15 (interim target -3) 10 (guideline) 75 (interim target -1) 50 (interim target -2) 37.5 (interim target -3) 25 (guideline)
Ozone	8 – hour daily maximum	160 (interim target – 1) 100 (guideline)

* Source: IFC Environmental, Health, and Safety (EHS) Guidelines

Table 5-12 WHO Ambient Air Quality Guideline

5.1.4.3 DATA SOURCES

The official data and information collected by and received from the national, regional and local institutions and municipalities were the main source of information to identify the air emission and air quality baseline conditions. The following data sources were used:

- National Environmental Action Plan II, Ministry of Environment and Physical Planning, 2006
- National Environmental Approximation Strategy, Ministry of Environment and Physical Planning, 2008;
- National Action Plan for Ratification and Implementation of Protocol for heavy metals, Protocol on Persistent Organic Pollutants (POPs) and Gothenburg Protocol to the Convention on Long-range Trans boundary Air Pollution, 2010;
- National Air Emission Inventory, 2005, Ministry of Environment and Physical Planning;
- National Air Emission Inventory, 2009, Ministry of Environment and Physical Planning;
- Feasibility Study for Corridor 8 – Eastern Section (Economic and Evaluation Study), 2011 EPTISA;
- US EPA Railway Air Pollutant Emission Factors;
- Methods of Estimation of Atmospheric Emissions from Transport: network and state of the art, INRETS Report No. LTE 9901;
- EMEP/EEA Emission Inventory Guidebook, 2009 (SNAP Code 80200 Railways);
- Report on Preliminary Assessment of Air Quality for sulphur dioxide, nitrogen dioxide, nitrogen oxides, carbon monoxide, suspended particles and ozone in the Republic of Macedonia, 2008;
- Annual Report of the state of Environment – AIR QUALITY, Ministry of Environment and Physical Planning, for 2010;

- Local Environmental Action Plan for Rankovce / Local Environmental Action Plan for Kratovo / Local Environmental Action Plan for Kumanovo / Local Environmental Action Plan for KrivaPalanka – Chapters on air emissions and air quality;
- Annual Reports from the National Hydrological and Meteorological Services, Republic of Macedonia, 2010;
- Annual Report on Diesel Fuel Consumption, Macedonian Railways – Transport 2010;
- Testing Report on Diesel Fuel Quality (Sulphur content), Okta Refinery Laboratory.

5.1.4.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

All the available documents related with air emissions (all SNAP activities and particularly SNAP code 80200 – Railways) and air quality for the northeastern - region where the railway alignment is located were collected and reviewed by the Consultant. The above mentioned documents contain all necessary data and information to get the real picture on the air quality along the route. Several site visits were organized and discussions with municipality representatives were conducted. In May 2011 several stakeholder meetings were held (Kumanovo, Kratovo, Rankovce and KrivaPalanka), where questionnaires were distributed to identify any environmental and socio-economic issues that should be analysed in more detail within the ESIA Study, including air quality issues.

5.1.4.5 BASELINE ASSUMPTIONS & LIMITATIONS

In the northeastern region there is only one air quality monitoring station located in city of Kumanovo. No other monitoring stations are in place, so that there is no information about the air quality in other cities of the region, such as Kriva Palanka. The city of Kriva Palanka is one of the most sensitive urban settlements with regards to air pollution due to heavy traffic and a large amount of construction works planned. No strategic mapping has been done for city of Kumanovo and for the main railway Tabanovce – Gevgelija (Corridor X).

The professional opinion of the environmental consultant was used to describe the baseline condition, taking into consideration the sources of air pollution in the region, especially in Kriva Palanka municipality (stationary and mobile sources).

There is no national legislation adopted yet on air emissions from mobile sources and outdoor equipment specification on air emission limits. There is no information on the transposition of the EU Directive 2004/26/EC on non-road machinery including emissions from the railway-locomotive operation and testing for compression ignition engines and emissions limits on CO, HC, NO_x, NMHC and particulates.

5.1.4.6 AIR QUALITY BASELINE CONDITIONS

The air quality in the northeastern region depends on the pollutant substances emissions originating from energy consumption in industry (mainly construction activities, food processing and mining – Toranica mine), households (wood fire), heating of public and commercial facilities, as well as from traffic, transportation, and agricultural activities.

Using the maps and monitoring reports of main polluters (production facilities and IPPC installations that reported their emissions into the Application for IPPC permit), the first National Air Emission Inventory on Air Polluters was prepared in 2005 and the second one in 2009 by the Ministry of Environment and Physical Planning.

The Air Emission Inventory identifies all sources of air pollution and annual quantities of pollutant substances into ambient air presented per company/municipality/region. All stationary and mobile sources were taken into account to calculate the annual emissions. Reporting was made using the data on emissions of pollutant substances SO_2, CO, CO, NO_x and PM_{10}.

Data on emissions from stationary sources in the Northeastern region (reported in 2005 and 2009) are given in the *Table 5-13* below.

Emission sources	Air Emissions Inventory Report (year)	Pollutants (t/year)			
		SO_2	CO	NO_x	PM_{10}
Domestic firewood combustion	2005	3.477	11.168	114	323
Industrial production facilities (SMEs in the region – number of facilities identified 86)		138	91	51	13
Industrial production facilities (large production plants with IPPC license)	2009	752	113	313	47

Table 5-13 Emission of air pollutants from stationary sources and domestic firewood in the Northeastern region

The main IPPC installations in the region are: companies dealing with construction activities (Granit, KIK, Mavrovo, Pelagonija), food processing installations (ZdravjeRadovo, BucenKozjak, KokinoWinary, Zitomel), mining activities (Toranica – lead/zinc ore) and construction materials (Bentomak). There are also other SMEs in the region with very small capacities involved in food processing and agriculture, printing and trade activities.

In addition to the air emissions from the industry, the 2009 National Air Emissions Inventory identifies, at a national level, the emissions from mobile sources, including those of railway operation – SNAP code 80200). These data are presented in *Table 5-14* .

SNAP Code	SO_2 (Mg)	NO_x (Mg)	NMVOC (Mg)	CH_4 (Mg)	CO (Mg)	CO_2 (Gg)	N_2O (Mg)	NH_3 (Mg)	TSP (Mg)
8-other mobile sources and machinery	286,51	2.357,24	1.077,08	15,73	2.251,69	187,65	60,14	0,32	256,82
80200– Railways	26,33	173,82	20,38	0,47	46,99	13,97	5,47	0,03	20,10

(1Mg=1000 kg/1Gg=1000 Mg)

Table 5-14 Total air emissions from SNAP code – Other mobile sources and machinery 8/ Railways 80200

The total amount of SO_2 emissions from other mobile sources than road transport for 2008 year is 286,51 Mga greater value compared with that for the railway, which is 26,33 Mg; for NOx the total amount is 2.357,24 Mg for other mobile sources and 173, 82 Mg for railways; TSP total emissions at national level is 256,82 Mg compared with 20,10 Mg of railway. Air emissions from the group of sources with SNAP code 8 for CO is 2.251,69 Mg and from the railwayas a source is 46,99 Mg. These data show that the railway source represents around 1/10 of the total emissions generated by this group of mobile sources and machinery (military, inland waterways, air traffic, agriculture, forestry and industry machinery).

The 2010 Annual Report issued by the Public Enterprise Macedonian Railways – Transport provides information on the number and type of locomotives, railcars, average age, installed engine power, passed gross train-km (freight and passenger) and energy and diesel consumption. The main characteristics of the trains existing in the railway system in operation in the country are presented below in *Table 5-15* below.

Specification of diesel fuel in Macedonia	
Density	0.845 g/m^3
Content of Sulfur	10 mg/kg
Specification of existing railway transportation system in Macedonia (2009/2010)	
Diesel locomotives	
Average age of diesel locomotives	43 years

Specification of diesel fuel in Macedonia	
Net tones-km 000 (total passenger and freight)/2009	198 646
Net tonnes-km 000 (passanger train)/2009	112 151
Net tones-km 000 (freight train)	86 495
Diesel fuel consumption for diesel locomotives in 2009	3 033 000 kg
Consumption of diesel fuel/net tones-km (total passenger and freight)	15, 27 kg diesel fuel/nettonnes-km
Share of diesel locomotives within the railway locomotives fleet	17,52%
Share of electric drive locomotives within the railway locomotives fleet	82,48%

Table 5-15 Main characteristics of the railway vehicles and operation

Air quality monitoring In the Republic of Macedonia there is a network of monitoring stations for air quality measurements (see figure below).

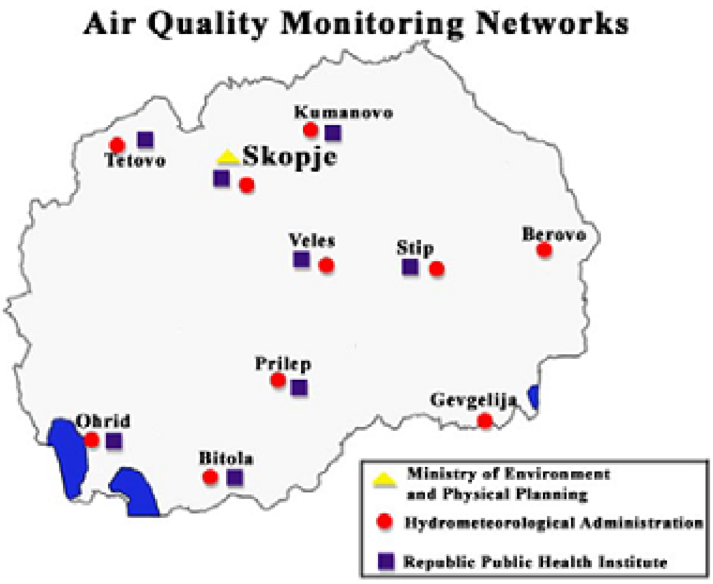


Figure 5-34 Air quality Monitoring Networks in Macedonia

In the Republic of Macedonia, the monitoring of air quality is provided by the Ministry of Environment and Physical Planning (MoEPP), through the Public Health Institute of Macedonia (with the help of the regional branches of the Public Health Institute across the country) and the Hydro metrological Institute.

The National Air Quality Monitoring System (directed by MoEPP) consists of 15 monitoring stations: 3 of them located in the city of Skopje, 2 located in the city of Bitola, 2 in city of Veles, 2 in the Municipality of Ilinden, and one in each of the following towns: Kichevo, Kumanovo, Kochani, Tetovo, Kavadarci and the village ofLazaropole.

The air quality in the northeastern planning region is monitored by a fixed monitoring station and a high volume sampler, placed in the city hospital in Kumanovo (site coordinates N 42°08.175' E 21°42.561') as a part of the National Air Quality Monitoring Network organized by the Ministry of Environment and Physical Planning. Figure below shows the location of this station in relation to the railway.

The fixed monitoring station in Kumanovo monitors the environmental and meteorological parameters: carbon monoxide CO (mg/m^3), sulphur dioxide SO_2 (µg/m^3), ozone O_3 (µg/m^3), suspended particles with the size of particles of 10 microns PM_{10} (µg/m^3), the speed and the wind direction, temperature, pressure, humidity and other parameters.

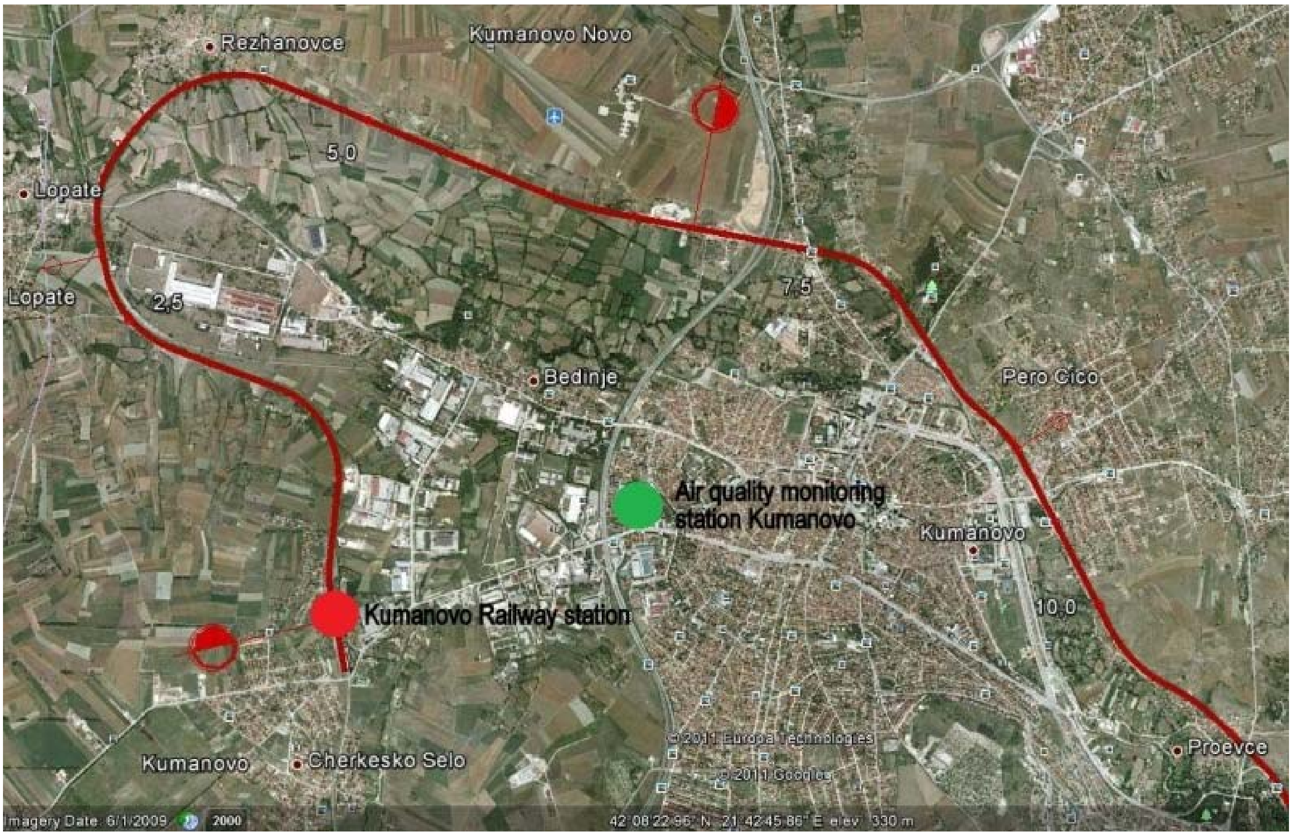


Figure 5-35 Location of the Kumanovo Air Quality monitoring station in relation to the railway

The nearest road is approximately 26 meters west from the monitoring station. The railway station ofKumanovo is around 1.7 km to the SWW from the monitoring station.

The same location is used for placing a high volume sampler, 2 meters away from the automatic monitoring station. It used for taking air samples and further subject to laboratory analysis for testing for the heavy metals concentrations in the air and suspended particles (PM_{10}).

According to the proposals for improving the monitoring of the quality of ambient air in the whole country by regions, there is a proposal for 3 additional automatic monitoring stations that should be installed in the northeastern region for better air quality collection of data and improved planning system.

Figure 5-36 Automatic monitoring station in Kumanovo

Error! Reference source not found.*Table 5-16* below shows the 2009 minimum and maximum monthly average concentrations for all pollutants that are monitored by the fixed monitoring station and the low-frequency sampler placed in Kumanovo, presented in the Annual Report on Air Quality by the MoEPP of RM, 2010.

Pollutants	Minimal average monthly concentration per every month	Maximal average monthly concentration per every month
SO_2 *	1,4[μg/m^3]/ May	68,31[μg/m^3]/ December
PM_{10}	9,2 [μg/m^3]/October	357,2 [μg/m^3]/December
CO	0,1 [mg/m^3]/May	3,9 [mg/m^3]/January
O_3	24,4 [μg/m^3]/January	139,6 [μg/m^3]/April
NO_2 *	5[μg/m^3]/ May	280[μg/m^3]/January

Source: Fixed monitoring station in Kumanovo, year report of air quality by the Ministry of Environment and Physical Planning 2010.

**Note: Because of dysfunction of the SO_2 and NO_2 modules the data is taken from the 2007 Report.*

Table 5-16 Minimum and maximum monthly average concentrations of pollutants in 2009 from the monitoring station in Kumanovo/Northeastern region

An important fact in evaluating air quality is the number of time the air quality limit values (1 hour or 24 hour) in the area are exceeded. These limit values are regulated in the Law on Ambient Air Quality and secondary legislation, where the alert thresholds are given as one hour limit values for the protection of human health and how many times during the month and year these values are exceeded. The data on how often air quality limit values were exceeded for all monitored pollutant substances for 2010 in Kumanovo are shown *Table 5-17* below**Error! Reference source not found.**.

Limit values	SO_2 μg/m^3	NO_2 μg/m^3	$PM1_0$ μg/m^3	CO mg/m^3	O_3 μg/m^3
Alert threshold	500	400			240
1h limit values for protection of human health for 2010	440	260	-	-	-
Times of exceeding of the 1h limit value in 2010	0	0	-	-	-
24h limit values for protection of human health for 2010	125	280	50	12/8 hour	
Times of exceeding the 24h limit value in 2010	0	0	126	0/8 hour	
Target values for human health					120
Times of exceeding the limit values for 2010					46

Table 5-17 Limits to human health and over draft per year in Kumanovo in 2010 **(**Source: Fixed monitoring station in Kumanovo, Annual report on air quality, Ministry of Environment and Physical Planning, 2010)

The data show exceeding limit values for the protection of human health in Kumanovo in 2010 for ozone concentrations (46 times throughout the year), and suspended particles with sizes of 10 microns (126 times in 2010). No exceeding limit values were reported for the other substances which were monitored.

From the data available to define the railway corridor air quality baseline conditions, it can be concluded that the main sources of air pollution at the moment in the region are stationary sources (industrial facilities and energy combustion facilities, and SMEs dealing with production activities), mobile sources (fuel powered vehicles), and fugitive emissions from households in the settlements burning wood for heating.

Except for the city of Kumanovo, where exceeding limit values for ozone and suspended particles have been reported, there are no air quality data for other settlements along the railway line. Based on the number of population, traffic, industry installations and number and types of SMEs, the expert judgment is that in the other towns (Kratovo, KrivaPalanka) and villages have better air quality and less or no exceeding in limit values is expecting.

5.1.4.7 CLIMATE IN THE NORTH EASTERN REGION

The climate in the region of the planned railway alignment, ranges from predominantly moderate-continental to mountainous (see *Figure 5-37*). The temperature varies according to the altitude. The lower areas have a moderately cold winter, moderately warm summer, fresh spring, and relatively warm autumn. These climate characteristics are due to the geographical position, the relief, and certain influences that penetrate through the Aegean Sea through the Kriva river. On the other hand, the high parts of Osogovo are influenced by steppe climate.

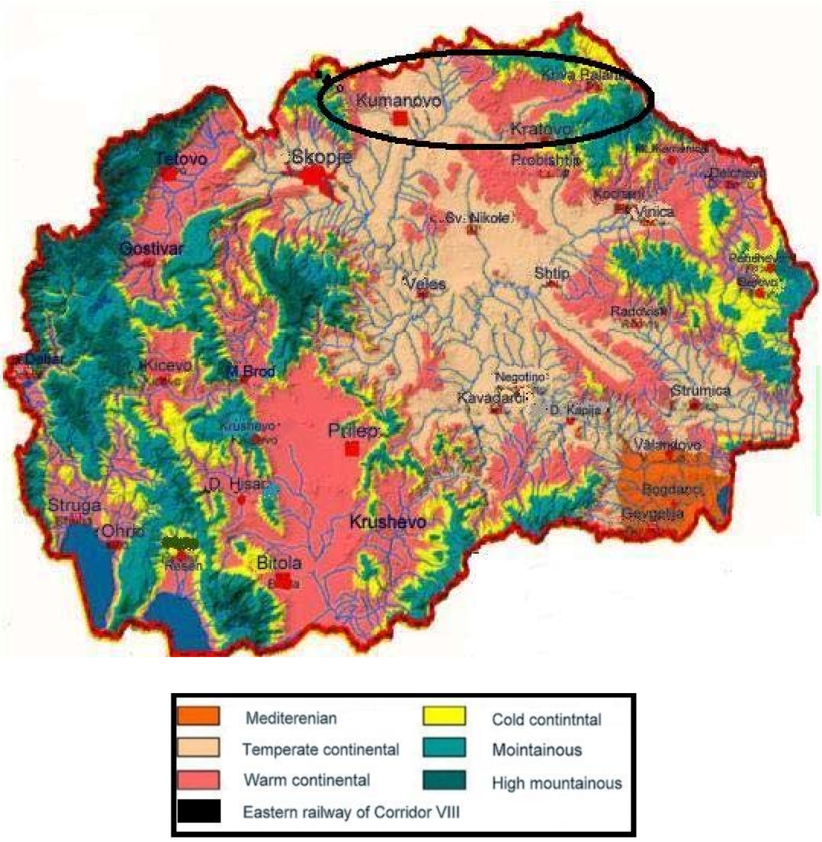


Figure 5-37 Climate types in Republic of Macedonia

The territory of the Municipality of Kumanovo is affected by moderate continental climate, in the low land, and continental climate in the higher areas of the municipality, with an average annual temperature of 12°C. In the lowland parts, warm and cold air masses affect the local climate and two seasons are distinguished: cold and wet winter and hot and dry summer.

The Kumanovo region is characterized by windy weather, with the dominant wind from the north with mean wind speeds up to 266.5 mm/sec (see *Figure 5-38* below)

The average value of annual precipitation is 550 mm, with the greatest intensity in November and May.

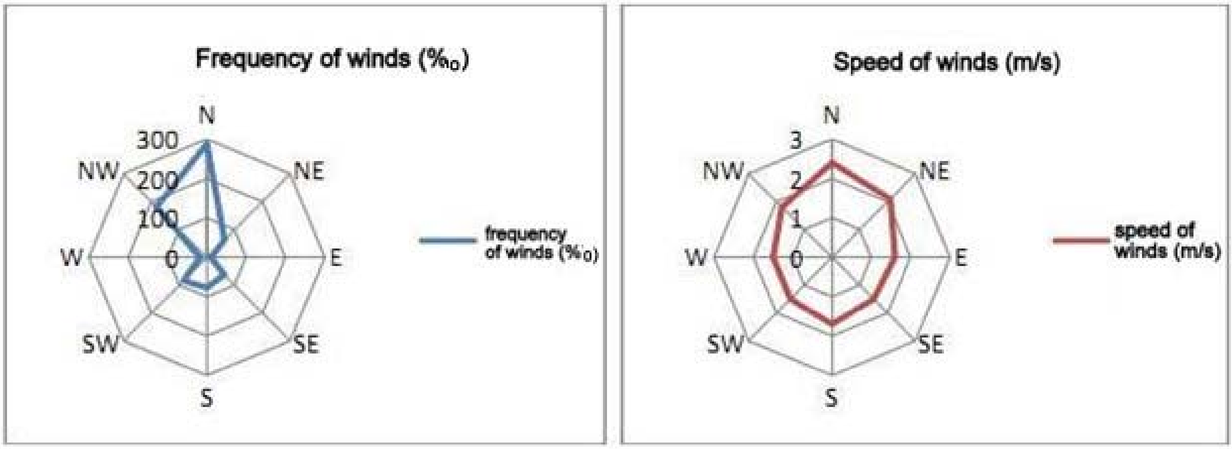


Figure 5-38 Wind rose in the municipality of Kumanovo

The Municipality of Kratovo, due to its geographical position and mountainous relief structure, presents several continental climate variations, including low-mountain, medium-mountain and high-mountain climate zones.

The average annual temperature is 10°C, with maximum summer temperatures of 38°C and minimum temperatures in winter down to -21°C. The average annual amount of precipitation is 630 mm and the wettest month is April.

The dominant winds in the community come from the northeast direction (see *Figure 5-39* below).

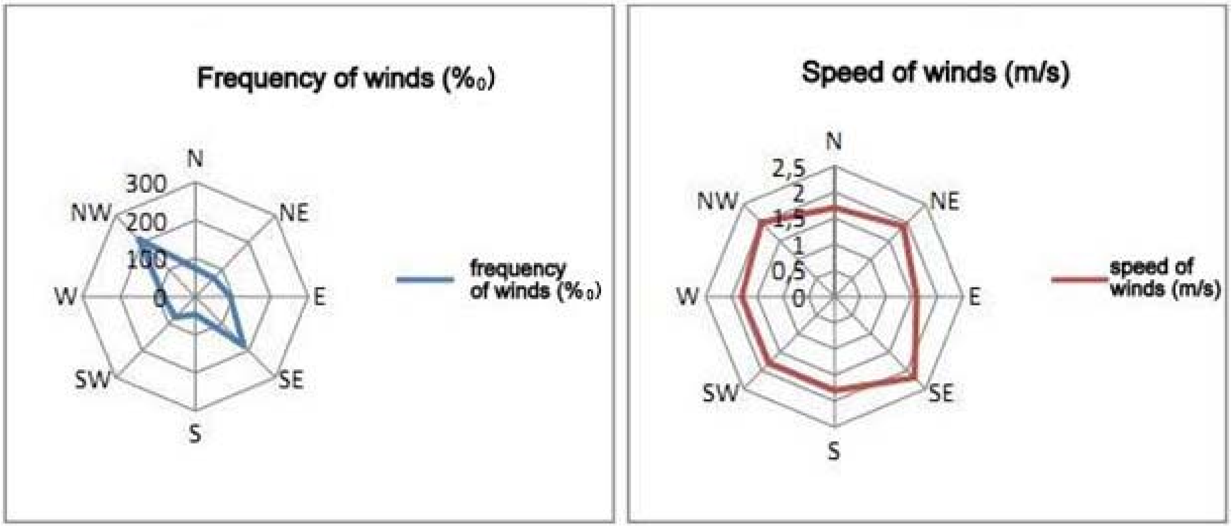


Figure 5-39 Wind rose in the municipality of Kratovo

The municipality Rankovce spreads in Slavishko Pole field and is surrounded by mountain massifs to the north and south. These orographic features have a significant influence on the local climate. The climate is temperate – continental in the lower parts, while in the high parts of Osogovo and German mountains, a mountain climate is dominant.

The average annual temperature is 10°C, and in Rankovce the average annual precipitation is 633mm.

The wind has a mainly south western direction, with an average annual speed of 2.9 m/s.

Due to the geographical position and hilly-mountainous terrain, the climate in the Municipality of Kriva Palanka is different in different zones: low-mountain, intermediate-mountain and high-mountain zones. The climate in the low-mountain zone is continental; in the intermediate mountain zones the climate is characterized by fresh summers, cold springs, cold and snowy winters and large amounts of rainfall. Due to the low temperatures the vegetation period lasts 7 months. In the higher areas, low temperatures are present in all seasons.

The average annual temperature is 11°C.

The average annual precipitation is 622 mm, due to the altitude which is a natural condenser of the vapor brought by the southern and western winds.

The winds have an average annual rate of 2.9 m/s, and the most frequent are the Northeastern winds (see *Figure 5-40* below).

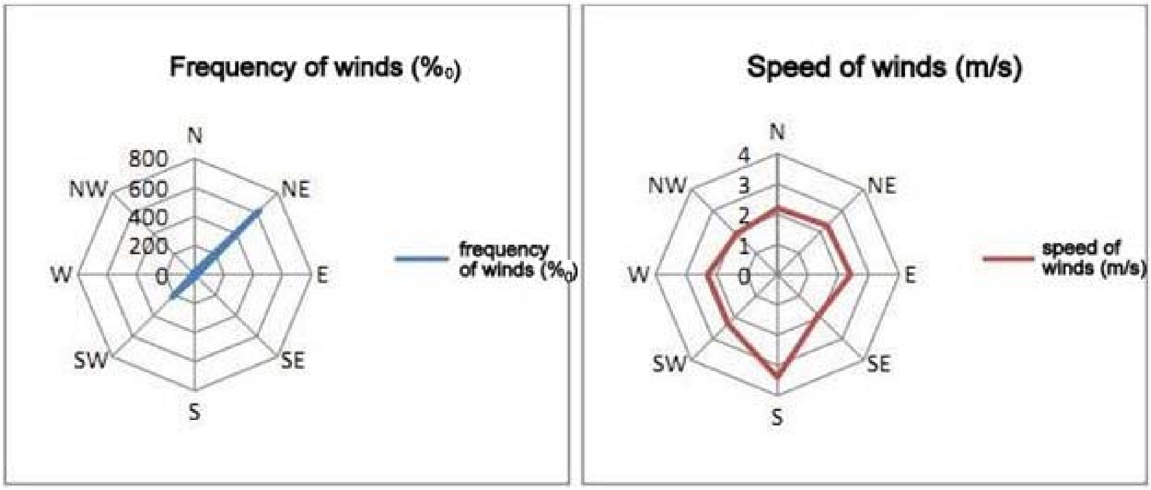


Figure 5-40 Wind rose in the municipality of Kriva Palanka

5.1.4.8 CLIMATE CHANGE

The Republic of Macedonia ratified the UN Convention on Climate Change and Kyoto Protocol in 2004 (Law on ratification – Official Gazette of RM No. 49/2004).

The national greenhouse gas (GHG) inventory was prepared for the period 1999-2002 (with 2002 as the base year) covering the following sectors: energy, industrial processes, agriculture, land-use change and forestry, waste and solvents.

The following GHGs were covered: CO_2, CH_4, N_2O, HFCs, PFCs and SF_6. Also the information on indirect GHGs - CO, NO_2, SO_2 and NMVOCs was provided. The Second National Communication on climate change was prepared and adopted by the Government of Macedonia with identification of all GHGs sources, vulnerable sectors and mitigation measures to decrease the climate change effects.

The total CO2 –eq emissions in Macedonia for the period 1990-2002 ranged from 11.9 to 14.4 Mt CO2 For the baseline year 2000, the emissions amount to 14.3 Mt CO 2 –eq. (7.16 t CO 2 –eq per capita).

The energy sector is the predominant contributor to climate change, with 70% of the contribution. The agricultural sector contributes with 10-15%, while other sectors contribute with less than 10% each.

The predominant emissions of GHGs are CO2 (79%) and methane (12%).

5.1.5 NOISE AND VIBRATION

5.1.5.1 STUDY AREA ('INVESTIGATION AREA')

The noise and vibration study area is located in the northeastern region in Macedonia following the railway alignment (at the left and right sides of the alignment), starting at the city of Kumanovo and finishing in the last settlement near the railway alignment before the Bulgarian border, the village of Zidilovo.

Generally, the study area has been restricted to a narrow strip at both sides of the alignment of no more than 250 m from the railway alignment. However, in certain cases, and in order to collect background data, this distance has been extended to 2 km.

5.1.5.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The noise in the environment is in constant growth, especially in densely populated areas, residential areas, near highways, railroad sand airports. It occupies an important place among the negative consequences of human development on the environment. The largest sources of noise in the environment are road vehicles, railways and airtraffic, industrial noise, noise from neighbourhoods, and, particularly important and specific for Macedonia, the noise from construction activities.

One of the essential elements for achieving a higher level of environmental protection is protection against noise at the regulatory level. The protection against environmental noise pollution is addressed in the Law of Noise Protection (Official Gazette of the Republic of Macedonia No.79/07, 124/10, 47/11). With this law, the basic requirements of Directive 2002/49/EC on the assessment and management of environmental noise are transposed, thus meeting the basic recommendations of the European Union and providing full access to the management of environmental noise. A series of secondary pieces of legislation has been adopted in the period 2007-2011 transposing the EU and WHO (World Health Organisation) Guideline values for community noise in specific environments.

According tothe Law on Noise Protection, the environmental noise is the noise caused by unwanted or harmful outdoor sound created by human activities, which is imposed to the nearby environment causing nuisance and disturbance. It includes noise emitted by vehicles, road and air traffic, rail traffic and areas with industrial activity. The law establishes the need to reduce harmful effects that are consequence of exposure to noise in the media and the environment and to provide a basis for developing measures to reduce noise from all its sources. The ultimate objective is the protection of the health and wellbeing of the population.

Noise measurement and monitoring are necessary for achieving and maintaining environmental noise levels within the limits that the regulations have defined for four types of areas in accordance to their human activity uses and the degree of protection against noise deemed necessary for each of those uses. These areas are:

- **Area with a first degree of noise protection**, includes areas of tourism and recreation, areas near health institutions for hospital treatment, and areas of national parks and natural reserves.
- **Area with a second degree of noise protection**, includes areas primarily intended for residential use, residential districts, areas in the vicinity of educational institutions, educational facilities and social protection services for adults and children, and facilities for primary health care, playgrounds and public parks, green and recreational areas, and local parks.
- **Area with a third degree of noise protection**, correspond to an area where some human activities with noise disturbance are accepted. These include commercial areas, areas with mixed housing/residential, craft activities and production activities (combined areas), areas designated for agricultural activity, places for performing administrative work, trade and service.
- **Area with fourth degree of noise protection,** correspond to an area in which actions are allowed that can cause the appearance of greater environmental noise. It includes non- residential areas exclusively intended for industrial activities and production of craft objects, transportation services, warehousing and utilities.

Law on Noise Protection and the Rulebook on Noise Levels (Official Gazette of the Republic of Macedonia No. 147/2008) -Article 3- establish the limit values of basic indicators of noise level for these areas. These are presented in the following *Table 5-18*.

Area defined according to the degree on noise protection	Noise threshold (dB)		
	L_d	L_e	L_n
Area with degree of noise protection I	50	50	40
Area with degree of noise protection II	55	55	45
Area with degree of noise protection III	60	60	55
Area with degree of noise protection IV	70	70	60

- L_d- day(the periodfrom7:00 to 19:00pm)
- L_e-evening (the periodfrom19:00 to 23:00pm)
- L_n-night(the periodfrom23:00 to 7:00pm)

Table 5-18 Limit values on noise levels

The national noise exposure limit values are in line with the WHO guideline values for community noise in specific environments (presented in *Table 5-19*) and with IFC noise level guidelines provided in the General EHS Guidelines: Noise Management (presented in *Table 5-20*):

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, treatement 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** **140 #2**
Outdoors in parkland and conservation areas	**Disruption of tranquility**	**#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

Table 5-19 WHO Guideline values for community noise in specific environments

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00
Residential; institutional; educational*	**55**	**45**
Industrial; commercial	**70**	**70**

* For acceptable indoor noise levels for residential, institutional and educational settings refer to WHO (1999)

Table 5-20 IFC Noise Level Guidelines

The Rulebook on Noise Levels - Article 4 - establishes the main limits of permitted indoor noise in buildings where people are staying (bedrooms, schools, hospitals, etc.), in order to protect, especially vulnerable groups, from noise annoyance, sleep disturbance or potential adverse impacts of noise on health. These indoor noise thresholds are presented in *Table 5-21* below.

Type of premises	Level of noise permitted, dBA		
	During day time	During evenings	During night time
Hospital rooms, intense care, operational halls	30	30	**30**
Premises in collective buildings, premises for child resting, bedrooms in homes for old people and pensions, hotel rooms	35	35	**30**
Ordinations in health institutions, conference halls, cinemas, theater and concert halls	40	40	**35**
School premises, reading room, amphitheaters, lecture rooms, premises for scientific-investigation works	40	40	**40**
Working premises in administrative buildings, offices	50	50	**50**
Salons of theaters and cinemas, hairdressers and cosmetic saloons, restaurants and cake shops	**55**	**55**	**55**

Table 5-21 Levels of Indoor Noise Permitted, Vulnerable Groups

Article 5 of the Rulebook establishes the limits for additional noise indicators; (LAmax), which must not be exceeded to avoid adverse noise impacts on the population's health. These limits are presented in *Table 5-22* below.

Type of premises	Level of noise permitted, dBA	
	Day time LA max	Night time LA max
Housing area (outdoors)	/	**60**
Premises inside houses, e.g. resting of children, bedrooms in houses for old people and pensions, hotel rooms	/	**45**
Hospitals and other sickbay healing premises	/	**45**
Industrial, commercial, trade and traffic areas	110	**110**
Public meetings, festivals, concerts, discothèques	**110**	**110**

Table 5-22 Level of Noise Permitted, Other Areas

The Decision determining in which cases and under what conditions the peace of the citizens is considered disturbed by noise (Official Gazette of RM No. 01/09) identifies the noise generating actions that can disrupt the public order and peace and sets the limit values for noise levels in non-urban areas shown in *Table 5-23* below.

Types of areas	Noise level expressed in dBA		
	Lд	Lв	Lн
Areas exposed to intensive road traffic	60	55	50
Areas exposed to intensive railway operation	65	60	55
Areas exposed to air traffic	65	65	55
Areas with intensive industrial activity	70	70	70
Quiet areas outside agglomerations	40	35	35

Table 5-23 Noise level limit values for non-urban areas

The Decree establishing the need to prepare noise strategic maps for agglomerations, main roads, main railways and main airports (Official Gazette of RM No. 15/11) points out the legal obligation for the city of Kumanovo, as one of few large cities in the country, to develop the strategic noise mapping and to propose the mitigation measures to reduce excessive noise levels. The existing Corridor X Railway (Tabanovce – Gevgelija) has been identified as a railway for which the strategic noise map should be developed. Based on the strategic mapping, an action plan containing mitigation measures should be envisaged.

Macedonian legislation on environmental noise is in line with EBRD’s Performance Requirements PR 4 Community Health and Safety Requirements and PR 3 Pollution Prevention and Abatement), EIB’s Environmental and Social Principles, environmental emissions and ambient standards derived from EU environmental legislation.

Relevant for the construction phase of the project will be the Occupational & Health standards for workers who will be exposed to noise disturbance during the work from construction vehicles, tools and machines. The exposure of workers to noise disturbance is regulated with the Law on Occupational Health and safety (Official Gazette of RM No. 92/07) and the Rulebook for Occupational Health and Safety at Work for Workers Exposed to Noise Risks (Official Gazette of RM No. 21/2008), which are in full line with the requirements of EU Directive 1989/391/EEC on the Introduction of Measures to Encourage Improvements in the Safety and Health of Workers at Work and Directive 2003/10/EC on Minimum Health and Safety Requirements Regarding the Exposure of Workers to the Risks Arising from Physical Agents (Noise). These requirements are in compliance with EBRD’sPerformance Requirement PR 2, EIB’s emission standards, and IFC noise limits for various working environments.

There is a legal basis for the development of secondary legislation on conditions for noise protection from roads, railways, airports and marine ports within the Law on Noise Protection, but it has not been accomplished yet. Also, there are no national standards developed for outdoor equipment where the requirements from EU Directive 2000/14/EC on Noise Emissions for Outdoor Equipment will be transposed. According to the National Program for Approximation of Legislation, these pieces of legislation are planned to be developed and adopted by 2013.

The responsible institutions for noise monitoring are the National Noise Monitoring Network (not developed yet) and public health institutes at municipality level. Currently, the assessment of the adverse noise impact on the community health is made by the Public Health Institutes only in three cities: Bitola, Kicevo and Kumanovo. The data is processed by the Macedonian Environmental Information Centre (MEIC), a division within the Ministry of Environment and Physical Planning. The MEIC is prepares on an annual basis the State of Environment Reports, which include the state of noise in these three cities. In the absence of a National Noise Monitoring Network, there is no data on noise level measurements for the broader area where the Railway Corridor VIII - Eastern Section project is located (except Kumanovo). Consequently, there are no planning municipal documents, nor strategic noise maps, nor action plans with preventive mitigation measures.

5.1.5.3 DATA SOURCES

Several strategic planning documents, especially the annually issued noise monitoring reports were used to identify the baseline noise conditions for the city of Kumanovo.

The Federal Transit Administration Noise and Vibration Manual and Software (United States Department of Transport) were used for preparing the noise prediction model. This model takes into consideration type and number of trains, type of areas where the trains will pass through, technical specification of the locomotives and wagons, and frequency of operation during day time and night time. The main sources for these inputs are:

- Program for development of the North-Eastern region of Republic of Macedonia, 2009-2014, 2009;
- Local Environmental Action Plan for the Municipality of Kumanovo, 2004;
- Local Environmental Action Plan for the Municipality of Rankovce, 2008;
- Local Environmental Action Plan for the Municipality of Kratovo, 2006;
- Local Environmental Action Plan for the Municipality of KrivaPalanka, 2005;
- Annual Report on noise monitoring, 2010;
- Annual report on state of environment, 2010, Ministry of Environment and Physical Planning for 2010, AIR/ WATER/ BIODIVERSITY/ WASTE /SOIL/ NOISE;
- National Transport Strategy Plan, Ministry of Transport and Communications, 2005;
- Carl E. Hanson, David A. Towers, and Lance D. Meister, (2006) FTA Noise and Vibration Assessment Manual, 2006;
- Carl E. Hanson, David A. Towers, and Lance D. Meister, (2006) FTA Noise Impact Assessment Spread sheet, 2006;
- Noise Impact Assessment- software guidance, 2006.

5.1.5.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

Along the railway alignment, official noise measurements are only measured for the city of Kumanovoby the Public Health Institute of Kumanovo. The data are reported to the Ministry of Environment and Physical Planning. The Annual Reports on noise for 2007/2009 and 2010 were the official source from which the data on noise indicators measured at several monitoring points in the city of Kumanovo (areas with degrees I,II and III of noise protection) were obtained. These values are used in subchapter 5.1.5.6 Baseline Noise Conditions.

Meetings with responsible persons within each of the municipalities affected by the railway project were organized to collect relevant data and environmental documents, and to discuss the current issues with regards to existing noise impacts.

Since, except for the city of Kumanovo, no published noise data is available for the different areas along the railway route, a methodology was established in order to define environmental noise baseline conditions along the alignment. This methodology was established based on good practice and national legislation, namely the Directive of measurement locations for stations and measurement points (Official Gazette of RM No. 120/08).

According to this methodology, a total of 12 noise monitoring points were selected along the railway alignment to measure noise levels. These points were selected mainly in settlement areas, at locations where there would be railway stations and halts, and at concentrated populations in which the peace of citizens could be disturbed. Previously, several field visits were performed in the period January 2011-June 2011, section by section, in order to identify the areas with different degrees on noise protection along the railway alignment on the left and right sides of the route.

Noise measurements at these points were performed in July 2011. The noise measuring equipment used for this purpose was a "Sound Level Meter" Model SL-4012, with specifications detailed in Table 5-24:

Specifications	
Display	52 mm X 32 mm LCD, 5 digits annunciator
Function	dB (A & C frequency weighting), Time waighting (Fast, Slow), Hold, Memory (Max. & Min.), Max. hold, AC output RS232 output
MeasurmentRange	30 - 130 dB
Resolution	0.1 dB
Accuracy (23±5°C)	*Meet IEC 61672 class2, tested under Input signal level on 94 dB & frequency range from 31.5 Hz to 8 k Hz
Range Selector	Auto range: 30 - 130 dB Manual range: 3 range, 30 - 80 dB, 50 - 100 dB, 80 - 130 dB, 50 dB on each step, with over & under range indicator.
Frequency	31.5 - 8,000 Hz
Calibrator	B & K (Bruel & Kjaer), MULTIFUNCTION ACOUSTIC CALIBRATOR 4226
Calibrator VR	Build in external calibrator VR, easy to calibrate on 94 dB level by screw driver.

Table 5-24 Technical specifications of the measurement instrument "Sound Level Meter"

Noise measurements were performed only during the day because it is estimated that due to the low population density and traffic levels in the study area, noise levels during the evening and night periods would be very low.

The duration of measurement time was set at 2 minutes, taking into account national and EU methodology guidelines for measurements to be taken at minimum 1 minute time periods.

The equipment is connected to the appropriate software through which a table is displayed and the data are processed further. Data is processed by the Data Acquisition Software Model: SW - U801 - WIN. This powerful software program enables full line RS232 serial instruments to work with data logging function.

The locations and a brief description of the noise monitoring points are provided below.

Noise Measurement Points in section 1: Kumanovo to Beljakovce

In section1, the measurement points were selected at the railway station of Kumanovo, the Kumanoska SPA, near the village of Shupli Kamen, the village of Klechovce. Measurement points in section 1 are shown in the following figure.

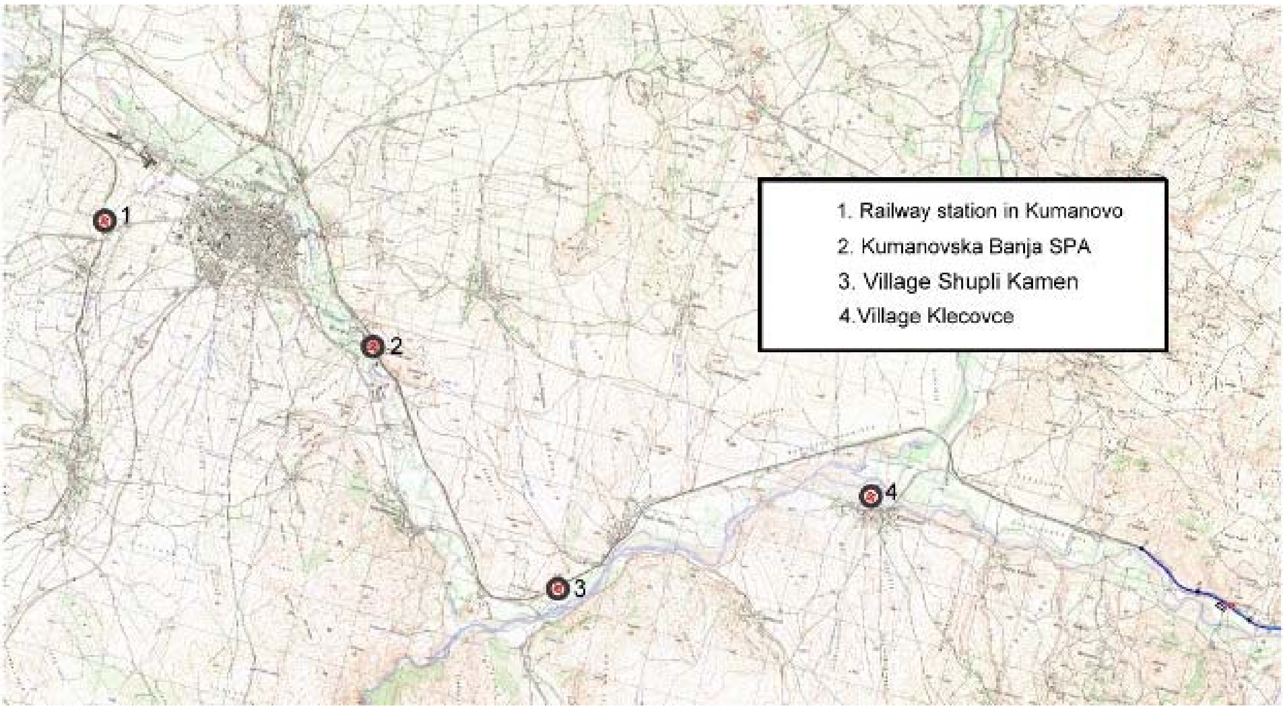


Figure 5-41 Locations of noise measurement points in section 1

Noise Measurement Points in section 2: Beljakovce to Kriva Palanka

In section 2,5 measurement points were selected: between the villages of Krilatica and Ketenovo, near the village of Vetunica, near the village of Opila, near the village of Ginovci and the village of Petralica. The noise measurement points in section 2 are shown in the following figure.

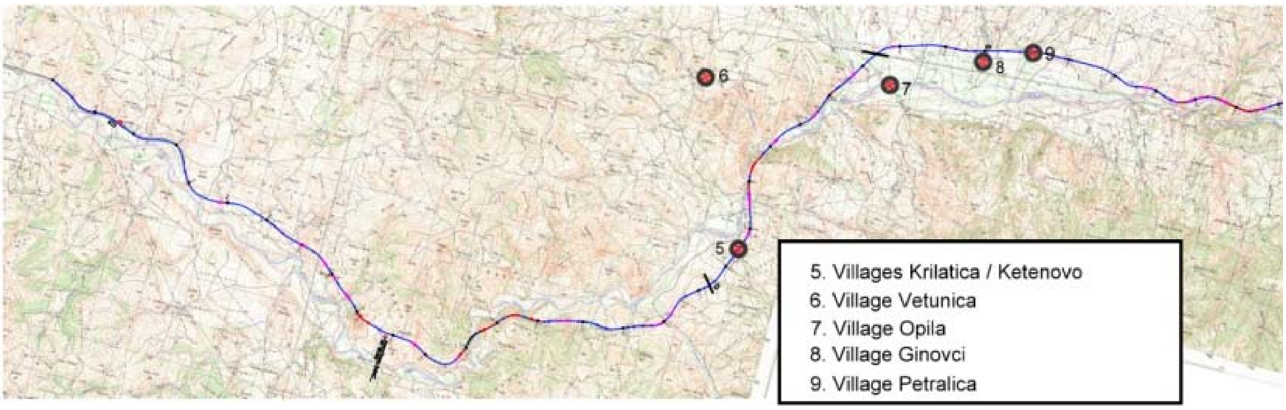


Figure 5-42 Locations of noise measurement points in section2

Noise Measurement Points in section 3: Kriva Palanka to Bulgarian Border (Deve Bair)

In section 3 of the route of Corridor VIII, three measurement points were selected: Kriva Palanka 1, Kriva Palanka 2 and a point near the village of Zidilovo. These sites were chosen due to the fact that the railway stations are planned to be built in Kriva Palanka and Zidilovo. The station at the village of Zidilovo, will be as well the first stop after the entrance in the Republic of Macedonia. The following map shows the location of the measurement points in section 3.

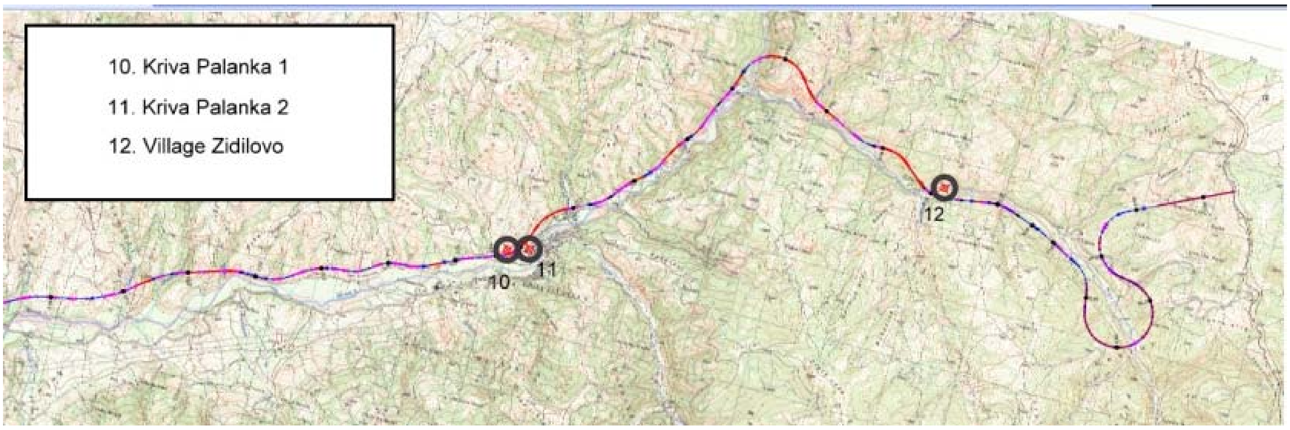


Figure 5-43 Locations of noise measurement points in section 3

5.1.5.5 BASELINE ASSUMPTIONS & LIMITATIONS

Other than the city of Kumanovom, no official noise measurement has been undertaken in other towns or villages in the Northeastern region (e.g. Kratovo, KrivaPalanka, and Rankovce).

The strategic mapping for city of Kumanovo has not been done.

Noise measurements were performed only duringthe day because it was estimated that due to the low population density and traffic levels of the study area, noise levels during evening and night time periods would be very low. This assumption was made by the Consultant based on their knowledge about the regional circumstances.

There is a legal basis for the development of secondary legislation on conditions for noise protection from roads, railways, airports and marine ports within the Law on Noise Protection (Official Gazette of RM No. 79/2007, 124/10 and 47/11), but it has not been developed yet. Also, there are no national standards developed for outdoor equipment where the requirements set in EU Directive 2000/14/EC on noise emissions for outdoor equipment will be transposed.

There were no data available for vibrations along the railway alignment.

The Detailed Railway Noise and Vibration Study shall be completed during the development of detailed design to identify and predict noise levels at all sensitive receptors along the alignment (especially across housing zones) and determine specific and optimum noise abatement measures according the national and EU/WHO standards.

5.1.5.6 NOISE BASELINE CONDITIONS

The data that are presented in this subchapter for the description of the noise baseline conditions come from published data for the city of Kumanovo during the period 2007, 2009, 2010, and noise measurements carried out during the preparation of this ESIA at 12 monitoring points located along the railway alignment in selected areas.

Kumanovo Noise Measurement Data

The Public Health Institute of Kumanovo has been undertaking noise measurements at several measurements points in city of Kumanovo since 2007. The noise data for each of the measurement points have been analysed and processed, and reportedin the Annual Report on Noise Monitoring published by the Ministry of Environment and Physical Planning. The latest report issued in 2010, presents the data form noise monitoring performed in April and October 2007, 2009 and 2010.

The locations of the ten existing noise measurement points in the city of Kumanovoare are shown in *Figure 5-44*. The most relevant point for this ESIA is point 10 (enclosed in a rectangle in *Figure 5-44*) at the crossroads of "October Revolution" street, "Ivo Lola Ribar" street and "Gorce Petrov" street, near the settlement of Sredorek, around 250 meters from the railway alignment.

Figure 5-44 Noise measurement points in the city of Kumanovo

The following chart (*Figure 5-45*) presents the intensity of the noise measured in 2007, 2009 and 2010 at the ten measurement points. Noise intensity is reported as equivalent noise level LAeq (dB).

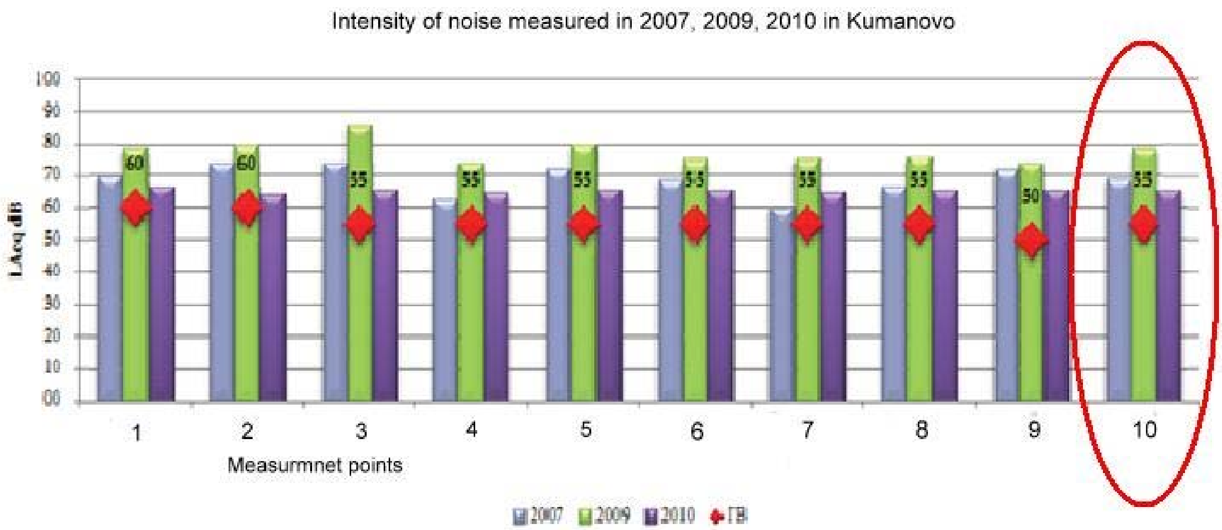


Figure 5-45 Intensity of noise measured in 2007, 2009, 2010in Kumanovo

The chart shows that for all the measurement points, the noise level is above the limit values set for the degree of noise protection type of area where the measurement point is located (marked with a red diamond). The highest intensity was measured during 2009 at all points.

For point 10, relevant to this study, the settlement of Sredorek sits within an area with degree II of noise protection, with noise limit values of 55 dB during the day/evening. The measurements performed in 2010 show a noise level value of 65 dB which exceeds this limit.

Noise Survey Results

Section 1: Kumanovo to Beljakovce

Point 1.Kumanovo railway station

Measurement point 1 is located at the railway station of Kumanovo. The area around the station is mainly commercial and residential (mixed), so it belongs to an area with degree II of noise protection.

The photographs below show the layout of the terrain in the surrounding of the noise measuring point close to Corridor VIII railway alignment.

Figure 5-46 View around the measurement point 1 - Railway station Kumanovo(Section1)

From the on-site noise measurements, the data obtained were analysed. The resulting intensity of noise is presented in the *Figure 5-47* below, which shows a minimum noise value of 41 dB(A)and a maximum value of 58 dB(A). Table, at the end of this subchapter, shows the average level obtained for the measuring period.

During the measurement period no trains arrived or left the station; the only noise sources were from the nearby restaurant and vehicles passing near by the station.

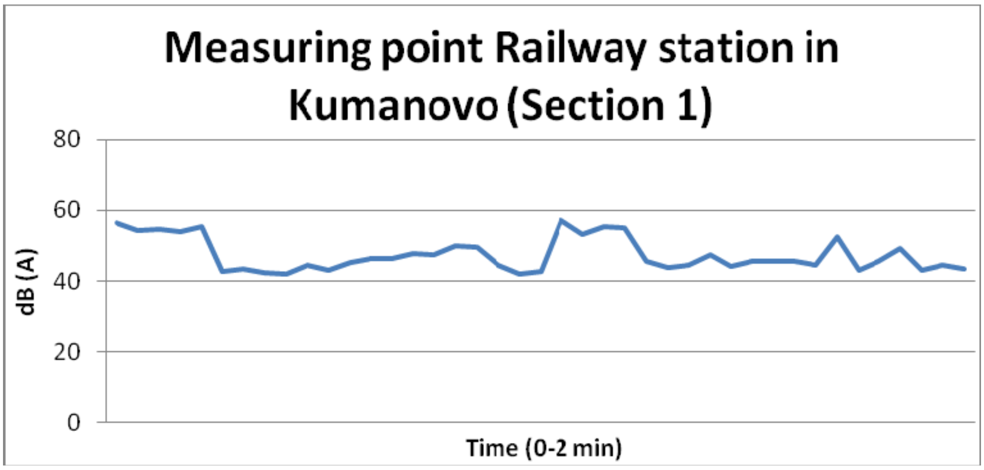


Figure 5-47 Intensity of noise at measurement point 1-Railway station Kumanovo

Point 2.Kumanovska Banja Spa

The second measurement point is located near Kumanovo Spa at a distance from the railway track of 10 meters, on the local motor road located between the river Kumanovska and the railway alignment.

The following photos (*Figure 5-48*) show the area around the measurement point. The photographs show that this measurement point is not located in a residential area, but is near a health and recreation facility. Therefore, this area belongs to an area with a degree I of noise protection.

Figure 5-48 Surrounding views of the measurement point 2-KumanovoSpa

The measurements taken were analysed using the software and the intensity of noise is shown graphically in the following chart (*Figure 5-49*) and the table, at the end of this subchapter.

The minimum noise level is 41 dB(A) while the maximum value for noise is 80 dB(A). This high value can be considered a normal noise intensity value for this site, as there are a lot of light vehicles (cars) and motorbikes passing along the motor way coming and leaving the spa.

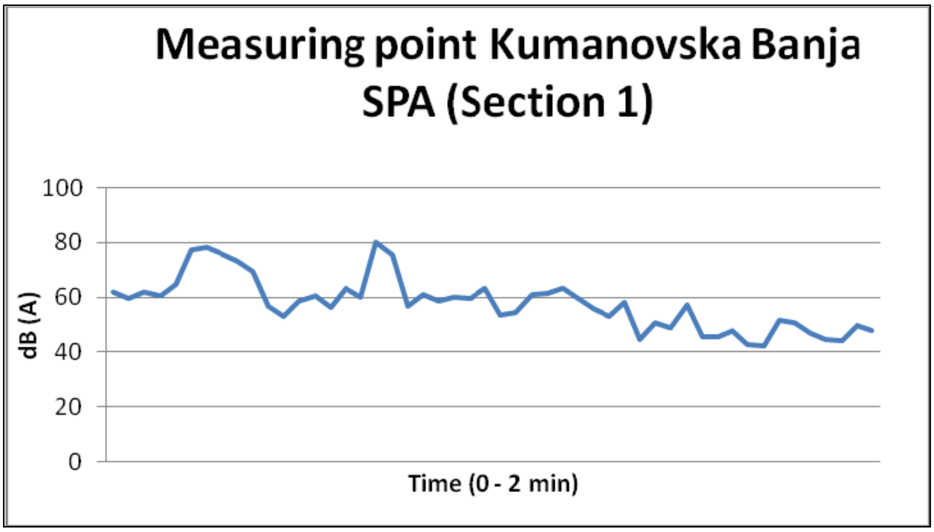


Figure 5-49 Intensity of noise measurements at point 2 – Kumanovo Spa

Point 3. Village of Kamen Shupli

The third measurement point is located near the village of Shupli Kamen. The photos in *Figure 5-50* show the layout of the terrain near the village at the noise measurement point.

Figure 5-50 Views of the surrounding of noise measurement point 3- Shupli Kamen

Measurement point 3 is located on the road near the village of Shupli Kamen, but far from the residential area with houses. Several small industrial facilities (furniture production, petrol station, restaurants and trade and commercial buildings) are located there, besides the houses. It could be identified as an area with degree III of noise protection.

Fromthe on-site measurements, the data obtained through the software is displayed graphically in the following chart, which shows that the minimum noise level is 33 dB(A) while the maximum value for noise is 63 dB(A).

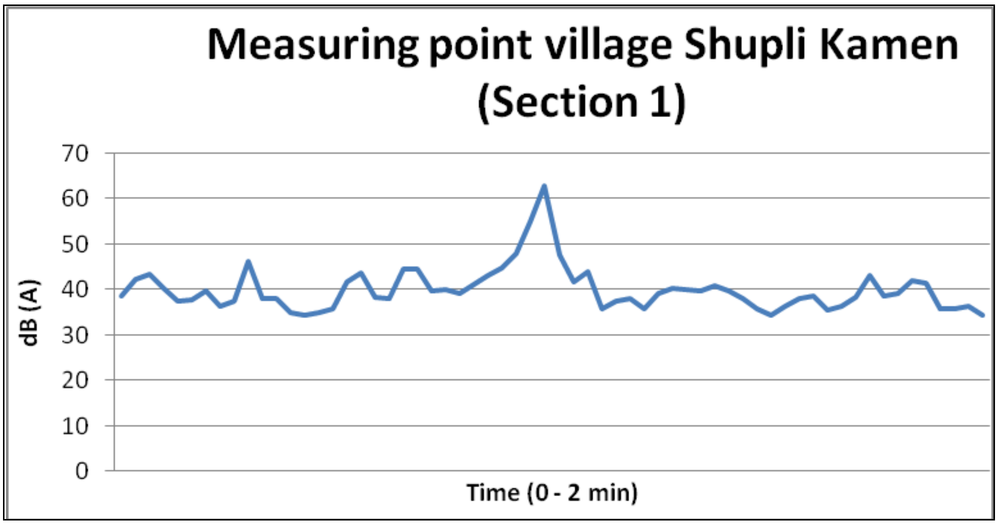


Figure 5-51 Intensity of noise measurements at point – 3 Shupli Kamen Village

Point 4. Village of Klechovce

The fourth noise measurement point in section 1 is located near the village of Klechovce. The photos show the landscape of the surroundings of this measurement point.



Figure 5-52 Views of the surrounding terrains near the village of Klechovce

Measurement point 4 is located on the road near the village of Klechovce and is a deserted or almost deserted area. The nearest houses are approximately 1 km away of the railway alignment. Taking into account that the track will pass near the village of Klecovce, it could be identified as an area with degree II /III of noise protection.

From the measurements taken at this point, the data obtained through the software and displayed graphically is shown in the following chart and in the table, at the end of this subchapter. The minimum noise level is 39 dB(A) while the maximum value for noise is 62 dB(A). This is a low noise level area with the peaks due to the passing of motor cars on the nearby road Kumanovo-Klecovce.

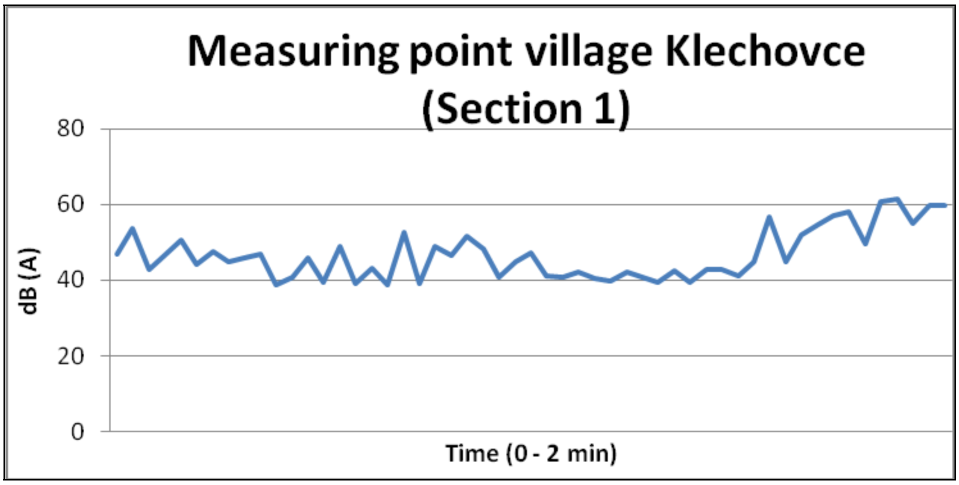


Figure 5-53 Intensity of the noise at measurement point 4 -Village Klechovce

<u>Section 2: Beljakovce to KrivaPalanka</u>

Point 5. Villages Krilatica/ Ketenovo

Noise measurement point 5 is located between two villages, Krilatica and Ketenovo, near the already constructed bridge at K.P. 51+090 km –Osovino.

The photos show the layout of the area of the measurement point and focus in the presence of the nearby houses, which are sensitive receptors.

Figure 5-54 Views of the surrounding terrain at noise measurement point 5 between the villages of Krilatica&Ketenovo

At this point of the railway alignment there are only a few objects (houses) of the local population and one wood producer company. Taking this into account, the area belongs to a mixed area with degree III of noise protection. From the on-site measurements, the data obtained through the software is displayed graphically in the following chart and in table at the end of this subchapter. The minimum noise for the areais47 dB(A)while the maximum value for noise is 57dB(A).

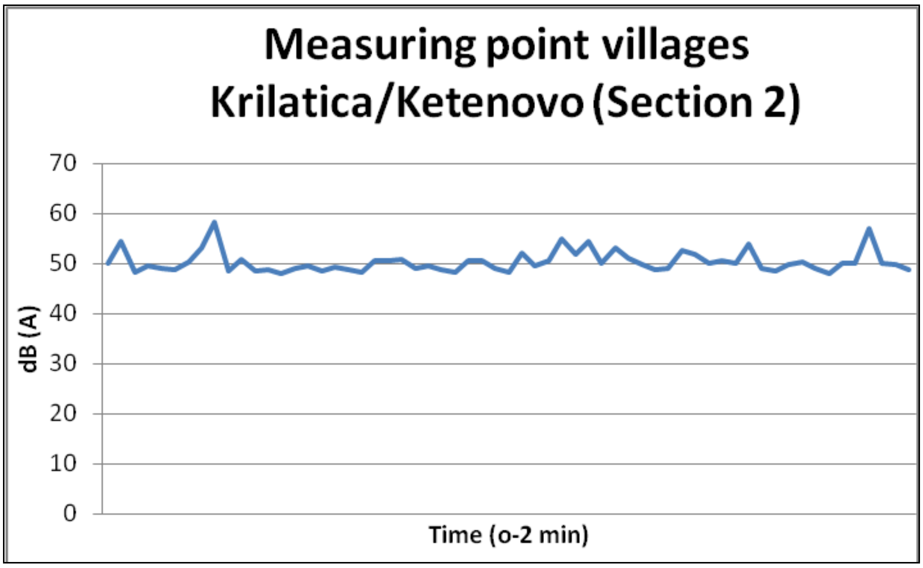


Figure 5-55 Intensity of thenoise at measurement point 5 – villages Krilatica/Ketenovo

Point 6. Village of Vetunica

Measurement point 6 is located near the village of Vetunica. This measurement point was chosen as a background measurement site. The location is 1.5 km away of the railway route. There are only several houses near the local road Rankovce - Vetunica.

Figure 5-56 Landscape around the measurement point 6 -near the village Vetunica

From the measurements at this location, the data was obtained and analyzed. The background noise levels for this settlement (*Figure 5-57*) in the vicinity but relatively far of the railway alignment range between 34 dB(A) and 44 dB(A). These low noise levels would be common to all the settlements in the study area, with the exceptions of the villages that are very close to the main roads (motor/local or regional road Kumanovo – Kriva Palanka).

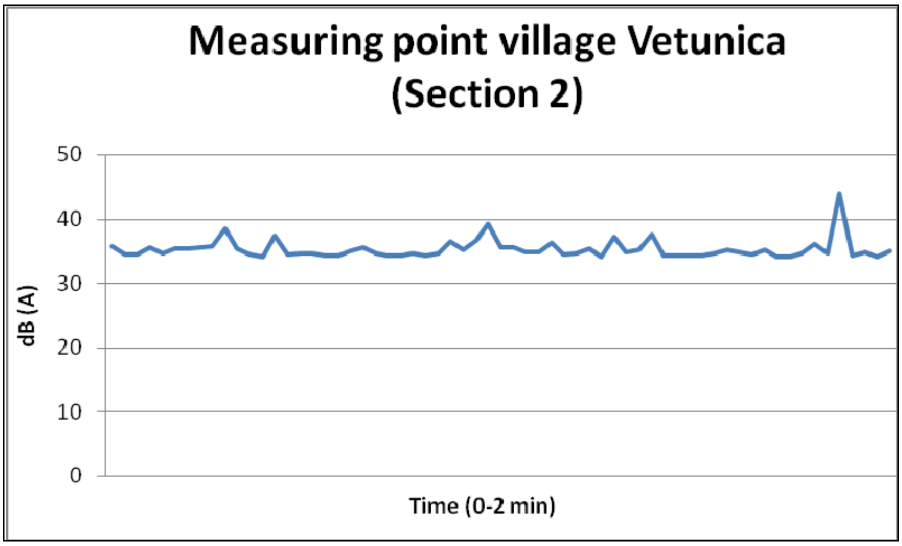


Figure 5-57 Intensity of the noise at measurement point 6-Village Vetunica

Point 7. Village of Opila

Noise measurement point 7 is located near the village of Opila. The photos (*Figure 5-58*) show the layout of the terrain of this measurement point. The village of Opila is located 5 km far from Rankovce and 4 km from the main regional road Rankovce – Kriva Palanka. The houses are located around the local road and the last house is located 1 km far from the railway alignment. No industrial or commercial facilities exist around the measurement point area.

Figure 5-58 Views around measurement point 7 - Village of Opila

From the measurements taken in this site (*Figure 5-59*) shows that the minimum noise value is 34 dB(A), while the maximum value for noise is 68 dB(A).

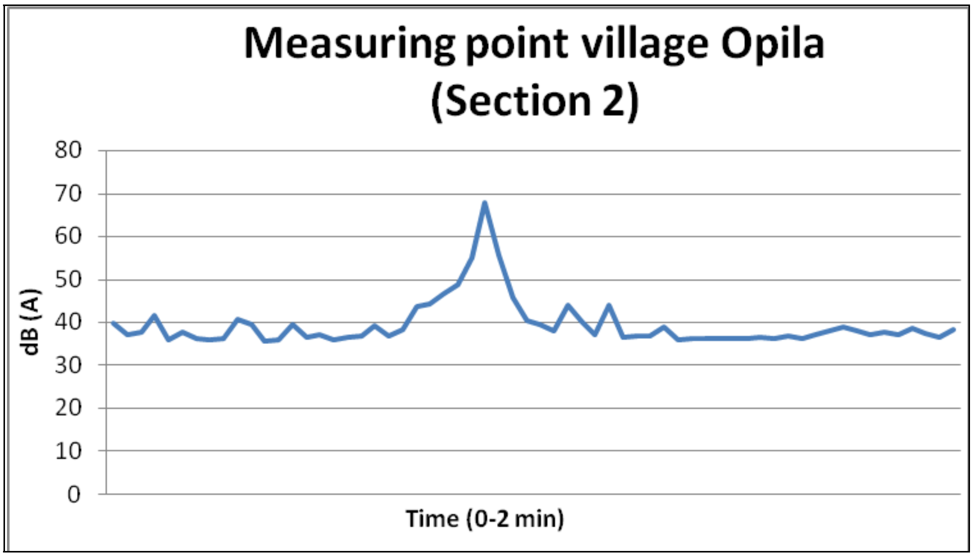


Figure 5-59 Intensity of the noise at measurement point -Village Opila

Point 8. Village of Ginovci

The next measurement point in section 2 is the measurement point 8, near the village Ginovci where the railway station will be constructed. The photos (*Figure 5-60*) in show the landscape around the measurement point.

Figure 5-60 Surrounding landscape around noise measurement point 8 - near the village of Ginovci

As shown in the photos, there are only private houses in the area around the noise measurement point, as well as several small storage facilities for construction material. This area could be identified as an area with degree II of noise protection due to the presence of buildings for housing.

The onsite noise measurements (*Figure 5-61*) shows a minimum noise value of 38 dB(A)and a maximum value of 78 dB(A). The sources of the high peaks were identified to be the nearby local road Rankovce - Ginovce and the existing regular traffic.

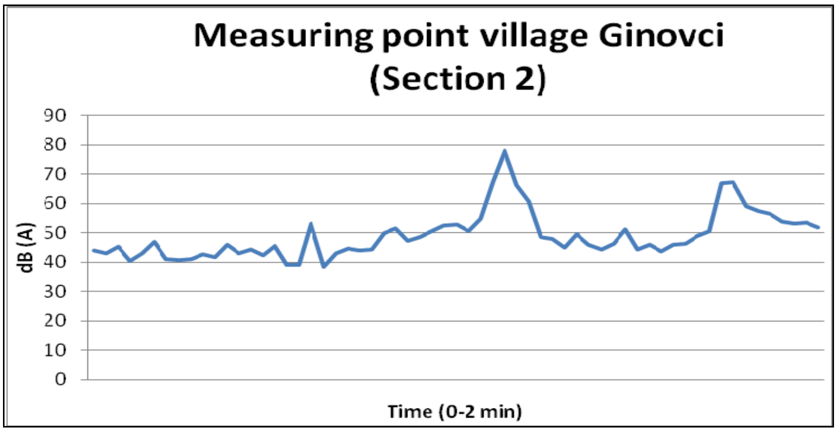


Figure 5-61 Intensity of noise at measurement point 8 -Village of Ginovci

Point 9. Village of Petralica

Noise measurement point 9 is located near the village of Petralica, where the railway alignment will pass nearby. The photos show the layout of the terrain near the measurement point.

Figure 5-62 Landscape around measurement point 9 near the village of Petralica

The photos show that this area is a residential one with houses around the route (they are approximately 500 meters from the planned railway alignment). This area belongs to an area with second degree (II) of noise protection due to the presence of the residential housings with no industrial or commercial buildings or premises nearby.

The measurements taken at this site (*Figure 5-63*) shows that the minimum noise value is 38 dB(A) while the maximum value for noise is 72 dB(A). The high peaks were originated from the passing cars along the local road that crosses the village of Petralica.

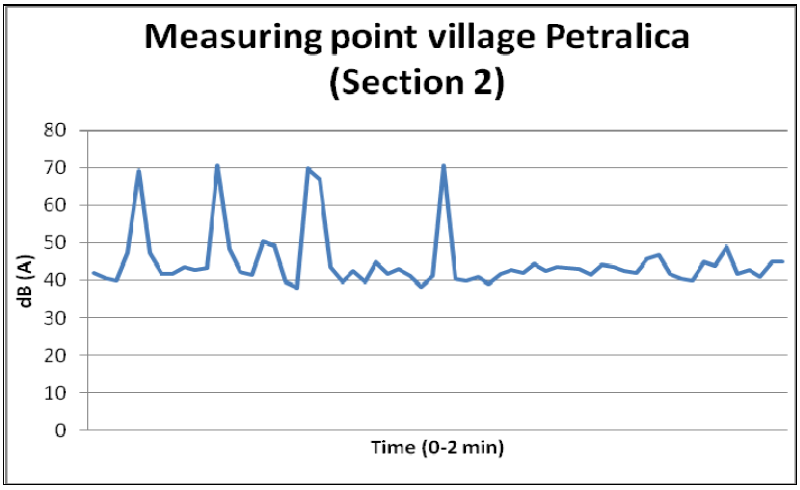


Figure 5-63 Intensity of noise at measurement point 9 -Village Petralica

Section 3: Kriva Palanka to Bulgarian Border (Deve Bair)

Point 10. Kriva Palanka 1

In section 3 noise measurement point 10 is located in downtown Kriva Palanka, at asite located up into a hill, where the railway station is planned to be built. It is a highly populated area, residential, with several private individual houses and a few small buildings (up to 4 floors). The photos show the landscape surrounding the measurement point.

Figure 5-64 Landscape of area around measurement point 10 – Kriva Palanka 1

The photos show that this is a residential area for the local population; it corresponds to an area with degree II of noise protection due to the proximity of the houses. No commercial or industrial premises are close to the measurement point.

The noise measurements taken on site (*Figure 5-65*) shows that the minimum noise value is 40 dB(A) while the maximum value of noise is 74 dB(A).

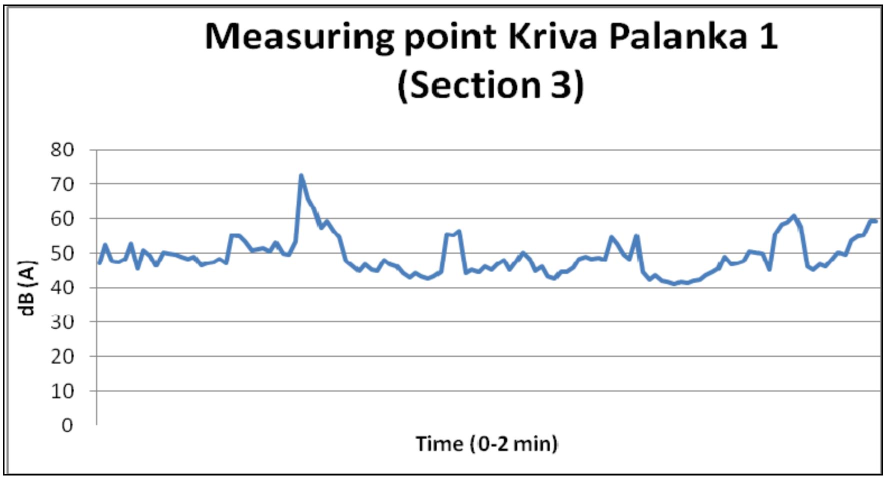


Figure 5-65 Noise intensity at measurement point10 Kriva Palanka 1

Point 11.KrivaPalanka 2

The following measurement point in section 3 is also located in the town of KrivaPalanka. The photos show the landscape in the neighbourhood of this noise measurement site.

Figure 5-66 Landscape around measurement point 11 - KrivaPalanka2

The photos show that this area has residential housings in high density, located in an area corresponding to degree II of noise protection. No industrial or commercial facilities exist in this area.

The noise measurements recorded (*Figure 5-67*) shows that the minimum noise value is 48 dB(A) while the maximum value for noise accounted is 76 dB(A).

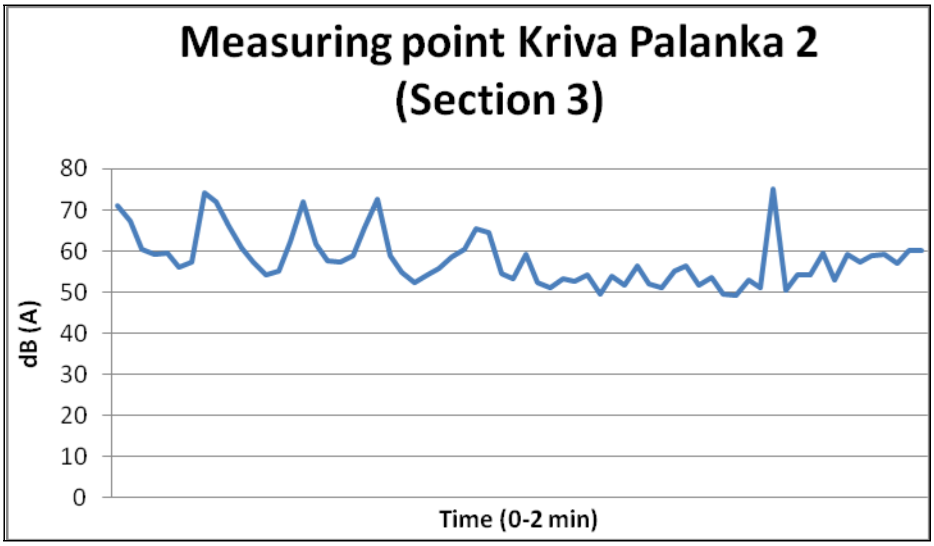


Figure 5-67 Noise intensity at measurement point 11KrivaPalanka 2

Point 12.Village of Zidilovo

Noise measurement point 12 is located in the village Zidilovo. The photos show the layout of the terrain around the measurement point.

Figure 5-68 Appearance of the terrain near the village of Zidilovo at noise measurement point 12

The photos show that this area has residential facilities along the regional road Kriva Palanka – Kustendil (Bulgaria). Although transport activities are already in place along the road (area with degree IV of noise protection, which explains the high existing noise levels in this area) the proximity of residential housings will require the stricter standards on noise (degree II/III of noise protection). The regional road is very busy. No industrial facilities are around, only the facility owned by AD Makpetrol – Skopje – a natural gas pipeline measurement plant near the location of the future railway station.

From the on-site noise measurements, the data obtained through the software is displayed graphically in the following chart, which shows that the minimum noise value is 43 dB(A) while the maximum value of noise is 81 dB(A).

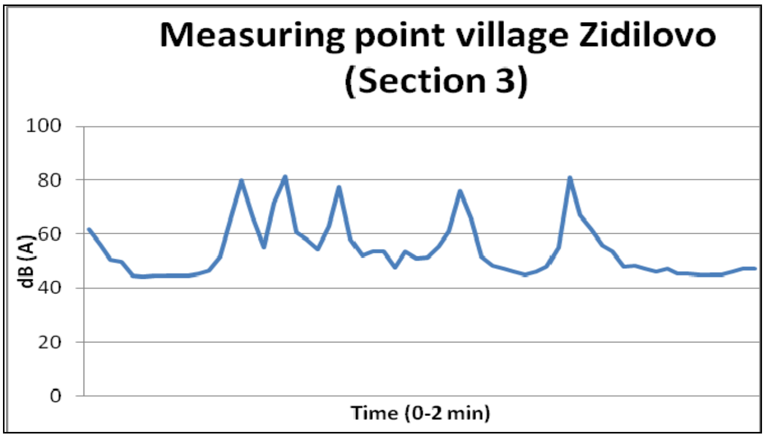


Figure 5-69 Noise intensity measurement at point 12 Village of Zidilovo

The preliminary measurements taken in the period July 2001 show that in most of the noise measurement point locations along the railway alignment the noise level values would be in compliance with national/EU standards with regards to the basic noise indicators for the different degree of noise protection areas.

The measurements carried out in measurement point 11 in the city of Kriva Palanka, and in point 12 in the village of Zidilovo showed higher noise levels that exceed the noise limits for an area with degree II of noise protection (residential area). These higher noise levels are due to traffic. In the case of the village of Zidilovo, the regional motor road Kriva Palanka – Bulgarian border crosses the village.

From the knowledge of the study area, it is anticipated that the night and evening noise levels will be even lower, considering the low density of population of these areas, the low frequency of vehicles during the night, and the fact that the population mainly work in the agricultural sector and carry out their core activities during the day.

Measurement points			Area with degree of noise protection*	Existing noise** (dB)A	Noise level* (dB)A		
					L_d	L_e	L_n
Section I	1	Railway station Kumanovo	Mainly commercial and residential (mixed) area - III degree of noise protection.	**48**	**60**	60	55
	2	KumanovskaBanja -spa	No residential area-health and recreation facility- I degree of noise protection	**48**	**50**	50	40
	3	Village ShupliKamen	Residential and commercial (mixed) area – III degree of noise protection	**40**	**60**	60	55
	4	Village Klechovce	Distant residential area (1 km from railway alignment) - II and III degree of noise protection	**46**	**55** **60**	55 60	45 55
Section II	5	Villages Krilatica/Ketenovo (52 km)	Residential and commercial (mixed) area – III degree of noise protection	**50**	**60**	60	55
	6	Village Vetunica	Residential and commercial (mixed) area – III degree of noise protection	**35**	**60**	60	55
	7	Village Opila	Residential very low populated area – III degree of noise protection	**39**	**60**	60	55
	8	Village Ginovci	II degree of noise protection due to the proximity of the households	**49**	**55**	55	45
	9	Village Petralica	II degree of noise protection due to the	**45**	**55**	55	45

Measurement points			Area with degree of noise protection*	Existing noise**	Noise level* (dB)A		
			proximity of the households				
Section III	10	KrivaPalanka 1	II degree of noise protection due to the proximity of the households	**49**	**55**	55	45
	11	Kriva Palanka2	II degree of noise protection due to the proximity of the households	**60**	**55**	55	45
	12	Village Zidilovo	II degree of noise protection due to the proximity of the households	**70**	**55**	55	45

* According to the Law on Noise Protection
** Estimation based on performed measurements

Table 5-25 Measured average noise levels along the railway alignment and national noise levels thresholds

5.1.6 WASTE MANAGEMENT

5.1.6.1 STUDY AREA ('INVESTIGATION AREA')

The investigation area for the existing waste management practice is the northeastern region of the Republic of Macedonia with a focus on municipal landfills, landfills already constructed and used during the previous construction period 1995-2004, current different waste streams management at municipal, regional and national level and especially hazardous waste streams. The baseline research also covers the already planned landfills for inert waste disposal in Section 3, for which the Main Design Projects were developed in 2010.

5.1.6.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

A list of the relevant documents for waste management is provided in Chapter 2 including also EBRD Environmental & Social Policy 2008 & Performance Requirements, EIB Social & Environmental Handbook and IFC EHS General Guidelines & IFC EHS Guidelines for Railways.

With regards to policy documents, the Republic of Macedonia prepared the main strategic documents:

- Waste Management Strategy of the Republic of Macedonia (2008 – 2020), Government of the Republic of Macedonia, 2008;
- National Waste Management Plan (2009 – 2015) of the Republic of Macedonia, Ministry of Environment and Physical Planning, 2008.

The main waste management hierarchy principles were adopted in these documents

In Macedonia, the main national legislation regarding the waste management sector is the Law on Waste Management (Official Gazette No. 68/04, 71/04 and 107/07) and some technical rules and guidelines. The Law on Waste Management significantly contributes to the approximation process in establishing a modern and comprehensive waste management system based on the main EU directives on different waste streams including hazardous waste. The Law on Waste Management as a framework regulation act provides general rules applying to the following issues: definitions and applicability regarding types of waste, strategy, plans and program formulation at different levels; competent authorities to draw up waste management procedures and issuing permits; landfills; incineration and co-incineration of waste, import, export and transit of waste; monitoring, reporting, data management; supervision of competent authorities, punitive provisions; transitional and final provisions. Within the Law on Waste Management the Waste Framework Directive (2006/12/EC) amended with EU Directive 2008/98/EC has been transposed.

The Law on Waste Management represents the basis for the adoption of secondary legislation, which regulates specific waste streams management at all levels according to the hierarchy waste principles. Secondary legislation, based on the Law on Waste Management and adopted in years 2007 and 2008, regulates permitting procedures and sets technical and other conditions for waste storage and transfer, for acceptance to landfill and for landfill operations. Separate Rulebooks already adopted are listed in Chapter 2. These are:

1. List of waste types (Official Gazette No. 100/05);
2. Rulebook on the manner and the conditions for waste storage, as well as on the conditions to be met by the sites on which waste storage is performed (O.G of RM No. 29/07);
3. Rulebook on the minimum technical requirements with regard to environmental protection tobe met by waste transfer stations, requirements to be met by the sites where waste transfer stations are built or placed, as well as on the terms for the waste storage in waste transfer stations depending on the types of waste (O.G of RM No. 39/07);
4. Rulebook on the landfill operation, monitoring and controlling in the operational and closing phase as well as on the closure and after-care procedures (O.G. of RM No. 156/07);
5. Rulebook for criteria for acceptance of waste to landfill in each landfill class, preparation procedure for acceptance of waste, basic testing procedures, sampling procedure and acceptance of waste (O.G. of RM No. 8/08) according to the EU Landfill Directive 99/31/EC;
6. Of particular importance are the activities on the regulation of hazardous waste exhibiting efforts to bring hazardous waste under control by means of the following secondary legislation:
7. Rulebook on the manner and the conditions for handling PCBs, the conditions to be met by installations and facilities for PCBs disposal and decontamination, on used PCBs and on the manner of labelling the equipment that contains PCBs (O.G. of RM No. 48/07) according to the EU PCBS Directive 96/59/EC;
8. Rulebook on the procedures and manner of collection, transport, processing, storage, treatment and disposal of waste oils, and the manner of keeping records and submission of data (O.G. of RM No. 156/07) according to the EU Waste oils Directive 75/439/EEC;
9. Rulebook of detailed conditions on the handling of hazardous waste, and on the manner of packaging and labelling (O.G. of RM No. 15/08) according to Hazardous Waste Directive (91/689/EEC) and Packaging and packaging waste Directive 94/62/EC.

The Law on the Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette No. 48/97) and the Law on Environment give the legal basis for the Rulebook on format and content of the forms for transboundary movement of waste (Official Gazette No. 37/03, 38/03).

The landfill operation is regulated with the Decree for determining the activities of installations requiring an integral environmental permit (Official Gazette No. 89/05), i.e. adjustment permit with an adjustment plan and time schedule. In this context, the Law on Environment gives the legal basis for the Rulebook on the form and content of the request for issuing a permit for the landfill operator as well as the form for and content of the permit (Official Gazette No. 140/07).

National legislation follows the recommendations of international organizations such as IFC EHS General Guidelines (waste oils, batteries & accumulators, oil leakage, packaging & packaging waste). In reviewing IFC EHS Guidelines for Railways on waste from Passenger Trains and Terminals and Waste from Field Operations (hazardous waste, chemicals, oil leakage),the Consultant concluded that they are already included in national legislation.

All principles for good proper waste management and guidelines for different waste streams management provided in IFC EHS General Guidelines and EBRD PR 3 and EIB principles and standards are also inline within the national regulation.

5.1.6.3 DATA SOURCES

The data sources for establishing the baseline conditions in terms of waste management include:

- Spatial Plan for Republic of Macedonia, Ministry of Environment and Physical Planning, 2004;
- Annual Reports from the State Statistical Office, Programme for Statistical Surveys (2008-2012), 2009;
- National Environmental Action Plan II, Ministry of Environment and Physical Planning, 2006;
- National Environmental Approximation Strategy, Ministry of Environment and Physical Planning, 2008;
- Waste Management Strategy of the Republic of Macedonia (2008 – 2020), Government of the Republic of Macedonia, 2008;
- National Waste Management Plan (2009 – 2015) of the Republic of Macedonia, Ministry of Environment and Physical Planning, 2008;
- Program for development of the North-East region of Republic of Macedonia, 2009-2014, 2009;
- Local Environmental Action Plan for Municipality of Kumanovo, 2004;
- Local Environmental Action Plan for Municipality of Rankovce, 2008;
- Local Environmental Action Plan for Municipality ofKratovo, 2006;
- Local Environmental Action Plan for Municipality of Kriva Palanka, 2005;
- Waste Management Plan for the Municipality of Kumanovo 2011 – 2016, 2010/Municipality Kratovo 2011 – 2016, 2010;
- Program for waste management for Municipality of Kratovo 2011, 2010;
- Program for waste management for Municipality of Kriva Palanka 2011, 2010;
- Program for waste management for Municipality of Kumanovo 2011, 2010;
- Program for waste management for Municipality of Rankovce 2011, 2010;
- Main Project on landfills for inert waste, Ministry of Environment and Physical Planning, 2005;
- Annual report of the processed data on environmental quality by the Ministry of Environment and Physical Planning for 2010 WASTE;
- Feasibility Study for Railway link Macedonia – Bulgaria, 1995;
- Primary project for construction of Corridor 8: Borrow pits and landfills Book No. I.9, II.9, III.9 , VI.9, V.9, June 2010;
- IFC EHS General Guidelines (waste management), April 2007;
- IFC EHS Guidelines for Railways, (waste), April 2007.

5.1.6.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

The key information and data were collected from official strategic documents adopted at national and local levels. Several site visits were performed in the period January – September 2011 by the Consultant in order to identify already existing landfills, established during the period 1994 – 2004 and organize several interviews with local environmental officers and communal inspectors within each municipality. The existing waste management practice was discussed with the Public Utility Enterprises for communal work including the annually collected, transported and final disposed quantity of waste on the municipal landfills.

Several stakeholder meetings were held in May 2011 in the cities of Kumanovo, KrivaPalanka, Rankovce and Kratovo to identify those waste related issues that needed to be analysed into more details within the ESIA Study.

5.1.6.5 BASELINE ASSUMPTIONS & LIMITATIONS

From the interviews with the PERI staff who were involved in the construction period 1994 – 2004, plenty of information and data related to waste management in that periodwas obtained (inert waste landfills and borrow pits in each municipality on the Northeastern region).

However, there is no information on total quantities of waste disposal in the existing landfills. All the municipalities in the north east region have adopted annual programs for waste management, but there is not a real implementation. Moreover, not all municipalities report to the Ministry of Environment and Physical Planning.

5.1.6.6 WASTE MANAGEMENT BASELINE CONDITIONS

National Waste Management

In Macedonia, the municipal waste management is full responsibility of local government. It is directly related to urban development plans for local and use and should be in line with the national strategic documents - the National Plan for Waste Management, the National Strategy for Waste Management and other documents that plan waste management. In the North - East region, the final disposal of waste is made in 5 municipal landfills with a total area of 47,700 m^2 and only 31,820$m^2$of active area. According to the parameters, the Northeastern region is among the regions with the lowest number of active landfills and smallest used area. Each municipality has adopted the Plan and Programme for Waste Management for the next 5 years.

Waste management includes waste generation, selection of different types of special waste, waste collection, transportation, treatment and final disposal in landfill. Proper waste management compliant with national and EU standards will reduce the impact of waste on the soil (occurring through uncontrolled dumping of waste), groundwater (from direct contamination from uncontrolled dumping of waste) and air (via outdoor waste combustion). Reducing the negative impact will contribute to improve the health conditions of citizens of the Northeastern region as well. The waste management is one of the national priorities and is a priority for this railway project as well due to the fact that during the construction of the railway, different types of waste will be generated for which appropriate waste management practice should be established.

The following figure shows the different types of permeability and hydro-geological characteristics of the Republic of Macedonia that need to be taken into account in waste management.

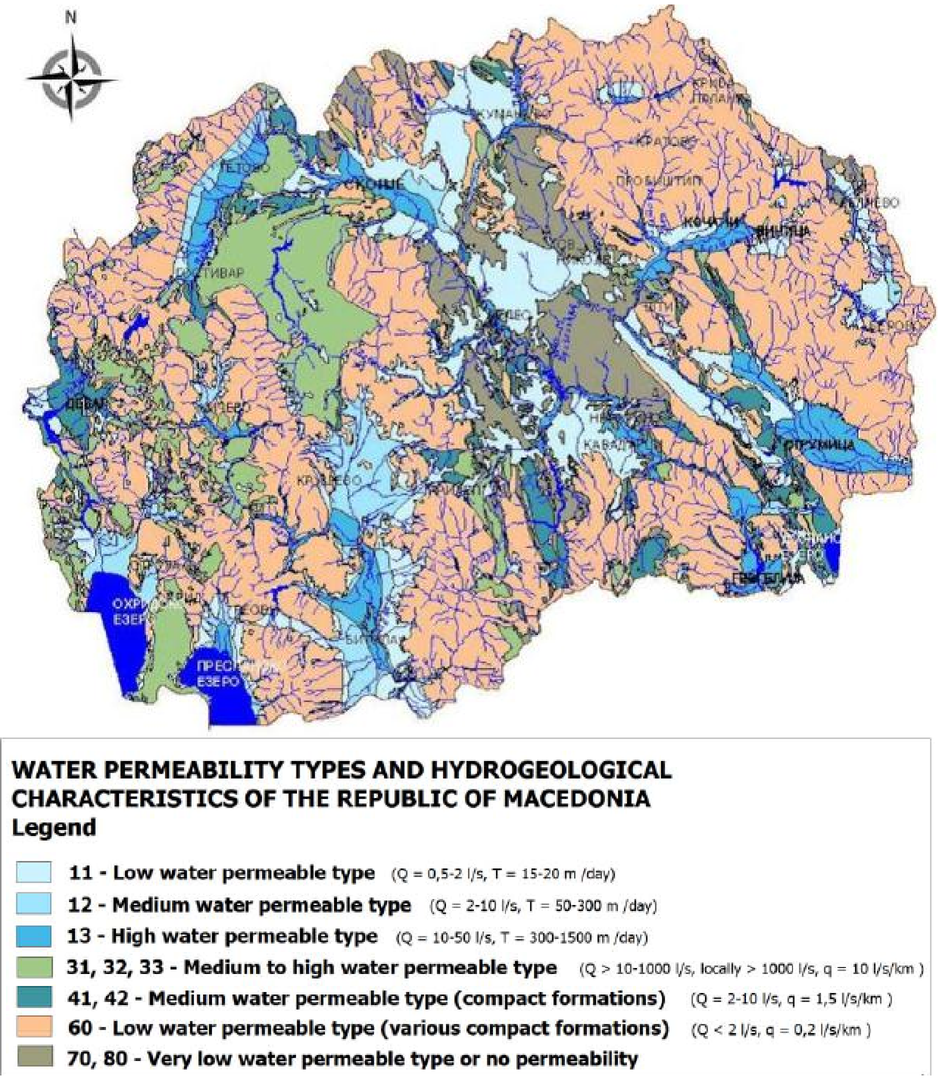


Figure 5-70 Water permeability types and hydro-geological characteristics of the Republic of Macedonia

The existing waste disposal practices in Macedonia (including the Northeastern region) do not comply with technical and/or environmental standards and do not follow the EU waste hierarchy referred to prevention, re-use, recycle or compost of material, recover of energy, and final disposal in a landfill. Due to the absence of organized systems of waste collection in smaller settlements and low pollution awareness among the population, the existence of numerous dumping sites is commonplace, especially in riverbeds and valleys, from where the waste often end up in rivers transported with rain runoff. At the existing illegal dumps, mixed municipal and inert waste is deposited. This causes a permanent environmental contamination and a potential risk of transmitting infectious diseases.

In summary, the present situation in the region is that almost all the waste is disposed of in landfills that represent risks of pollution to the air, soil, surface water and groundwater, as well as potential risks for biodiversity, agricultural land and human health due to the disposal of mixed hazardous and non-hazardous waste. An additional environmental problem is represented by the traditional open air burning of municipal waste, green waste and plastics originated from greenhouses or silage coverage.

All existing active municipal waste landfills in the Republic of Macedonia are categorised according to the assessment of their environmental risk. 16 landfills are ranked with high risk, 16 with medium risk, and 19 with low environmental risk. Existing municipal waste landfills categorised according to their environmental risk are shown in the figure below. The relevant municipal landfills in the Northeastern region have been ranked as follows:

- KrivaPalanka landfill - high risk;

- Kumanovo landfill - medium risk;
- Kratovo landfill - medium risk.

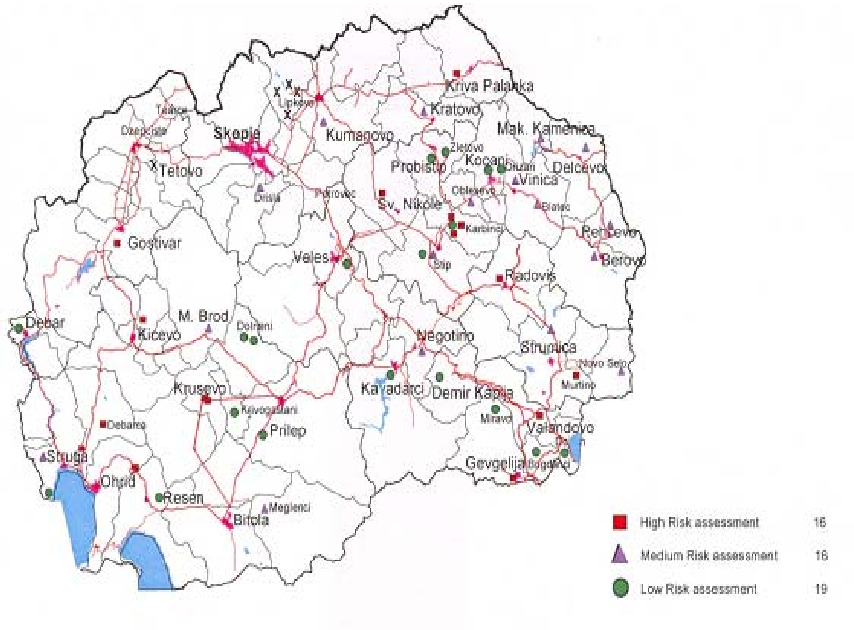


Figure 5-71 Risk assessment to the all existing municipal landfills

Northeastern Region Waste Management

According the National Strategy of Waste Management (Official Gazette No. 39/08), the construction of a regional landfill site and several transfer stations is planned. There are as well several EU funded projects for strengthening the capacities of all municipal staff dealing with waste management and improving their capacities to prepare the regional waste management plans.

In January 2010 the Regional Public Enterprise for waste management "EKO-ZONA" (ECO ZONE) was established in Kumanovo for the Northeastern region. This newly created legal entity comprises all municipalities in the region based on the Memorandum of Understanding among the Mayors within the region. The Regional Public Enterprise was established under the Law on communal works, Law on waste management and Law on local self government. The main functions will be to establish the regional system for waste management; ensure financial support for construction of the regional sanitary landfill for municipal waste; and monitor the operation of the regional landfill.

Up to now, waste management in each municipality has been organized separately at the local level. As shown in *Figure 5-71* above, the municipal landfills in the Northeastern region are Kriva Palanka, Kumanovo and Kratovo. A description of these and other landfills in the area of the railway corridor follows. The information is organized according to the three sections of the railway alignment.

Section 1

In section 1, one (1) municipal landfill, that of Kumanovo Municipality is found.

In the municipality of Kumanovo, the Public utility enterprise “Cistota I zelenilo” provides the service of collection, transportation and final disposal of waste to the municipal landfill, using 20 vehicles for this purpose. With these vehicles they manage to lift up to 26071 t/year of municipal solid waste.

The municipal landfill is located at the site known as "Krasta", which is 7 km away from the city of Kumanovo, near the village of Pcinja (*Figure 5-72*). It covers an area of11.686 ha and has a capacity of 1.832.000 m^3, of which only 1.168.000 m^{3}are used. It has been categorized as having a medium environmental risk.

There are also illegal dumpsites in other districts, namely those in Proevce and Dobroshane.

There is no an organized system for primary selection of the recyclable waste. The unemployed persons, mainly Roma population, collect the recyclable PET bottles and paper and sell this material to the waste management companies or companies dedicated to recycling.

Figure 5-72 Municipality landfill "Krasta" in Kumanovo

Section 2

In Section 2, two (2) municipal landfillshave been located: Rankovce and Kratovo

Rankovce Municipality

In the territory of the Municipality of Rankovce, the community service is provided by the Public utility enterprise “Chist Den”, which collects 616 t/year of community waste. The Rankovce municipal landfill is located 3 km West of Rankovce, near the village of Vetunica. At the landfill the amounts of waste disposed of are not recorded, but according to estimates from the Public utility enterprise, the total quantity of waste deposited is estimated in 500 m^3. The municipal landfill in Rankovce was not included in the list of ranked municipal landfills.

Illegal dumpsites in Rankovce Municipality have been identified at the following locations: PotrchinDol, in Petralica, JabuchinDol in Ginovci, and Rankovackariver.

Kratovo Municipality

In the municipality of Kratovo, waste management is provided by the Private utility enterprise ”Silkom”, which owns two vehicles and manages to lift up 1365 t/year of solid waste The location of the landfill in the Kratovo municipality area is "MeckinDol", near the railway alignment, 3 km West of Kratovo. The landfill covers an area of 45,000 m^2 and it is estimated that the total quantity of waste deposited is 52 000 m^3. It has been categorized as having a medium environmental risk (Figure 5-73).

Illegal dumpsites are located in the villages of Shlegovo, Prikovci and Ketenovo.

Figure 5-73 Municipality landfill in Kratovo

Section 3

In section 3, one (1) municipal landfill, that of Kriva Palanka Municipality, is located.

The Public utility enterprise “Komunalec”, located in Kriva Palanka, manages the solid municipal waste in this municipality, collecting 4.265 t/year of waste. The landfill is located in Konopica village, near the regional road to Bulgaria M2, nearby the Kriva river (*Figure 5-74*). It accepts, on an annual basis, around 85.000 m^3 of solid waste, or 3.000 tons in weight. It has been categorized as having a high environmental risk.

Figure 5-74 Municipality landfill in Kriva Palanka

With regards to the fate of inert or construction waste generated during construction, processing or craft activities, it usually ends up disposed of at the very same generating point or in public spaces, and in the best case in the municipal landfill in the absence of a landfill for construction debris in the Northeastern region.

The locations of the municipal landfills and illegal dumps are shown in *Figure 5-75*, which provides an indication of their proximity to the railway alignment.

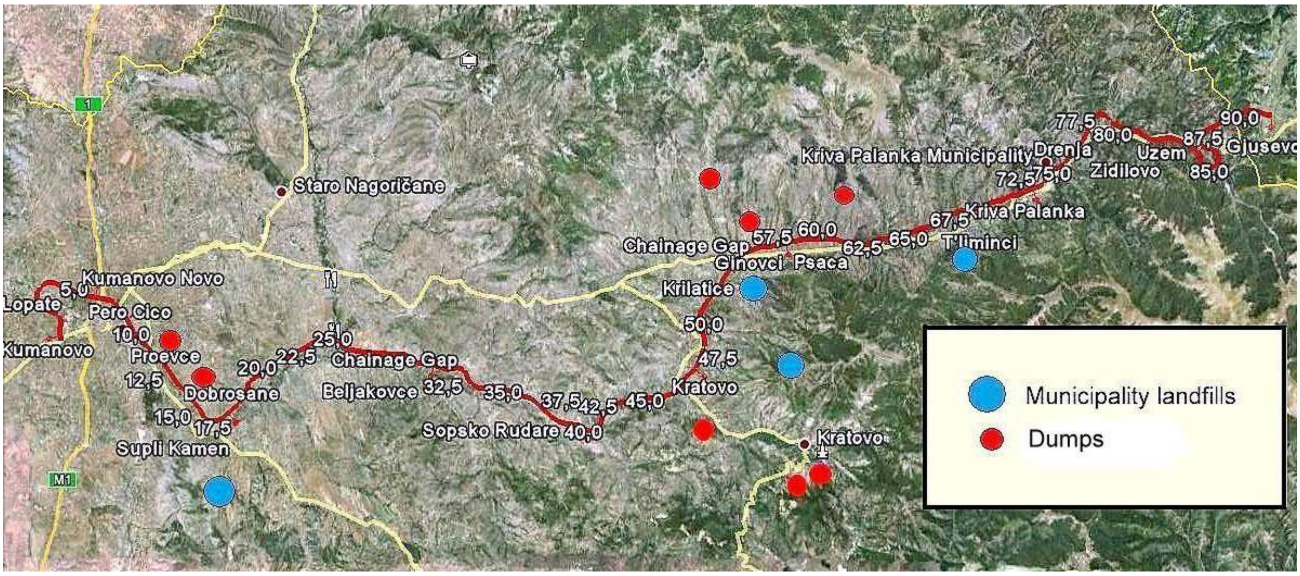


Figure 5-75 Municipal landfills and illegal dumps along the railway corridor in the North - East region

Management of construction waste during the 1994-2004 railway construction period

In the period 1994-2004, during the previous railway construction works, the inert waste generated was collected and taken to inert waste sites that were identified together with the municipalities. The following data were obtained by the relevant persons from the PERI who were directly involved in the project activities in that period.

There is no knowledge of any potentially contaminated materials locations along the railway alignment.

A brief description of these inert waste disposal sites as well as of the borrow pits that were used during that period is provided for each section of the railway alignment.

Section 1

In section 1 there is 1 borrow pit, which is shown in *Figure 5-77* and its characteristics described in ***Error! Reference source not found.****Table 5-26* below.

	Existing	Section	km	Status
1	Borrowing pit (Shupli Kamen)	1	**16**	Soil or embankments

Table 5-26 Borrow pit in section 1 of the railway alignment

Section 2

In section 2 there are 8 landfills and 1 borrow pit, which are shown in *Figure 5-78* and their characteristics described in the following *Table 5-27*.

Some of them are not completely filled and therefore they still have capacity to receive the construction waste that will be generated during the new construction works of sections 1, 2 or 3 of the railway.

	Existing	Section	km	Status
2	Landfill	2	**44**	Humus landfill for an excess of material
3	Small landfill (at the exit of tunnel 5a)	2	**45**	Humus landfill that will be used for disposing of construction material
4	Landfill - Groove (Ketenovo)	2	**46**	Landfill covered in humus
5	Small landfill	2	**46.7**	Landfill of humus, part made of platform with dug out sediments, no excess of material until 48 km
6	Landfill	2	**49**	Landfill located after the forest and is levelled with humus.
7	Landfill between two tunnels (6 и 6a)	2	**50**	Humus landfill, the tunnel material will be disposed by the river, rocks for the embankment will be brought from 6a (50 – 70 000m^3)
8	Landfill (after tunnel 6a)	2	**51**	Landfill of humus
9	Borrowing pit	2	**53**	For construction material - sand and gravel
10	The biggest landfill	2	**65**	Has not been worked on the surface, there is room for disposal, and if it is not used it will be forested.

Table 5-27 Landfill and borrow pits in section 2 of the railway alignment

Section 3

In section 3 there are 2 landfills, which are shown in *Figure 5-79* and their characteristics described in the following *Table 5-28*.

Existing	Section	km	Status
Landfills at the tunnel (4– 4a)	3	**67**	Renewal of the excess on the slopes, there are trees on the landfills
Landfill (on the lower side, before bridge 7)	3	**69**	no data obtained on the status of the landfill

Table 5-28 Landfill in Section 3 of the railway alignment

Because the construction works carried out in the 1999-2004 period stopped without a management plan for the next activities and implementation of mitigation measures to protect the environment, currently there are a few dumps along the alignment and near the Kriva river, where the inert waste has been simply thrown away.

Figure below illustrates one of the few dumps that exist along the railway route. It is the result of construction activities of the railway in the 1994-2004 period.

The proposed project will not include the rehabilitation/rectifying issues related to these dumps from the previous construction of the railway.

Figure 5-76 Dump caused by the construction activities on the railway route (1994-2004)

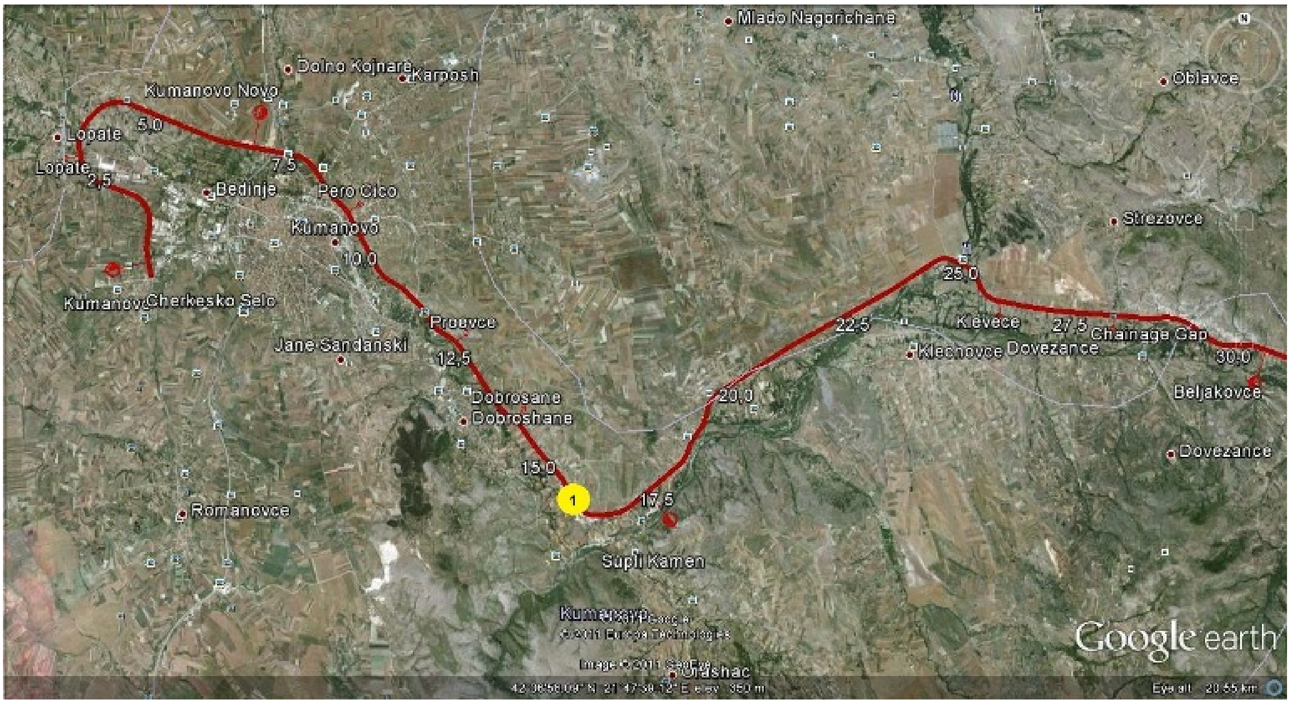


Figure 5-77 Existing landfills in Section 1

Figure 5-78 Existing landfills in Section 2

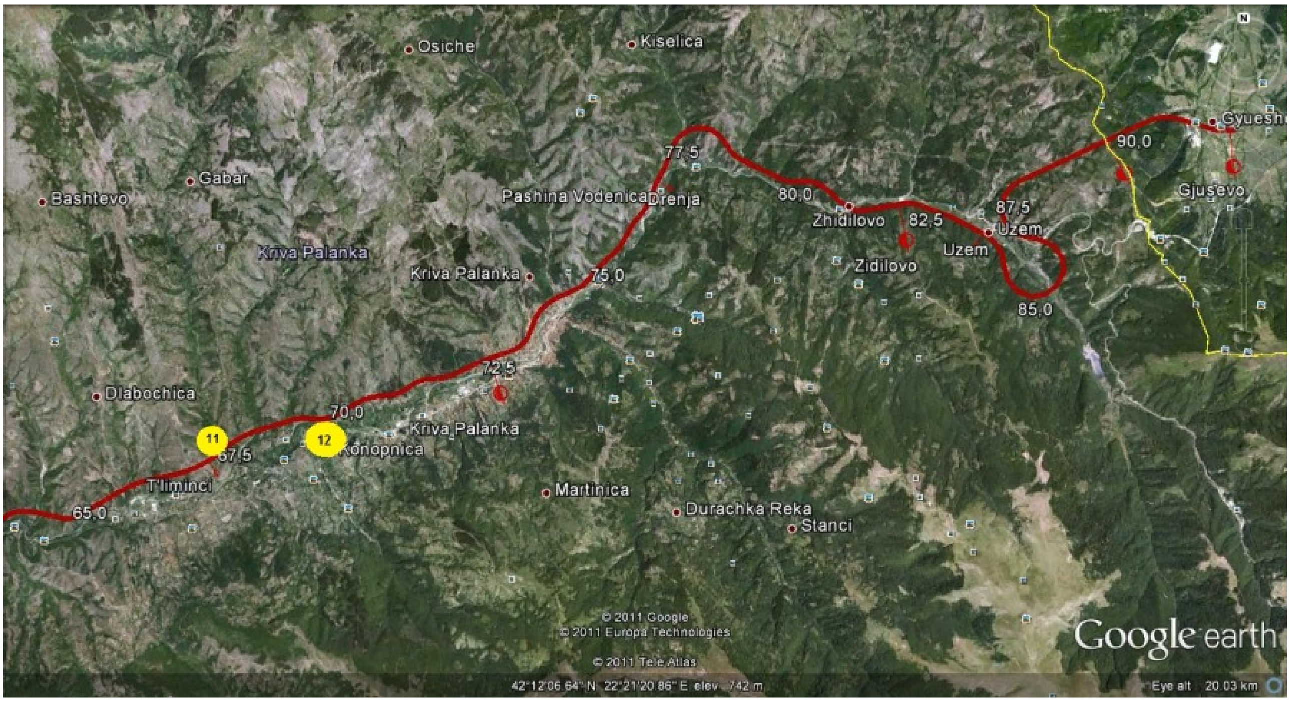


Figure 5-79 Existing landfills in Section 3

5.1.7 NATURE CONSERVATION & BIODIVERSITY

This section addresses the study of the biotic environment and encompasses the baseline conditions for Protected & Designated Areas, Habitats, Flora and Fauna.

5.1.7.1 STUDY AREA ('INVESTIGATION AREA')

In order to adequately identify and study the Protected & Designated Areas that may be in the radius of influence of the railway project, a distance of approximately 10 km around both sides of the corridor has been considered. This distance shall cover all protected and environmentally important sites within the northeastern region of the Republic of Macedonia as well as within the southwestern area of Bulgaria bordering the Republic of Macedonia in the railway project area.

For Habitats, Flora and Fauna, a strip of land 500 meters wide along the corridor (250 m at both sides of the railway alignment axis) has been considered as sufficient to assess the potential effects the railway project may have on these variables, both during construction works and operation. No additional area for access roads is deemed necessary, since the already completely and partially built up alignment in sections 1 and 2 should serve as access road for the construction of the new railway, while in section 3, where no alignment has been constructed yet, the existing road network, mostly comprised of rural non-paved roads, can be used as access roads.

5.1.7.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The legal basis for nature protection in the Republic of Macedonia is found in the Constitution, the Law on Environment[1], international agreements signed or ratified by the country and laws regulating the use of certain natural resources.

The basic law in the area of nature protection is the Law on Nature Protection (Official Gazette of the Republic of Macedonia Nos. 67/04, 14/06 and 84/07). Most of the EU legislation on nature conservation has been transposed into this Law, which also contains obligations from relevant ratified international agreements. Full implementation of the Law is still to be achieved with the adoption of several by-laws. Thus, with regards to the transposition of the two directives that comprise the cornerstones of EU nature protection policy[2], the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC), there are still many requirements pending of full transposition. For instance, Article 53(4) of the Law on Nature Protection states 'The ecological network, by its characteristics, principles, measures and scope of protection shall be fully compatible with the Coherent European Ecological Network "NATURA 2000", but no specific procedural requirements for the implementation of the obligations arising from Article 6 of Habitats Directive 92/43 /EC regarding the assessment of plans and projects significantly affecting Natura 2000 sites have yet been defined in secondary legislation.

The Law on Nature Protection regulates the protection of nature through protection of biological and landscape diversity and protection of natural heritage within and outside protected areas.

The law sets up a system of protected areas divided into several categories ranging from strict protection to regulation of human activities. The key obligations deriving from the Law on Nature Protection encompass the revalorization of protected areas protected prior to its adoption, and the development of new proclamation acts, by which the system of protected areas will be completed. Another obligation under the Law is the development of a Strategy for Nature Protection, with a validity of 10 years, which should include long-term basis of the policy for nature protection, as well as development of plans for protected areas management.

Article 53 of Law on Nature Protection stipulates the establishment of a coherent national ecological network for the purpose of conservation, maintenance or restoration to a favourable conservation status of the environmentally important areas, and to connect protected areas and ecologically important areas (in future, Natura 2000 sites as well) through ecological corridors.

[1] The Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08) is the framework law which is the pillar of environmental and nature protection in FYR Macedonia. Specific environmental aspects tackled by this Law are regulated by several separate laws (Law on Nature Protection, Law on Ambient Air Quality, Law on Waters, etc.)

[2] The Birds Directive (79/409/EEC) requires the designation of Special Protection Areas, while the Habitats Directive (92/43/EEC) requires the establishment of a European ecological network of selected habitats and species (the Natura 2000 sites).

The environmentally important areas (that contribute to the protection and conservation of biological diversity in the Republic of Macedonia), the system of ecological corridors as well as the international environmentally important areas (of significance for the conservation or attainment of improved conditions with regards to the conservation of species and habitat types at the international level) are constituent parts of the ecological network.

The development of the national ecological network in the Republic of Macedonia, as part of the Pan-European Ecological Network (PEEN) is an obligation of the Republic of Macedonia as one of the signatory countries of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS, 1996). The goal of this Strategy and PEEN, as a basic tool for implementation of the strategy, is to enable efficient implementation of the United Nations Convention on Biological Diversity at European level, namely provision of favourable conservation status of ecosystems, habitats, species and landscapes of European importance.

In addition to Law in Nature Protection, the establishment of the national ecological network has been prescribed in several national strategic and legal documents, such as:

- Spatial Plan of the Republic of Macedonia (2004) - the basic elements of the national ecological network have been defined in the Study for the National Heritage Conservation (developed in 1999), while its establishment “provides vision of the desired state of the natural environment in several decades”;
- National Biodiversity Strategy and Action Plan of the Republic of Macedonia (2004) – attributes high priority to the establishment of ecological network for the purpose of preservation of exceptional natural values;
- Second National Environmental Action Plan (2006) envisages specific action for establishment of national ecological network for the purpose of achieving integrated system of nature protection and conservation of biological diversity in accordance with the EU standards and multilateral agreements.

The protection and conservation of biodiversity in the context of projects in which they invest is widely recognized in EBRD and EIB environmental and social sustainability policies. They both support a precautionary approach to the conservation and sustainable use of biodiversity through the implementation of applicable international law and conventions and relevant EU Directives. Detailed guidelines addressing this approach are provided in:

- Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources of EBRD’s Environmental and Social Poliy (2008);
- Part C6 and Annex 7 of EIB’s Environmental and Social Practices Handbook.

Likewise, IFC’s Policy and Performance Standards on Social and Environmental Sustainability commitment for protecting nature and biodiversity is contained in Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management. This standard is specifically referred to in IFC’s Environmental, Health, and Safety Guidelines for Railways.

5.1.7.3 DATA SOURCES

Data collection for the baseline of nature conservation and biodiversity was obtained through:

- Literature review;
- Personal experience of the experts in different fields that contributed to the study from previous investigations;
- Interpretation of topographic maps, satellite images (Google Earth) and aerial photographs (orto-photo images of the Macedonian state cadastre).
- Targeted fieldwork.

5.1.7.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

For the description of habitats, a map of habitats along the railway corridor was expressly prepared for this ESIA. All natural and man-made habitats with size large enough to be presented on a map of a 1:25,000 scale were mapped. The habitat units that were mapped correspond to the finest level of EUNIS Habitat Classification that the team was able to distinguish.

Habitats were mapped by ground-truth data and analysis of satellite images, topographic maps (1:25,000), aerial photographs, etc. Ground truth data of habitats were taken by GPS during the field works that took place in May and June 2011. Point data were loaded in GIS software (ArcGis 9.2). Layers with topographic maps, satellite images and aerial photographs were overlaid. In some cases, the areas of different habitats were first mapped on printed topographic maps and these drawing were later on digitized and loaded in the GIS software.

Since the projected railway is almost 90 km long, after the identification and mapping of the habitat types, representative areas for all of the identified habitat types were selected along the railway corridor to focus the investigation in these areas, and confirm (and correct if necessary) that the habitat information derived from the desk study for the area, actually corresponded to the assigned habitat type. In addition to this thorough investigation is selected areas, all the experts involved in the biodiversity study visited the entire length of the projected railway alignment in order to map/identify specific objects or variations of certain habitats. The specific surveying method used by the experts depended on the taxonomic group investigated: tracks and signs of mammals were observed and collected, birds were observed and identified by their sounds, butterflies were identified and released by netting, some insects were collected by pitfall trapping, etc. In addition, available data from previous investigation of the experts were used in this study.

Inventories of plants, animals and fungi species were prepared by the experts. These are presented in Annexes 6, 7, 8.1 and 8.2.

5.1.7.5 BASELINE ASSUMPTIONS & LIMITATIONS

The preparation of the biodiversity baseline has been mainly limited by the lack of existing detailed data specific of the railway corridor. This has been particularly thrue for plants and mammals. Nor vegetation maps or habitat maps exist in the Republic of Macedonia at the national or regional levels. Much of the information, thus, has been newly generated by the experts in the various biology fields participating in the study, through interpretation of cartography, satellite images and aerial photographs, and field surveys.

Moreover, the determination of sensitive plant and animal species that are potentially present along the railway corridor has been limited by the fact that no Red Data Books and Red Lists for Macedonian flora, fauna and fungia have been prepared yet at a national or regional level. Thus, the establishment of the presence of sensitive species in the railway corridor area had to be done on the basis of the most relevant international conventions and treaties (Bern Convention, IUCN red list, Habitats Directive, etc.). These international documents contain lists of species threatened to different levels (e.g. from Least Concern to Extinct). The problem arises from the fact that there may be species that are of low concern at an international level, but have some level of threat in the Republic of Macedonia (or vice versa), thus under-estimating (or over-estimating) the sensitivity value of the species.

5.1.7.6 PROTECTED & DESIGNATED AREAS

This section presents a description of the natural areas in the vicinity of Project Railway Corridor VIII - Eastern Section that have a significant interest due to the value of their natural resources.

Except for already declared protected natural areas, none of these areas have yet a legal status under Macedonian law that fully warranties their protection. These areas include:

- Protected natural areas declared (or anticipated to be declared) under Macedonian law;
- Proposed ecological corridors of the national ecological network to connect protected areas and ecologically important areas (including future Natura 2000 sites), as required by Article 53 of Law on Nature Protection;
- Natural areas covered under the protection regime of European Union legislation or international conventions (Natura 2000/Emerald sites);
- Proposed areas for the management of species;
- Other areas of natural interest without protection coverage (IBAs, IPAs).

Protected Areas and Proposed Protected Areas under Macedonian legislation

According to the Law on Nature Protection 67/2004, there are six categories of protected areas in the Republic of Macedonia: Strict Natural Reserve, National Park, Monument of Nature, Nature Park, Protected Landscape, and Multi-purpose Area. Categorization of protected areas has been done in accordance with the International Union for Conservation of Nature.

In the study area 1 protected area and 3 areas proposed for protection are found:

<u>Protected Areas</u>

Monument of Nature Kuklica. It is protected because of its specific geomorphological features (sand pillars created by water erosion of sand sediments).

Category: Monument of nature

Status: Protected.

The railway (section 2) passes more than 500 m south of the Monument of Nature Kuklica,.

<u>Proposed Protected Areas</u>

There are three areas proposed for protection under the 2010 UNDP/GEF project Development of a representative protected areas' network in the Republic of Macedonia, which is still not officially accepted by the Ministry of Environment and Physical Planning. These are:

Kiselicka river. Proposed because of its importance for mammals and birds.

Category: Nature Park.

Status: Proposal for protection.

Section 3 of the railway alignment intersects with this area.

Osogovo Mountains. Large area with unique landscape characteristics and specific interactions of people with nature.

Category: Protected landscape.

Status: Proposal for protection.

Section 3 of the railway alignment runs parallel to the border of this proposed area (approximately 2 km to the north of it) and intersects it at the end, near the Bulgarian border.

Bislimska Klisura. Gorge on Pcinja river known by the nesting sites of several birds of prey and presumably rich bat fauna.

Category: Monument of nature.

Status: Proposal for protection.

The railway alignment (section 1) passes a safe distance (more than 500 m north) from the Monument of nature Bislimska Klisura.

The map in *Figure 5-91* shows the location of these areas in relation to the railway alignment.

Ecological corridors

The Project for development of the national ecological network in the Republic of Macedonia (known as MAK-NEN), implemented by the Macedonian Ecological Society (MES) and the European Centre for Nature Conservation (ECNC) in cooperation with the Ministry of Environment and Physical Planning of the Republic of Macedonia includes two biocorridors in the area of Project Railway Corridor VIII-Eastern Section recognized as important corridors for large mammals. These corridors are proposed areas to be comprised in the MAK-NEN and are yet to be approved by the Ministry of Environment and Physical Planning. These areas are:

- Osogovo-Bilina Planina linear biocorridor;
- Osogovo-German landscape biocorridor

Their function as biocorridors results from the fact that they enable various daily, periodical or seasonal movements and migrations of different animals or dispersal of plants. They are important for the normal life cycle of many animals:

- Amphibians. Migrations during reproduction to spawning areas (common toad, green toad);
- Brown bear. Movements for searching food and migration. Brown bear is extremely rare in the Project area. Their presence is irregular and these corridors are very important for enabling the establishment of sound bear populations in the future;
- Gray wolf. Movements for searching pray;
- Ungulates, particularly roe deer. Movements and seasonal migration for grazing;
- Small mammals. Periodical and seasonal movements;

The location and limits of the Osogovo-Bilina Planina linear biocorridor and the Osogovo-German landscape biocorridor is shown in *Figure 5-80* and *Figure 5-81*.

Figure 5-80 Position of the two bio corridors that intersect with the railway corridor

Figure 5-81 Limits of the two biocorridors that intersect with the railway corridor

The Osogovo-German landscape biocorridor extends on a South-North direction from Osogovski Planini mountains, in the region of the villages Mozhdivnjak and Konopnica to the German mountain in the region of the village Petralica. Basically it represents the connection of Osogovo Mountains with the range of mountains on the border with Serbia (northern Macedonia). These mountains are Kozjak, German and Bilina Planina (from West to East).

The Osogovo-Bilina Planina (Deve Bair) linear corridor extends on a south-north direction from the northern slopes of Osogovski Planini mountains, in the area of the villages Krklja and Uzem, through the road crossover Deve Bair to Bilina Planina in the area of the villages Kiselica and Trnovo. It should enable the main connection between populations of large carnivores from Osogovski Planini mountains to the northern border mountains, specifically Bilina Planina. It is part of the wider corridor of the Pan-European Ecological Network for Southeastern Europe

The most important features (land cover) of both biocorridors are presented in *Table 5-29*. This table also shows the points at which the railway alignment cuts these corridors.

Biocorridors	Biocorridor type	Position along the alignments	Habitat type coverage (%)	
Osogovo-Bilina Planina (Deve Bair)	Linear corridor	km 64+700 to km 68+300	Forest	42.9
			Scrub	28.2
			Grasslands	6.7
			Agricultural area	22.2
Osogovo-German	Landscape corridor	km 80+000 to km 88+200, but the alignment also touches the biocorridor from km 76+700 to 88+000	Forest	27,5
			Scrub	28,8
			Grasslands	18,8
			Agricultural area	25,0

Table 5-29 Main features of Osogovo-German landscape biocorridor and Osogovo-Bilina Planina (Deve Bair) linear biocorridor

Emerald Sites

In order to promote the system of protected areas, the Republic of Macedonia accepted the approach of ecological networks. In 2002, the development of the EMERALD network was initiated, in areas of special interest for conservation (ASCI). As it can be seen in *Figure 5-82*, there are two Emerald sites in the Northeastern region of Macedonia and both are intersected by the railway aligment in the last part of section 3, near the Bulgarian Border. These are:

- **Pchinja-German** (Code MK0000029), occupying the northern mountains Kozjak, German and Bilina Planina on the border with Serbia. Surface area: 63,490 ha;
- **Osogovo** (Code MK0000026), which completely overlaps with Osogovo Mountains range. Surface area: 56,630 ha.

Both sites were designated as Type C[3], areas important for birds, other species and/or habitats. These sites are still not officially approved by the Council of Europe.

Macedonian legislation has not yet incorporated the obligations arising from of Article 6.4 of Habitats Directive 92/43 /EC regarding the assessment of plans and projects significantly affecting Natura 2000 sites. Nor do similar requirements exist for Emerald network sites or ecological corridors.

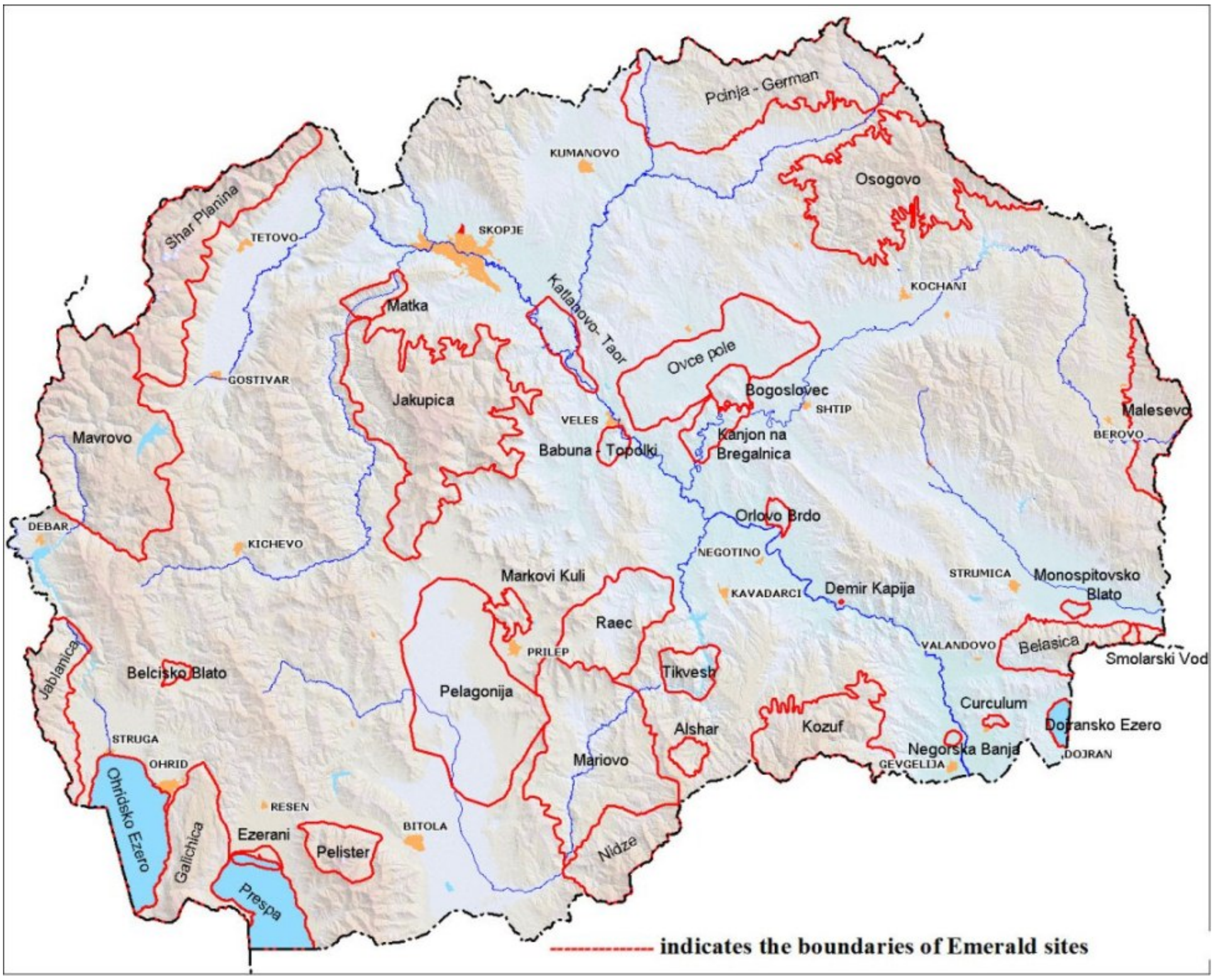


Figure 5-82 Emerald sites in the Republic of Macedonia

[3] In order to provide compatibility of the Emerald Network with Natura 2000, the Emerald sites are categorized into three different types: Type A (Areas important for the protection of birds, which are in accordance with the Special Protection Areas (SPAs) of Natura 2000), Type B (Areas important for other species and/or habitats, which are in accordance with the Special Areas for Conservation (SACs) of Natura 2000), Type C: Areas important for birds, other species and/or habitats.

Nature 2000 sites

There are two Natura 2000 sites in Bulgaria, right across the border of the project railway corridor. These are a Special Protection Area (SPA) and a Special Area for Conservation (SAC), which overlap on most of their territories. These are:

- **Osogovo**, with Code BG0002079 (Birds Directive Site, SPA)

  Surface area: 24,125 ha

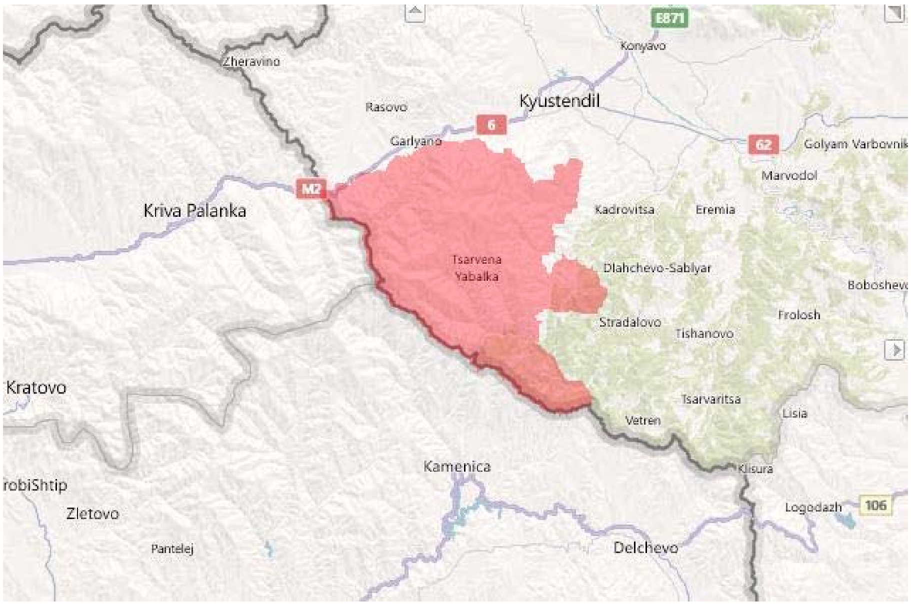


Figure 5-83 Osogovo Birds Directive Site in Bulgaria

- **Osogovska Planina**, with Code BG0001011 (Habitat Directive Site, SAC)

  Surface area: 34,513 ha

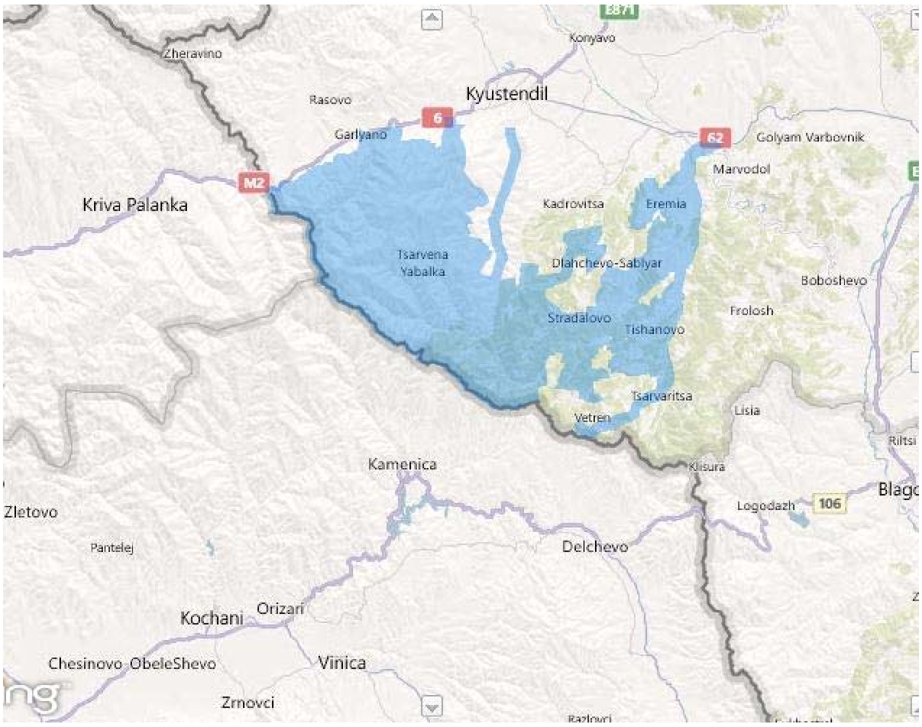


Figure 5-84 Osogovska Planina Habitat Directive Site in Bulgaria

Areas for the management of species

These areas have no legal status. They were proposed as amendments to the Spatial Plan of the Republic of Macedonia (UNDP project). However, these changes are still to be adopted by the Macedonian Parliament or Government.

In the study area there are four areas designated for the management of species. These are:

- **River Pcinja - Staro Nagoricane village**. Designated for the management of Otter. Section 1 of the railway alignment runs along the southern limit of this area;
- **Zubovce village**. Designated for the management of large birds of prey (Imperial eagle, Long-legged buzzard). The railway alignment borders with this area;
- **Kriva river – Beljakovce village**. Designated for the management of Otter, birds of prey (Imperial eagle, Long-legged buzzard), Black stork, and Roller. The railway intersects with this area;
- **River Vetunica**. Designated for the management of birds of prey Long-legged buzzard and historical site of Egyptian vulture. The railway intersects with this area. *Figure 5-85* below shows the location of nesting sites in this management area.

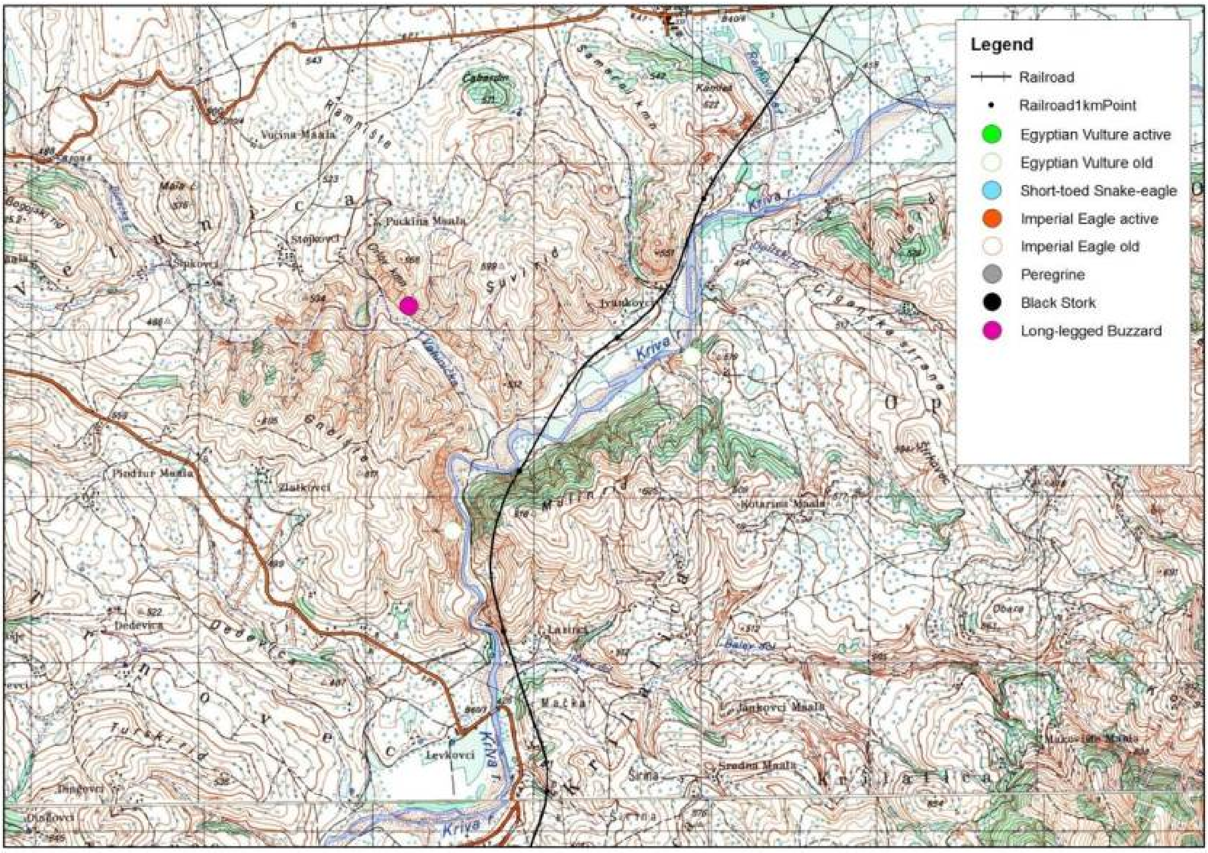


Figure 5-85 Distribution of nesting sites in the area for management of species Vetunica

Important Bird Areas (IBAs)

The Important Bird Areas (IBAs) are areas where a significant proportion of the population of one or more species of birds that are considered as priority by the BirdLife organization is present.

There is one identified Important Bird Area of global importance in the study area:

River Pcinja-River Petrosnica-Kriva river (IBA Code: MK006). It meets the IBA criteria for the presence of Imperial eagle, Roller and Long-legged buzzard. Other important bird species present in this IBA are Peregrine falcon, Lanner falcon, Short-toed snake eagle, Black stork, Masked shrike.

Figure 5-87, Figure 5-88, Figure 5-89 show the location of nesting sites for various bird species in this IBA. The railway intersects with its core area Kriva river as it can be observed in the map in *Figure 5-87*.


Figure 5-86 Imperial eagle (*Aquila heliaca*) – left, and Long-legged buzzard (*Buteo rufinus*) – right

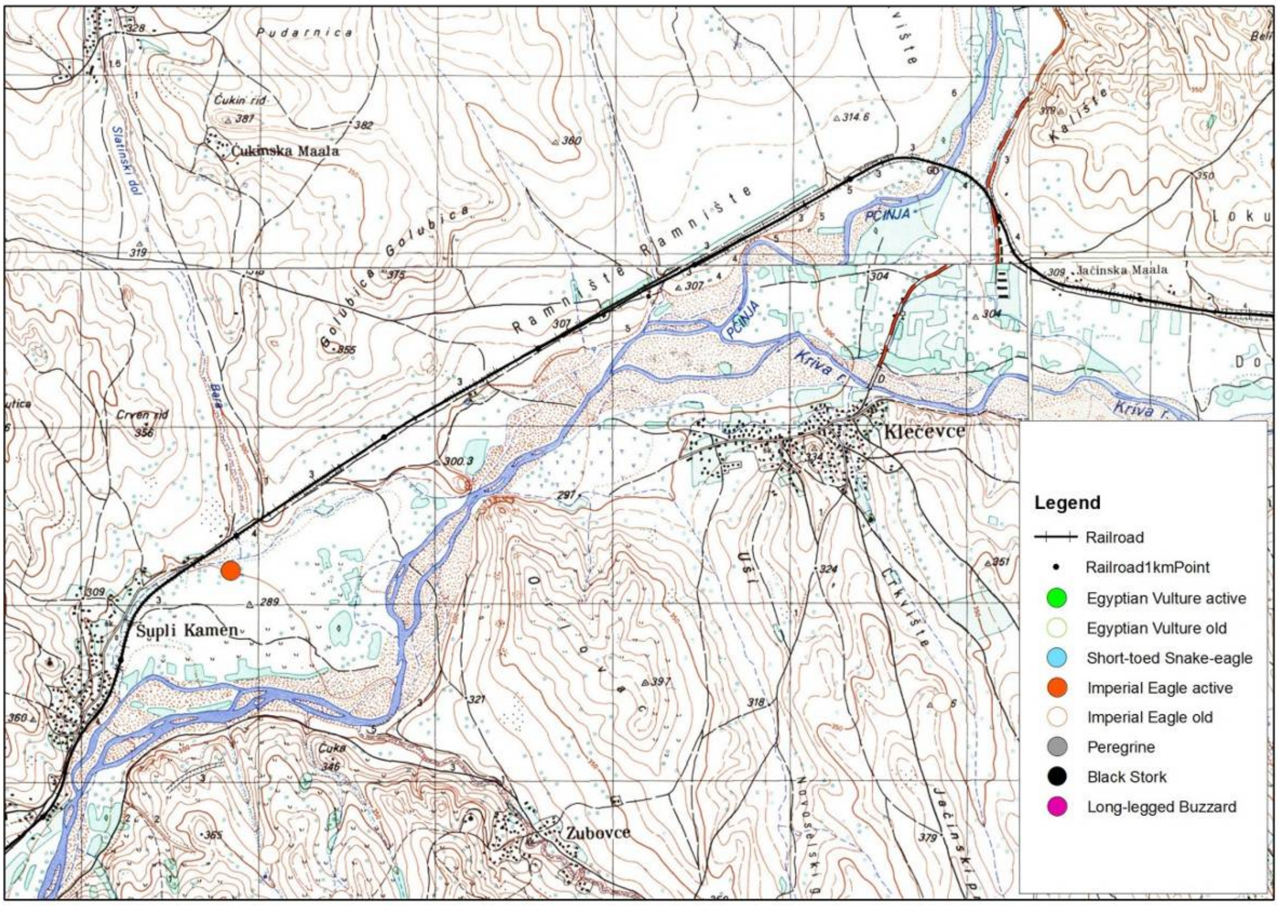


Figure 5-87 Distribution of nesting sites in IBA River Pcinja-River Petrosnica- Kriva river (western part of the IBA)

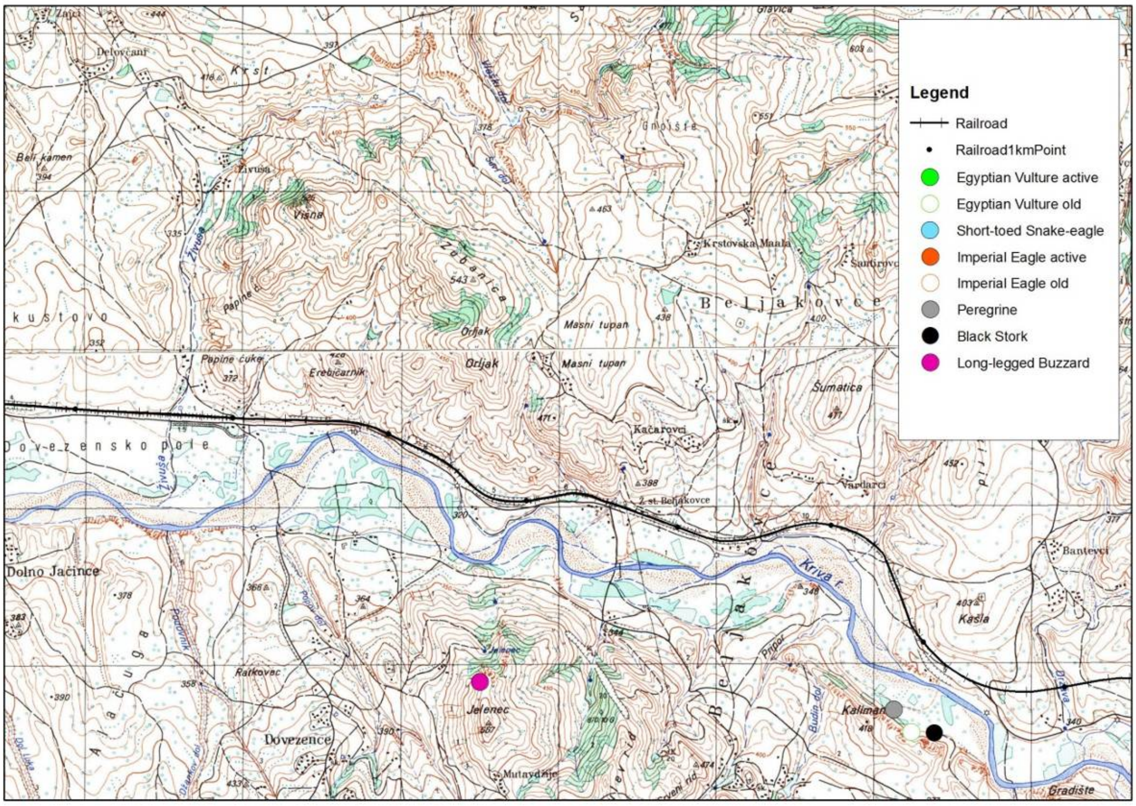


Figure 5-88 Distribution of nesting sites in IBA Pcinja river- Petrosnica river- Kriva river (central part of the IBA)

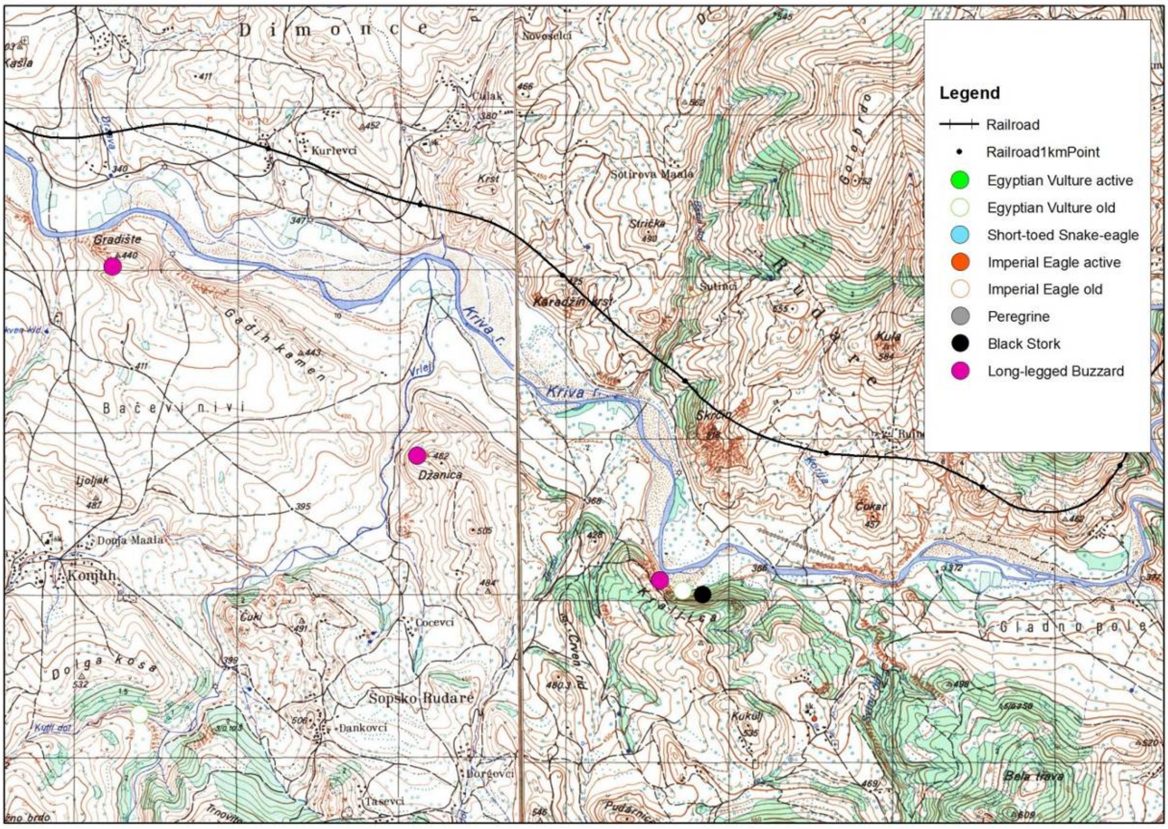


Figure 5-89 Distribution of nesting sites in IBA River Pcinja-River Petrosnica- Kriva river (eastern part of the IBA)

Important Plant Areas

Important Plant Areas (IPAs) is a Plantlife International initiative for the identification of areas important for the diversity of wild plants based on the presence of endangered plant species, endangered habitats and species richness.

There is one IPA located in the project area, IPA 14 Okonovo, which intersects with the alignment in the eastern end of the railway corridor (see *Figure 5-90*). This IPA site was selected based on the importance of the habitats (namely Criterion C – Important habitats – from Annex I of Habitat Directive or Bern Convention) and does not host endangered plant species.

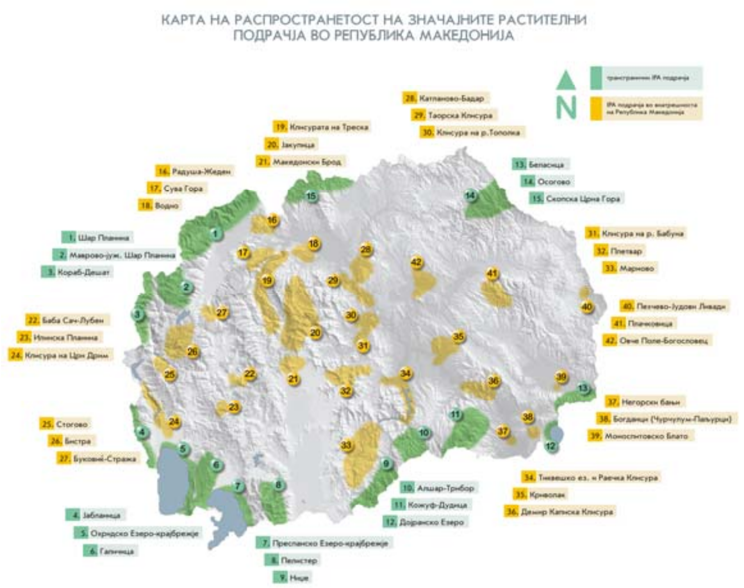


Figure 5-90 Location of IPAs in Macedonia

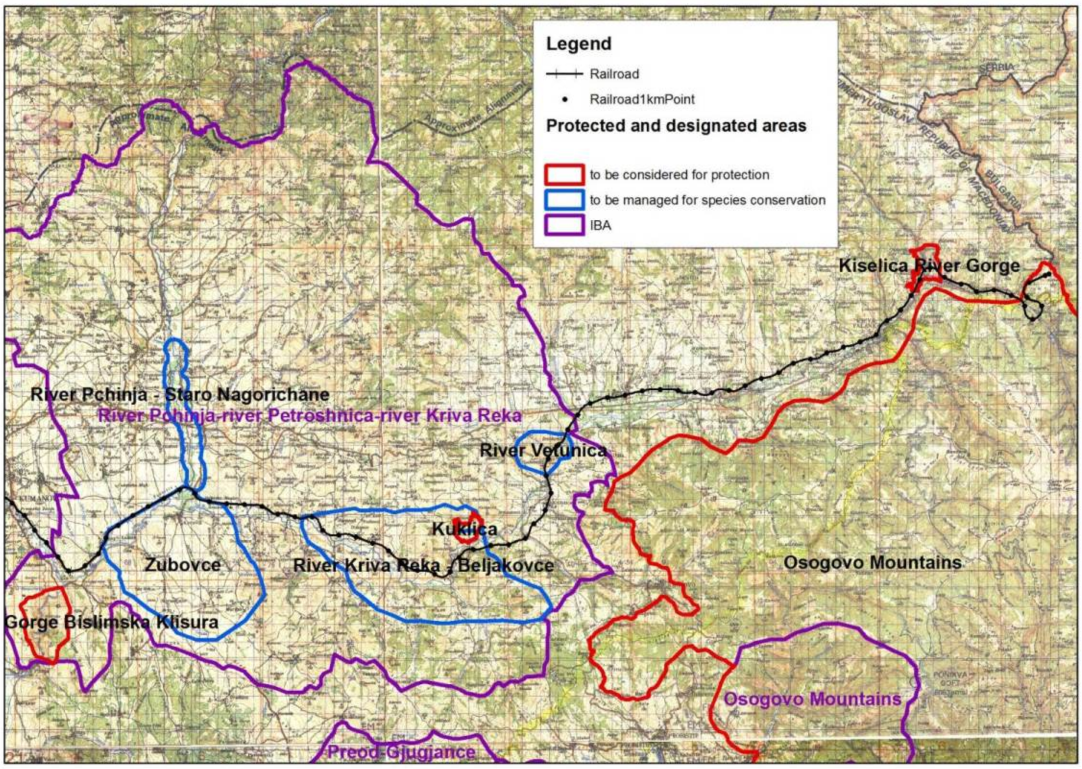


Figure 5-91 Protected and Designated Areas along Railway Corridor VIII-Eastern Section

5.1.7.7 HABITAT BASELINE CONDITIONS

The following section presents the summarised results of habitat types mapping (May-June 2011), field observations, and literature data on flora and fauna composition of the corridor along the existing and planned railway line, starting from the railway station Kumanovo up to Deve Bair (the border between Macedonia and Bulgaria). It contains the habitats description, distribution and importance at the local and regional levels. Habitats along the railway corridor are presented on a map (see Annex 5).

From a point of view of the main biodiversity features (geomorphology, biogeography, geology), the whole alignment can be divided in five distinctive parts (units):

- Low hilly urban area in Kumanovo and its surrounding, down to the village of Dobroshane (km 0+000 - km 15+000). More or less urban or semi-urban areas, densely populated;
- Open valley area along the Pchinja and Kriva river valleys. From the village of Dobroshane to the village of Rudare (km 15+000 - km 37+800). Low land flat and low hilly area with gentle slopes toward the Kriva river, with sparse human population and dominated by dry grassland vegetation;
- Hilly narrow valley area along the Kriva river, from the village of Rudare to the village of Rankovce (Ivankovci) (km 37+800 - km 53+600), including the small valley of the stream Kratovska. The area has more or less steep hill slopes, is sparsely populated, and more or less afforested with degraded to very degraded oak forests and dry grasslands;
- Slavishko Pole.More or less flat to gently sloped area from the village of Rankovce to the villages of Psacha/Petralica (km 53+600 - km 60+800). More or less densely populated agricultural area with tendency to the abandoning of the fields;
- Gorge area of the Kriva river from the village of Psacha through the town of Kriva Palanka and to the village of Uzem (up to the Bulgarian border) (km 60+800 - km 88+200). Hilly or mountainous mostly forested area with steep to very steep slopes towards the Kriva river, very sparsely populated.

The habitats along the area of the railway corridor can be divided in two main categories according to their origin, namely, natural and anthropogenic habitats.

Natural habitats include:

- Forests and shrublands;
- Grasslands;
- Rocky sites, and
- Water habitats.

Anthropogenic habitats include:

- Tree plantations;
- Grasslands of anthropogenic origin;
- Agricultural land;
- Urban or urbanised areas.

The main criterion to make the division within these categories was the division proposed by EUNIS Habitat Classification (European Commission, DG Environment), but other criteria such as presence of different plant communities, distribution, degradation level, and geomorphologic features were also used.

The description of the habitats that is presented below follows the following pattern:

- At the beginning, a description of the general characteristics of the habitat, followed by a reference to their general distribution in the region and their distribution in the railway corridor;
- Description of the plant association. Dominant and most common plant species and characteristic fungi species;

- Description of the fauna of the habitats, presented by vertebrates (amphibians, reptiles, birds and mammals) and selected groups of invertebrates (dragonflies, ground beetles, grasshoppers and daily butterflies).
- Fish species and some other groups of invertebrates are analysed in the description of wetlands.

The complete lists of species by habitats are presented in appendices to the ESIA:

- Annex 6 - Plant species;
- Annex 7 – Fungi & Lichens;
- Annex 8.1 – Vertebrates (Amphibians, Reptiles, Birds, Mammals);
- Annex 8.2 – Invertebrates (Dragonflies, Ground beetles, Daily butterflies, Grasshoppers).

NATURAL HABITATS

NATURAL FORESTS AND SHRUBLANDS

Forests and shrublands are divided into three main habitat types:

- Oak forest (forest of pubescent oak and oriental hornbeam),
- Beech forest, and
- Riparian habitats.

Almost the whole area is situated in the belt of typical forest of pubescent oak and oriental hornbeam. It is the dominant type of vegetation that determines the features of the hilly forested landscape and represents the lower vegetation belt in the railway corridor area. It belongs to the Sub-Middle-European-Balkan sub-region and its Scardo-Pindic province. In the frames of this zone, beech forests can be found in the gorges of streams, penetrating outside of their main altitudinal zone (above 1000 m).

Willow woodlands and belts develop in the gorges of streams as well as in dales and ravines in the area of oak forest. These habitats penetrate from the lowest parts of the railway corridor area up to 1000 m a.s.l.

All of the three habitat types have been under strong anthropogenic pressure for many centuries. Almost all of them are in different stages of degradation. The degradation level was the second criterion used to divide forests and shrublands, especially the oak shrubland (preserved, sparse, and degraded).

OAK FOREST BELT

Xerothermophilous Oak Forest - Pubescent Oak and Oriental Hornbeam Forest

Reference to EUNIS Habitats: G1.737 Eastern sub-Mediterranean white oak - **G1.7372 Moesian white oak woods**
Reference to EU HD Annex I: **Eastern white oak woods 91AA**
Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

It is characterised by the forest community **Querco-Carpinetum orientalis macedonicum** Rud. 39 apud Ht. 1946 (*Figure 5-92*). This thermophilous and xerophilous community develops under regional climatic influence on the skeletal soils. The edifier species is Oriental hornbeam (*Carpinus orientalis*), and very abundant and frequent is pubescent oak (*Quercus pubescens)* (*Figure 5-93*). Beside these tree species, *Fraxinus ornus*, *Colutea arborescens*, *Coronilla emeroides*, *Acer monspessulanum*, *Rhamnus rhodopaea* are present in the tree and shrub layers and *Cyclamen neapolitanum*, *Carex halleriana* are characteristic for the herb layer.

Regional distribution: This association is widespread in the Adriatic and Aegean sub-Mediterranean region. In Macedonia it is climazonally distributed up to about 600 m a.s.l., and on the southern slopes of the mountains it reaches up to 1,000 m altitude.

Distribution in the area of the railway corridor

There is a well-developed forest of pubescent oak and oriental hornbeam on the right side of the Kriva river near Dlabocica village (see *Annex 5 - Habitat Map*).

Figure 5-92 Well developed forest of pubescent oak and Oriental hornbeam in the area of Rudare village.

Figure 5-93 Pubescent oak (*Quercus pubescens).*

Flora, fungia and fauna

Flora: The extended list of plant species growing in this biotope is given in the *Annex.*

Fungia: Fungi of this biotope are characterised by the presence of species developing on deciduous trees such are *Radulomyces molaris*, *Vuilleminia comedens*, *Peniophora quercina*, *Stereum hirsutum*, *Daedalea quercina*, *Exidia truncata*, *Hapalopilus rutilans* etc. (on *Quercus pubescens*) and *Hyphodontia crustosa*, *Dichomitus campestris*, *Phellinus torulosus* etc. (on *Carpinus orientalis*). The terricolous fungi are characterised by thermophyllous species like *Leccinum griseum*, *Amanita caesarea*, *Boletus aestivalis, B.aereus* etc. A comprehensive list of fungal species is provided in Appendix II.

Fauna: The extended list of animal species is provided in *Annex.*.

Mammals: Probably ones of the most frequent inhabitants of the oak forest are the wild boar (*Sus scrofa*) and the yellow-necked mouse (*Apodemus flavicollis*). Other typical forest species is the wild cat (*Felis sylvestris*). Eastern Hedgehog (*Erinaceus concolor*), red squirrel (*Sciurus vulgaris*), common mole (*Talpa europea*), wood mouse (*Apodemus sylvaticus*), Balkan short-tailed mouse (*Mus macedonicus*), striped field mouse (*A. agrarius*), fat dormaous (*Glis glis*), brown hare (*Lepus europeus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), badger (*Meles meles*) and the roe deer (*Capreolus capreolus*) can also be found in the oak forest belts, although this habitat is either not primary for them, or they live in a diverse variety of habitats. The presence of the brown bear (*Ursus arctos*) is doubtful. Sporadic occurrences from Bulgaria, through Ososgovo Mts. are registered.

Birds: This habitat is occupied by 31 resident species and 19 breeding species. The most common ones are *European Turtle Dove Streptopelia turtur, Common Cuckoo Cuculus canorus, Common Scops Owl Otus scops, Eurasian Nightjar Caprimulgus europaeus, Common Nightingale Luscinia megarhynchos, Common Redstart Phoenicurus phoenicurus,* three warbler (*Sylvia*) species*, Eurasian Golden Oriole Oriolus oriolus, Common Buzzard Buteo buteo, Grey-faced Woodpecker Picus canus, Eurasian Green Woodpecker Picus* *viridis,* four woodpecker (*Dendrocopos*) species*, Winter Wren Troglodytes troglodytes, European Robin Erithacus rubecula, Eurasian Blackbird Turdus merula, Song Thrush Turdus philomelos, Mistle Thrush Turdus viscivorus, Long-tailed Tit Aegithalos caudatus,* four tit (*Parus*) species, *Wood Nuthatch Sitta europea, Eurasian Treecreeper Certhia familiaris, Eurasian Jay Garrulus glandarius, Eurasian Chaffinch Fringilla coelebs, European Greenfinch Carduelis chloris, European Goldfinch Carduelis carduelis* and *Hawfinch Coccothraustes coccothraustes.*

Reptiles and amphibians: This habitat is favourable for reptiles due to several ecological conditions (suitable climate, low altitude, habitat condition). In total five species of amphibians and nine species of reptiles are present in this habitat.

The amphibians found in this habitat are**:** Fire Salamander (*Salamandra salamandra*), Common Newt (*Lissotriton vulgaris*), Yellow Belied Toad (*Bombina variegata),* Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*).

The reptiles found in this habitat are Hermann's Tortoise (*Eurotestudo hermanni*), Greek Tortoise (*Testudo graeca),* Erhard's Wall Lizard (*Lacerta erhardii*), Green lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Snake-eyed Skink (*Ablepharus kitaibelii*), Slow Worm (*Anguis fragilis),* Aesculapian Snake (*Zamenis longissimus*) and Nose-horned Viper (*Vipera ammodytes)*.

Butterflies: Most of the butterfly species are not forest dwellers. Sporadic occurrences in this habitat can be mostly found by the following species: *Anthocharis cardamines, Maniola jurtina, Melanargia galathea, Pararge aegeria, Brintesia circe, Apanthopus hyperantus, Coenonympha pamphilus, Leptidea sinapis, Vanessa atalanta, Thymelicus sylvestris* etc*.*

Ground beetles: The fauna of Ground beetles (Carabidae) is represented by 15 species and low diversity. The dominant species are *Carabus convexus dilatatus, Carabus coriaceus cerisyi, Harpalus rubripes, Laemostenus punctatus* and *Notiophilus substriatus*. All of the species are widespread in Europe or the Balkans.

Longhorn beetles: These forests are probably the richest habitat with Longhorn beetles (Cerambycidae), having in mind that larvae of larger part of this family develops in oak. Most common species are: *Pseudovadonia livida, Stenurella bifasciata, Stenurella nigra, Stenurella melanura, Stenurella septempunctata, Stenopterus rufus, Clytus rhamni, Pyrrhidium sanguineum* etc*.* Oak forest is also a home of remarkable species like *Morimus funereus* and *Cerambyx cerdo.*

Degraded Xerothermophillous Oak Forests - Pubescent Oak and Oriental Hornbeam

Reference to EUNIS habitats: G1.7C2 [*Carpinus orientalis*] woods - **G1.7C22 Helleno-Balkanic oriental hornbeam woods**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**
and
Reference to EUNIS habitats: **F5.16 Deciduous [*Quercus*] matorral**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**
and
Reference to EUNIS habitats: F6.66 Balkan peninsula supra-Mediterranean garrigues - **F6.661 Balkan Peninsula supra-Mediterranean shrub garrigues**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The same plant community described above characterises this habitat. The difference results from the lower percentage of deciduous species (*Carpinus orientalis, Quercus pubescens, Fraxinus ornus,* and others) due to their overexploitation in the past but also in the present, which has changed the physiognomy of the community (*Figure 5-94*).

Degraded natural stands representing this biotope are usually invaded by *Paliurus spina-christi*, *Pyrus amygdaliformis*, *Prunus spinosa* etc. The plant association that represents this habitat is **Paliuretum submediterraneum** Rizovski prov. It differs from the other associations by the domination of *Paliurus spina-christi* in different succession stages (*Figure 5-95*). Other features that distinguish this biotope from the previous one are as follows: much better developed herb layer due to the presence of open spots and clearings between the evergreen shrubs, shallow, eroded soils, dense ravine system, smaller or bigger bare rocks. The most important plant species in the tree layer of this association are *Paliurus spina-christi, Quercus pubescens, Fraxinus ornus, Juniperus oxycedrus, and Pistacia terebinthus* (in some places). The herb layer is composed of *Minuartia glomerata, Euphorbia myrsinites, Ajuga laxmanii, Knautia orientalis, Tunica illyrica, Althea sp.* etc.

Regional distribution

This biotope is connected to the previous habitat type, hence the remarks as regards to its general distribution are identical.

Distribution in the area of the railway corridor

Such a type of degraded natural forest does not have a regular distribution, but it is connected to village surroundings, and it is located in the vicinity of the agricultural land and the existing roads and railways. This habitat is most dominant in the surroundings of the villages of Rudare and Kuklica. Fragmentary areas occur in close proximity to the villages of Vetunica, Ginovce, Mozdivnjak, Tlminci and Dlabocica. (see Appendix IV - Habitat Map).

Figure 5-94 Degraded natural stand of pubescent oak and oriental hornbeam mixed with planted pine.

Figure 5-95 *Paliurus spina-christi* - commonly known as Christ's Thorn.

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: The fungal composition is very similar to the previous biotope since it represents the same habitat and same host tree and shrub species. The characteristic lignicolous fungal species for the biocoenosis defining this biotope do not occur here due to the absence of adequate hosts, but new tree species such as

Paliurus spina-christi, Juniperus spp. and *Pyrus amygdaliformis* enable development of other fungal species such are *Peniophora cinerea* on *Paliurus spina-christi*, *Peniophora junipericola* on *Juniperus* spp. and *Peniophora incarnata, Laeticorticium polygonioides* etc. on *Pyrus amygdaliformis*. Compared to the previous habitat, there is greater diversity of non-mycorrhizal terricolous fungi here owing to the larger proportion of grass areas. Among others, some typical meadow species such as *Bovista plumbea, Hygrocybe conica, Marasmius oreades* etc. are found in this habitat.

Mammals: The most common species for this habitat are: Eastern hadghog (*Erinaceus concolor),* Marbled polecat (*Vormela peregusna*)*,* Guenther's vole (*Microtus guentheri*)*.* Also, presence of *Apodemus flavicolis, Apodemus agrarius, Rattus rattus, Mus macedonicus, Lepus europeus, Canis lupus, Vulpes vulpes, Mustela nivalis, Meles meles, Felis sylvestris, Sus scrofa, Capreolus capreolus* is expected as these species live in a diverse variety of habitats.

Birds: This habitat provides greater diversity of microhabitats, ecological niches and breeding sites. The number of breeders (25) is higher than in the well-preserved forests of Pubescent oak and Oriental hornbeam, but the number of residents is lower. The number of breeders is higher due to the presence of species such as: *Eastern Olivaceous Warbler Hippolais pallida,* some *Sylvia* species*, Lanius collurio, Lanius minor, Lanius senator, Spanish Sparrow Passer hispaniolensis* and some *Emberiza* species characteristic for the hill pastures. However, the total number of bird species is almost the same as in the previos habitat (~60).

Reptiles and amphibians: The species of amphibians and reptiles in this habitat are the same as for the forest of pubescens oak and Oriental hornbeam.

Butterflies: Degraded oak and hornbeam forest offer diverse plan life and shady spots. Butterfly diversity in this habitat is consisted of both: typical species found in dry, bushy vegetation like: *Thymelicus sylvestris, Phengaris arion, Melitaea phoebe*, *Arethusana arethusa,* as well as species common for a variety of diverse habitats: *Iphiclides podalirius, Papilio machaon, Aporia crataegi, Carcharodus alceae, Gonepteryx rhamni, Limenitis reducta, Nymphalis antiopa, N. polychloros, Brintesia circe, Erebia medusa, Argynnis niobe, Aglais io, Plebeius agestis, Vanessa cardui, V. atalanta, Melanargia larissa, Coenonympha pamphilus, Leptidea sinapis, Colias crocea, Satyrium acacia, Hamearris lucina* etc*.*

Ground beetles: The fauna of Ground beetles (Carabidae) is represented by species of hill pastures and pubescent oak forests. There are no specific species for the habitat of degraded Pubescent oak forests.

Longhorn beetles: The fauna of Longhorn beetles in this habitat is similar to the previous one. Open terrain with low vegetation allow species which only in larval stage develop in wood (amost all species of Lepturinae subfamily, such as *S. bifasciata, S. melanura, S. nigra, S. septempunctata, P. livida* and others) to stay in same area as imago since they can feed on nearby flowers.

Orthoptera: Due to the presence of open surfaces with sparse vegetation a significant number of orthopteroid species live here. Most common are *Tylopsis lilifolia, Ancistrura nigrovittata, Poecilimon thoracicus, Polysarcus denticauda, Tettigonia viridissima, Decticus albifrons, Platycleis affinis, Odontopodisma decipiens, Omocestus rufipes, Chorthippus bornhalmi, Euchorthippus declivus* etc.

Thermophilous Oak Forest – Mixed Italian Oak and Turkey Oak Forest

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.762 Helleno-Moesian [*Quercus frainetto*] forests**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

In the upper parts of the oak forest belt there are stands of Italian oak (*Quercus frainetto*). These stands represent small patches of the forest belt **Quercetum frainetto-cerris macedonicum** Oberd. 1948 em. H-at. 1959, which is normally above the lower pubescent oak and oriental hornbeam belt (*Figure 5-96*). The edifier species are Italian oak (*Quercus frainetto - Figure 5-97)* and Turkey oak (*Quercus cerris*). Beside these tree species, *Cornus mas, Carpinus orientalis, Crataegus monogyna, Rosa galica, Rosa arvensis* etc. represent the subdominant tree layer and shrub layer. *Danaa cornubiensis, Trifolium pignantii, Inula salicina, Lathyrus inermis, Stachys scardica, Crocus veluchensis* etc., are the most common plants in the herb layer. The elements from more xerothermic forest (Querco-Carpinetum orientalis) such as *Quercus pubescens, Carpinus orientalis, Pyrus amygdaliformis, Fraxinus ornus, Colutea arborescens, Coronilla emeroides* etc. are usually mixed with *Quercus frainetto* forest.

Regional distribution

Italian and Turkey oak community, which comprises the largest part of oak forests, is a climazonal community in all valleys in Macedonia, usually developing at an elevation of 800-1100 m. Very similar forests develop in all valleys of the central region of the Balkan Peninsula.

Distribution in the area of the railway corridor

The habitat is distributed intermittently on a number of locations along the Kriva river. The better-preserved associations are in the vicinity of the town of Kriva Palanka, namely, in the surroundings of Tlminci and Drenjevo villages. In addition, it occurs on minor surfaces along the right course of the Kriva river, on the Drenjevo-Uzem stretch (see Appendix IV - Habitat Map).

Figure 5-96 Forest of Italian oak and Turkey oak in the area of Kriva Palanka.

Figure 5-97 Italian oak (*Quercus frainetto)*

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: In the oak forests many macromycete species, both lignicolous and terricolous, are noted. The most common species are *Armillaria mellea, Boletus aestivalis, Cantharellus cibarius, Clitocybe gibba, Hydnum repandum, Lactarius zonarius, Stereum hirsutum, Trametes hirsuta* and *T. versicolor.* Certain species such as *Boletus aereus B. luridus, B. quelletii, Hygrophorus chrysodon, Lactarius piperatus, Russula cyanoxantha* and *Xerocomus chrysentheron* are known mycorrhizal fungi associated with oak. Some of the lignicolous species usually grow as saprobes on fallen branches, stems and stumps of oak and other deciduous trees such as *Polyporus arcularius, Daedalea quercina*, *Exidia truncata, Hapalopilus rutilans, Hymenochaete rubiginosa, Radulomyces molaris, Peniophora quercina* and *Vuilleminia comedens.*

Mammals: Mammal fauna is similar to the one of forests of pubescent oak and Oriental hornbeam.

Birds: Bird fauna is almost the same as in the forest of pubescens oak and Oriental hornbeam

Reptiles and amphibians: The species of amphibians and reptiles: In this habitat are the same as the forest of pubescens oak and Oriental hornbeam.

Butterflies, longhorn beetles and orthopterans: The fauna similar to the one of forest of pubescens oak and Oriental hornbeam

Ground beetles: This fauna is similar to the one of the pubescent oak forests. However, some mesophyle species were also recorded: *Molops rufipes denteletus* (stenoendemic subspecies) and *Tapinopterus balcanicus* (Balkan subendemic). *Carabus intricatus* and *Carabus montivagus* are common in this habitat, as well. In total, 16 species were recorded.

Degraded Thermophilous Oak Forest - Italian and Turkey Oak

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.762 Helleno-Moesian [*Quercus frainetto*] forests**
and:
Reference to EUNIS Habitats: **F5.16 Deciduous [*Quercus*] matorral**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

In the aspects of vegetation, fauna and fungi, this habitat is identical to the previous one. Degradation here is a result of excessive forest exploitation, which has given rise to occurrence of grassland species of plants, animals and fungi. For more detailed data on the species composition, refer to Appendices I, II and III.

Distribution in the area of the railway corridor

The habitat stretches on several localities along the right course of the Kriva river, on the Kriva Palanka-Drenjevo stretch (see *Annex 5 - Habitat Map*).

Mesophilous Oak Forests - Flowering Ash and Sessile Oak Forest

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.763 Helleno-Moesian [*Quercus dalechampii*] forests**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

In the upper parts of the oak forest belt, there are stands of ass. **Orno-Quercetum petraeae** Em 1968. It grows on a base of phylitoids, covered by medium-deep to deep forest brown soil (*Figure 5-98*). The tree belt is dominated by the following: *Quercus petraea, Quercus cerris, Fraxinus ornus, Carpinus betulus* and *Acer campestre*. *Corylus avellana, Cornus mas, Ligustrum vulgare, Crataegus monogyna, Evonimus verrucosa, Mallus silvestris* occur in the bush belt. The most frequent in the herb layer are as follows: *Festuca heterophylla, Lathyrus niger, Lathyrus venetus, Campanula persicifolia, Melica uniflora, Pulmonaria officinalis, Cyclamen neapolitanum, Scilla bifolia, Poa nemoralis, Sanicula europea*, *Stellaria media*, etc.

Regional distribution

The sessile oak community has a climazonal distribution in Macedonia and occupies a clearly defined belt between 800 and 1,250 m.

Distribution in the area of the railway corridor

In the area of the railway corridor, it does not have a regular distribution. As an intermittent belt, it stretches along the left course of the Kriva river between Kriva Palanka and Uzem village, as well as along the downstream of the Vitunica river, at the confluence with the Kriva river. The best preserved association with older trunks is found in the surroundings of Jancevci village (see *Appendix 5 - Habitat Map*).

Figure 5-98 Forest of flowering ash and sessile oak near the Bulgarian border

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Fungia: The fungal composition is very similar to the previous biotope. Due to the higher altitude, some thermophilic species are disappearing. In some places where there are well-developed birch stands, many associated species occur. Some of the species such as *Leccinum scabrum* and *Lactarius torminosus* are known as mycorrhizal partners of birch, while *Piptoporus betulinus* is a typical lignicolous species that usually grows as a parasite or saprobe on living or dead trees of birch.

Mammals: Mammal fauna is similar to the one of the forests of Pubescent Oak and Oriental Hornbeam.

Birds: Bird fauna is almost the same as in the Forests of Pubescent Oak and Oriental Hornbeam and forests of Italian and Turkey oak.

Reptiles and amphibians: This habitat has a similar composition to that of Forest of Pubescens Oak and Oriental Hornbeam regarding amphibians. Thre are two reptile species less because of the higher altitude (in total 7 reptile species). The reptiles found in this habitat are**:** Greek Tortoise (*Testudo graeca), Wall lizard (Podarcis muralis)*, Green lizard (*Lacerta viridis*), Slow Worm (*Anguis fragilis),* Aesculapian Snake (*Zamenis longissimus*), Smooth Snake (Coronella austriaca) and Nose-horned Viper (*Vipera ammodytes)*.

Butterflies and orthopterans: Butterfly fauna similar to the Habitat of Forests of Pubescent Oak and Oriental Hornbeam.

Ground beetles: Sessile oak forests hold more mesophyle species than the lower oak forests. Thus, the fauna of Sessile oak forests is a mixture of the faunas of submontane beech forests and Italian and Turkey oak forests. Although the lists of the species are very similar, the structure of the communites differs slightly. *Carabus montivagus, Carabus convexus dilatatus, Tapinopterus balcanus* and *Notiophilus substriatus* are the most abundant ground beetle species.

Longhorn beetles: Because of similar altitude, species that feed (or only develop) in different deciduous forests (oak, beech), like *Morimus funereus, Rutpela maculata, Cerambyx scopoli*, can be found here.

Degraded Mesophilous Oak Forests - Flowering **Ash and Sessile** Oak

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.763 Helleno-Moesian [*Quercus dalechampii*] forests**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

In the aspects of vegetation, fauna and fungi, this habitat is identical to the previous one. Due to intense anthropogenic impact, the forests are degraded in a number of locations, which has resulted in growth of grassland species of plants, animals and fungi. For more detailed data on the species composition refer to Appendices I, II and III.

Distribution in the area of the railway corridor

This forest type begins near Vitanovci village and goes all the way to the Bulgarian border (see Appendix IV - Habitat Map).

Forested Ravines and Dales

Reference to EUNIS Habitats: **none**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This habitat type differs from previous forest habitats and dry grasslands. It is more humid and with a larger quantity of biomass. Many herb species from hill pastures are present in this type of habitat, especially on the upper part of the dale slopes, but new species, characteristic for forests and meadows (*Poa, Anthoxantum, Cinosurus* species etc.) are also distributed here. The shrubs are denser than in the hill pastures with sparse shrubs habitat but shrub and tree species are the same as in shrubby grasslands on open terrain. The most abundant trees and shrubs are species from the oak forest belt *(Figure 5-99*). Some individual stems of planted Lombardian poplar (*Populus "italica"*) emerge as well.

Figure 5-99 Typical ravine in the oak forest belt near Rudare village

Distribution in the area of the railway corridor

This habitat type is not so common in the area of the railway corridor. It occurs on a number of localities along the tributaries on the right side of the Kriva River (streams and dry valleys) in the area of the villages of Beljakovce, Dimonce and Rudare, while there are larger areas on the left side of the Kriva river near Krilatica village (see Appendix IV - Habitat Map).

BEECH FOREST BELT

Beech Forests - Submontane

Reference to EUNIS Habitats: G1.69 Moesian [*Fagus*] forests - **G1.691 Southwestern Moesian beech forests**
Reference to EU HD Annex I: **91W0 Moesian beech forests**
Reference to CoE BC Res. No. 4 1996: **41.1 Beech forests**

General characteristics

The belt of beech forests is represented by the ash **Festuco heterophyllae-Fagetum** Em 1965 (*Figure 5-100*). It grows on a base of mica minerals and gneisses covered by forest brown neutral to sparsely acid soil. The tree belt is absolutely predominated by *Fagus silvatica*, and there are individual growths of *Quercus petraea, Sorbus torminalis, Ostrya carpinifolia* etc. From a diagnostic point of view, the most relevant in the bush belt is *Corylus avellana*, while in the ground floor those are *Festuca heterophyllae, Cyclamen neapolitanum, Danaa cornubiensis, Lathyrus venetus, Pteridium aquilinum, Stellaria holostea, Luzula silvatica* etc.

Regional distribution

The submontane beech forest prevails in the mountainous regions of Macedonia, and it occupies a clearly defined belt between 1,000 and 1,200 m altitude, but in its shadow expositions it lowers down to 700 m.

Distribution in the area of the railway corridor

The beech forests occupy the highest elevations of the corridor, and the northern and north-eastern expositions on the left side of the Kriva river. They develop only in the area between the villages of Uzem and Kostur (see Appendix IV - Habitat Map).

Figure 5-100 Submontane beech forest around Kostur village

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: There are approximately 80 fungi species recorded in the beech forest in this corridor. Part of the recorded species, such as *Bertia moriformis*, *Fomes fomentarius, Hypoxylon fragiforme, Marasmius alliaceus, Mycena renatii, Sterem rugosum, Psilocybe rhombispora* and *Xerula radicata* are rather characteristic species of beech. The most common species were as follows: *Amanita rubescens, Armillaria mellea, Diatrype disciformis, Diatrype stigma, Laccaria laccata, Lactarius piperatus, Lycoperdon perlatum, Mycena pura, Mycena rosea, Panellus stypticus, Russula cyanoxantha, Schizopora paradoxa, Stereum hirsutum, Trametes hirsuta, Trametes versicolor* and *Xerula radicata*. Certain species such as *Amanita citrina, A. rubescens, Hygrophorus chrysodon, Lactarius blenius, Lactarius piperatus* and *Russula cyanoxantha* are mycorrhizal fungi known to associate with beech. The rest of the species are saprobes. The species *Ganoderma applanatum, Polyporus squamosus, Trametes gibbosa* and *Fomes fomentarius* are established as parasites on beech trunks.

Mammals: Most common and typical inhabitants of this habitat are the Fat dormouse (*Glis glis*) and the beech marten (*Martes foina*). Other frequently registered forest species are: the wild cat (*Felis sylvestris*), badger (*Meles meles*), roe deer (*Capreolus capreolus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), wild boar (*Sus scrofa*), western polecat (*Mustela putorius*), yellow-necked mouse (*Apodemus flavicollis*), red squirrel (*Sciurus vulgaris*). Again, presence of the brown bear (*Ursus arctos*) is very sporadic. In the investigated area, probable corridors occupied by bears are the eastern-most parts of the railway, close to the Bulgarian border, between the Osogovo Mt. and Bilina Mt.

Birds: The fauna of birds is poorer compared to the previously described oak forests. There are 24 resident species and only 14 breeding species. All of the resident species can be found in the previosly described oak forests. The only difference in the breeding bird fauna is the presence of *Coal Tit Parus ater* and *Eurasian Bullfinch Pyrrhula pyrrhula*.

Reptiles and amphibians: The beech forest habitat is more favourable for amphibians than for reptiles as a result of higher humidity. In total, eight amphibian and five reptile species are found in this habitat. The amphibian species are: Fire Salamander (*Salamandra salamandra*), Common Newt (*Lissotriton vulgaris*), Yellow Belied Toad (*Bombina variegata),* Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*), Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*). The reptile species are: Wall Lizard (*Podarcis muralis*), Slow Worm (*Anguis fragilis), Grass Snake (Natrix natrix),* Aesculapian Snake (*Zamenis longissimus*) and Nose-horned Viper (*Vipera ammodytes)*.

Butterflies: As mentioned previously, butterflies rarely inhabit forested areas. The butterflies most often avoid beech forests, although they can be densely distributed in the clearings, openings or edges of beech forests.

Ground beetles: Submontane beech forests hold the highest diversity of ground beetles of all forest habitats. The number of endemic and subendemic species is the highest in the submontane beech forests (*Molops rufipes denteletus, Tapinopterus balcanicus, Pterostichus brucki, Platynus scrobiculatus serbicus*, *Aptinus merditanus* etc.). Almost exclusively, these are typical forest dwellers with occasional intruders from the neighboring grasslands. Dominant species are: *Abax carinatus carinatus, Abax ovalis, Amara convexior, Aptinus merditanus, Carabus convexus dilatatus, Carabus coriaceus cerisyi, Carabus hortensis, Carabus intricatus intricatus, Carabus montivagus montivagus, Harpalus rubripes, Harpalus rufipalpis rufipalpis, Molops rufipes denteletus, Myas chalybaeus, Notiophilus substriatus, Pterostichus brucki, Pterostichus oblongopunctatus oblongopunctatus* and *Tapinopterus balcanicus*. Most of these species are carnivores, feeding on soil animals, or they feed on dead leaves. *Carabus* species in these forests have larger individual areas (they can cover distance of up to 50 meters per day). The rest of the species have very small individual areas (movements of few meters per day).

Longhorn beetles: Compared with oak forests, the presence of Longhorn beetles in submontane beech forests is lower, although here can be found almost the same species that develops in different deciduous forests, often feeding on flowers or flying through the meadows. Most common are *Alosterna tabacicolor, Rutpela maculata, Cerambyx scopolii, Xylotrechus rusticus, Morimus funereus.*

Orthoptera: The number of orthopteran species in the submontane beech belt is low, but worth mentioning are mesophilous species like Balkan endemites *Isophya speciosa* and *Pholidoptera rhodopensis*.

RIPARIAN FORESTS, WOODLANDS AND SHRUBLANDS

These forests and shrublands develop along the river banks and streams everywhere in the area under consideration. Well-preserved forests of this type are very rare nowadays. People were clearing these stands for providing fertile alluvial soil for agriculture. In this area, the forest communities belong to Salicion albae Soó (30) 1940 alliance and shrublands to Tamaricion parviflorae Karp. 1961 alliance.

Riparian Willow-Poplar Woodland

Reference to EUNIS Habitats: G1.11 Riverine [Salix] woodland - **G1.112 Mediterranean tall [*Salix*] galleries** (G1.1121 Mediterranean white willow galleries)
Reference to EU HD Annex I: **92A0 *Salix alba* and *Populus alba* galleries**
Reference to CoE BC Res. No. 4 1996: **44.1 Riparian willow formations**
Reference to EUNIS Habitats: G1.31 Mediterranean riparian [*Populus*] forests - **G1.315 East Mediterranean poplar galleries**
Reference to EU HD Annex I: **92A0 *Salix alba* and *Populus alba* galleries**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The willow-poplar woodlands in the studied area develop on alluvial sandy soils on the riverbank terraces. The ground is flooded regularly during the wet period. The biotope is characterised by permanent humidity, light structure and texture of the soil. In the wider areas along the rivers, open terrain and small meadows are often present.

This woodland type belongs to the **Salicetum albae-fragilis** Issler 1926 association (*Figure 5-101*). The most typical tree species are *Salix alba*, or mixed *Salix alba* and *Salix fragilis*. *Populus nigra*, *Salix triandra*, *Sambucus nigra*, *Viburnum opulus*, *Cornus sanguinea*, *Rhamnus frangula*, *Amorpha fruticosa* etc. occur in small groups or individually. In some stands, poplar trees (*Populus nigra*, *Populus tremula* and *Populus alba*) prevail and the stand resembles typical poplar community. In the herb layer the most characteristic species are: *Poa trivialis*, *Poa palustris*, *Carex vulpina*, *Polygonum lapatifolium*, *Polygonum hidropiper*, *Rumex sanguineum*, *Veronica anagalis-aquatica*, *Scirpus lacustris* etc.

Riparian forests in which aspen or black poplar (*Populus tremula, Populus nigra*) dominate are very rare in the railway corridor, and they occur as small patches. They occupy the riparian belt, from the willow belt outwards, on the drier soil (*Figure 5-102*). However, the habitat has been transformed into arable land in the past. Poplar communities have not been mapped separately.

Regional distribution

This biotope is common for almost all lowland rivers in Macedonia.

Distribution in the area of the railway corridor

Well-preserved riparian willow-poplar woodland is present along the Kumanovska river near Dobrosane village and along the Pcinja river near the villages of Suplji Kamen and Klecovce. The same association intermittently occurs on a number of localities along the Kriva river, particularly close to the villages of Beljakovce, Kuklica, Vetunica (at the confluence of Vetunica river into the Kriva river), and in the surroundings of the villages of Psaca, Stambolica, Drenje, Uzem and other localities along the Kriva river. The best-preserved habitats are found at the confluence of the Pcinja and the Kriva rivers near Klecovce village (see Appendix IV - Habitat Map).

Figure 5-101 Willow woodland along the Pcinja river

Figure 5-102 Typical poplar community near Klecovce village (outside and inside)

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Fungia: A considerable number of species (48) were collected in this association. The majority of the known species are lignicolous, and they were collected as parasites and saprobes on *Salix alba, Populus tremula* and *Alnus glutinosa.* Part of the recorded species, such as *Laetiporus sulphureus, Phellinus igniarius* and *Panus tigrinus* are species characteristic of *Salix*. It is particularly important to underscore the parasitic species in this association such as the following species: *Phellinus igniarius, Ph. tremulae, Ganoderma applanatum, Polyporus squamosus, Pleurotus cornucopiae* and *Laetiporus sulphureus*. The species *Phellinus igniarius* and *Laetiporus sulphureus* are established only as parasites on *Salix alba,* while *Phellinus tremulae* is a dangerous parasite on aspen.

Mammals: Common species for this habitat are the lesser white-toaded screw (*Crocidura suaveolans*) and wood mouse (*Apodemus sylvaticus*). Red fox (*Vulpes vulpes*), wild boar (Sus scrofa), red squirrel (*Sciurus vulgaris*), common mole (*Talpa europea*) and wheasel (*Mustela nivalis*) are also common for this habitat. Presence of the otter (*Lutra lutra*) is likely in this habitat of the investigated area, even though not confirmed for certain.

Birds: The fauna of resident species is not much different compared to the other forest types in the railway corridor area, except for *Common Kestrel Falco tinnunculusCommon Kestrel Common Kestrel Falco tinnunculus* and *Cetti's warbler Cettia cetti*. The main difference can be observed in the fauna of breeding birds (19 species). Specific for this habitat are: *European Roller Corracias garrulus, Sedge Warbler Acrocephalus schoenobaenus*, *Marsh Warbler Acrocephalus palustris*, *Eastern Olivaceous Warbler Hippolais pallida* and *Eurasian Penduline Tit Remiz pendulinus*.

Reptiles and amphibians: This habitat is preferred both, by amphibians and reptiles. In total 8 amphibians and 10 reptile species are present. The amphibians found here are Fire Salamander (*Salamandra salamandra*), Common Newt (*Lissotriton vulgaris*), Yellow Belied Toad (*Bombina variegata),* Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*), Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*). The reptiles found here are: Hermanns Tortoise (*Eurotestudo hermanni*), Greek Tortoise (*Testudo graeca),* Erhard's Wall Lizard (*Lacerta erhardii*), Green lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Slow Worm (*Anguis fragilis),* Aesculapian Snake (*Zamenis longissimus*), Grass Snake (*Natrix natrix*), Dice Snake (*Natrix tessellata*) and Nose-horned Viper (*Vipera ammodytes)*.

Butterflies: Riparian habitats form good biotopes for the survival of the butterflies. Sparse willow woodlands along the rivers are home of dozens of species such as: *Thymelicus lineola, Brintesia circe, Apatura ilia, Polygonia c-album, Maniola jurtina, Celastrina argiolus, Pieris mannii, Pararge aegeria,* *Leptidea sinapis, Limenitis reducta, Erebia ligea, Vanessa cardui, V. atalanta, Aglais urticae, Aglais io, Apanthopus hyperantus, Anthocharis cardamines, Lycaena tityrus, Colias crocea, C. alfacariensis, Pontia edusa, Gonepteryx rhamni, Argynnis adippe, A. paphia, Melanargia larissa, Pyronia tithonus, Nymphalis antiopa, N. polychloros, Polyommatus icarus, P. belargus, Satyrium spini.*

Ground beetles: The fauna of ground beetles of willow woodlands is considerably rich. There were more than 30 species recorded. All of these species are hygrophiles and only few are eurytope species. Dominant species are *Carabus granulatus*, *Chlaenius nitidulus, Stenolophus mixtus, Agonum sexpunctatum, Bembidion* species, etc.

Dragonflies: Dragonfly fauna of the willow woodlands is one of the most important conservation aspects. There are about 15 dragonfly species. The most characteristics are *Calopteryx virgo, Calopteryx splendens, Libelulla depressa, Sympetrum sanguineum*.

Orthoptera: Orthopteroid fauna is very similar to sandy and gravel river banks, but the abundance of species in willow woodlands is much lower.

Riparian Willow-Poplar Belt

Reference to EUNIS Habitats: G1.11 Riverine [Salix] woodland - **G1.112 Mediterranean tall [*Salix*] galleries** (G1.1121 Mediterranean white willow galleries)
Reference to EU HD Annex I: **92A0 *Salix alba* and *Populus alba* galleries**
Reference to CoE BC Res. No. 4 1996: **44.1 Riparian willow formations**

General characteristics

Different from the previous habitat type, the current one represents a very narrow belt along the streams and rivers with willow domination and rare occurrence of poplars. The flora, fauna and fungi species in this habitat are identical with the previous one. For more detailed data on the species composition, please refer to Appendices I, II and III.

Distribution in the area of the railway corridor

Well-developed riparian willow-poplar belts are present at certain localities by the Pcinja and Kriva rivers. These belts are most distinctive in the surroundings of the villages of Beljakovce, Stracin, Krklja, etc. (see Appendix IV - Habitat Map).

Riparian Shrub Communities - Shrublands of Tamarisk and *Salix amplexicaulis*

Reference to EUNIS Habitats: F9.12 Lowland and collinar riverine [Salix] scrub - **F9.123 Balkan riverine willow scrub**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **44.1 Riparian willow formations**
and
Reference to EUNIS Habitats: F9.31 [Nerium oleander], [Vitex agnus-castus] and [Tamarix] galleries - **F9.3133 East Mediterranean tamarisk thickets**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **44.8 Southern riparian galleries and thickets**

General characteristics

This biotope mostly represents the heliophilous shrubland dominated by *Tamarix* spp. and *Salix amplexicaulis*. These shrub species form the specific plant community named **Tamarici-Salicetum amplexicaulis** (Kárpáti 1962) Em 1967 (*Figure 5-103*). It develops on sandy and gravely river drifts in the range of the willow community. The ground comprises sandy or gravely soil or soil in the process of formation. These areas are flooded from time to time and the wetland shrubland or forest vegetation cannot be established. In the herb layer, *Lycopus europaeus*, *Equisetum arvense*, *Juncus articulatus*, *Mentha longifolia*, *Agrostis alba* etc. are common. Numerous annual species from the neighbouring grassland areas can often be seen.

Regional distribution

Riparian shrub communities in Macedonia are regularly distributed in the lower and middle Vardar river valley together with the valleys of the main tributaries: Crna river, Bregalnica, Pcinja etc.

Distribution in the area of the railway corridor

This biotope develops on the rivers Pcinja and Kriva banks or smaller permanent river islands. The best-preserved tamarisk shrublands are distributed on the large drifts of the frequently flooded Pcinja river in the vicinity of the villages of Kleckovce and Supli Kamen. In the Kriva river valley, riparian shrub communities develop in the vicinity of the villages of Dovezence, Beljakovce, Vetunica and Kostur (see *Appendix 5 - Habitat Map*).

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Fungia: Fungi are represented by very specific species growing on *Tamarix* spp. such as the saproparasitic species *Inonotus tamaricis*, then *Peniophora tamaricicola* etc

Fauna: Animal composition of the shrublands of *Tamarix* and *Salix amplexicaulis* is mixture of the different types of fauna of the neighboring communities and it is very similar with the fauna of the willow woodlands, but much poorer. It is due to the small surface that the community is distributed on very small areas. This is especially true for the birds, amphibians, reptiles and mammals.

Figure 5-103 Tamarisk shrubland near Klecovce village

Butterflies: Ones of the most suitable habitats for butterfly diversity are the river banks. Representatives from the Lycaenidae family are most common for this habitat. Typical inhabitants found along Kriva river are the Large Cooper, *Lycaena dispar*, the Lesser Purple emperor, *Apatura ilia* and the Common Gleider, *Neptis sappho*. An array of other butterfly species are also found here: *Lycaena alciphron, L. virgaureae, Pyrgus malvae, P. sidae, Glaucopsyche alexis, Maniola jurtina, Papilio machaon, Iphiclides podalirius, Aglais io, Coenonympha pamphilus, Zerynthia cerisy, Pyronia tithonus, Erebia medusa, E. ligea, Limenitis reducta, Phengaris aion, Plebeius argus, Polyommatus amanda, Cupido osiris, Ochlodes sylvanus, Erebia euryale,* *Vanessa atalanta*, *Boloria euphrosyne* etc. Pierids like *Aporia crategi, Pieris mannii, Colias crocea, C. alfacariensis* and *Pontia edusa* are too common in this habitat.

Ground beetles: The ground beetles fauna of tamarisk communities is similar, but poorer in species than willow woodlands.

Dragonflies: Dragonfly fauna is consisted of 16 species, the same ones that occur in the willow woodlands. The most characteristic are *Sympetrum sanguineum, Libelulla depressa* and *Onychogomphus forcipatus*.

Orthoptera: Orthopteroid fauna is very similar to sandy and gravel river Banks.

OPEN TERRAIN - GRASSLANDS OF NATURAL ORIGIN

Almost all grasslands in the studied area are represented by the category hill pastures, which is characteristic of the hilly areas in all valleys and plateaus in Macedonia. As a secondary formation, hill pastures are surrounded by sparse vegetation of different degradation stages. Hill pastures with sparse vegetation are another habitat, and in the region of the railway line it is of very similar vegetation composition to that of typical hill pastures.

Hill Pastures

Reference to EUNIS Habitats: **E1.33 East Mediterranean xeric grassland** (E1.332 Heleno-Balkanic shrot grass and therophyte communities)
Reference to EU HD Annex I: **6220 Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea**
Reference to CoE BC Res. No. 4 1996: **34.5 Mediterranean xeric grasslands**

General characteristics

Hill pastures in Macedonia are secondary formations. They develop in the areas situated in the sub-Mediterranean and warm continental oak forest belt. The climax communities in the observed region are associations of pubescent oak and Oriental hornbeam. Nonetheless, the primary forest vegetation is heavily degraded or has totally disappeared because of excessive exploitation or systematic cutting to provide pastures and arable land during the last two millennia. There are no published data concerning the hill pastures in the area along the railway line but, according to our observation, the dominant community in the entire area is **Helianthemo-Euphobietum thessalae** Micev. 1973. This Central Balkan endemic association belongs to Trifolion cherleri Micev. 1970 alliance and Astragalo-Potentilletalia Micev. 1970 order. The community develops in the areas distinguished by a influence of the Mediterranean climate, that is, humid and not very cold winters, and 1-3 months of summer drought. The Mediterranean influence is evident through the presence of Mediterranean plant species (*Figure 5-104*).

In the area of the railway corridor at Kratovo region (villages Kuklica and Ketenovo) another plant community can be found. It is **Erusimo-Trifolietum** Micev. 1973 association, which is similar to the previous plant community according to its general appearance. The floristic character of these sites is represented by a domination of grasses: *Andropogon ischaemum* L., *Bromus squarrosus* L., *Stipa aristella* L., *Chrysopogon grillus* Trin.; thorny plants: *Eryngium campestre* L., *Echinops sphaerocephalus* L., *Echinops ritro* L, *Xerathemum annuum* L., *Carlina graeca* Heldr. et Sart., *Cirsium spp.* and others: *Plumbago europaea* L., *Marrubium peregrinum* L. etc. Besides this, a long list of plant species that are not strictly related to the community develops in this habitat. The remaining species from former forest vegetation are present as well.

There was no systematic research in this particular area concerning the distribution of plants, fungi and animals. Thus, the only data provided in this report are derived from our observations during the biotope types mapping.

Regional distribution

The hill pastures biotope is distributed in the central-east and northeast parts of Macedonia and in the southern part of Serbia.

Distribution in the area of the railway corridor

It spreads across the whole studied area but it is discontinuous, often mixed with other cultural or natural grassland biotopes. Close to the settlements, the species composition changes slightly because of the invasion of ruderal plants, as well as weed plants from the neighbouring fields. The best-developed communities occur in the areas of villages such as Beljakovce, Dimonce, Rudare, Krilatica, Petralica, Drenjevo, etc (see Appendix IV - Habitat Map).

Figure 5-104 Typical hill pastures in the area of Rudare village

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: As far as fungi are concerned, the grassland species dominate in the area, in particular non-mycorrhizal saprotrophic species such as *Pleurotus eringii, Bolbitius vitellinus, Bovista plumbea, Calvatia utriformis, Entoloma sericeum, Hygrocybe conica, Omphalina pyxidata, Stropharia coronilla, Vascellum pratense.* Some edible species such as *Calocybe gambosa, Marasmius oreades* and *Macrolepiota procera* are common in this habitat.

Mammals: Commonly found species in this habitat are: common mole (*Talpa europea*), sibling vole (*Microtus rossiaemeridionalis*), guenther's vole (*Microtus guentheri*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*A. agrarius*), brown hare (*Lepus europeus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), marbeled polecat (*Vormela peregusna*), badger (*Meles meles*) and roe deer (*Capreolus capreolus*).

Birds: There are about 30 bird species in this habitat. The number of resident species is very low (*Grey Partridge Perdix perdix* and *Crested Lark Galerida cristata*). There are 10 breeding species such as *Montagu's Harrier Circus pygargus, Common Quail Coturnix coturnix, Eurasian Thick-knee Burhinus oedicnemus, Calandra Lark Melanocorypha calandra, Greater Short-toed Lark Calandrella brachydactyla, Eurasian Skylark Alauda arvensis, Tawny Pipit Anthus campestris, Common Stonechat Saxicola torquata*, etc. However, this habitat is very important for foraging of 15 birds from surrounding habitats.

Reptiles and amphibians: Hill Pastures are more suitable for reptiles than amphibians due to the lack of humidity and water. Only two species of amphibans are present in this habitat, Common Toad (*Bufo bufo*) and Green Toad (*Pseudepidalea viridis*). This habitat is favourable for the reptiles and it is the richest of all habitats along the rail-line. In total 11 species of this class can be found here and the representatives are: Hermanns Tortoise (*Eurotestudo hermanni*), Erhard's Wall Lizard (*Lacerta erhardii*), wall lizard (*Podarcis muralis),* Balkan Wall Lizard *(Podarcis taurica*), Green lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Dahl's Whip Snake (*Platyceps najadum*), Whip Snake (*Dolichophis caspius*), Dahl's Whip Snake (*Platyceps najadum*), Four Line Rat Snake (*Elaphe quatuorlineata*) and Nose-horned Viper (*Vipera ammodytes)*.

Butterflies: Hill pastures are excellent habitat for butterfly diversity. In the investigated area, following species can be found populating this habitat: *Hesperia comma, Euchloe ausonia, Pontia edusa, Pieris mannii, P. napi, P. rapae, Aglais urticae, Pseudophilotes vicrama, Papilio machaon, Iphiclides podalirius, Zerynthia cerisy, Colias crocea, Gonepteryx rhamni, Lasiommata megera, Arethusana arethusa, Pyrgus malvae, P. serratulae, Polyommatus icarus, Lycaena phleas, L. tityrus, L. vigaureae, L. thersamon, Plebeius sephirus, Aporia crategi, Callophrys rubi, Argynnis niobe, Melitaea athalia, M. phoebe, Boloria euphrosyne, Cyaniris semiargus, Limenitis reducta, Melanargia larissa, Coenonympha pamphilus, Plebeius agestis, Vanessa cardui, Euphydryas aurinia, Hesperia comma etc.*

Ground beetles: The ground beetles fauna of hill pastures is very specific and rich in species. It differs considerably from the one of the forested habitats. The majority of the species are carnivores or omnivores, but some species are dominantly herbivores (e.g. *Dixus obscurus, Acinopus picipes*). All of these species are praticolous and characteristic for open-type of habitats and they only rarely enter the dense forests. All of the species have wide distribution in Europe or Mediterranean area.

Dragonflies: There are several species of dragonflies that occur in the hill pastures. The most common species is *Onychogomphus forcipatus*.

Longhorn beetles: Although larvae of longhorn beetles develop in wood, most of the adults feed on flowers in open terrains with low vegetation. Because of that, species that are characteristic for degraded oak and hornbeam forest can be seen often in this habitat: *Purpuricenus budensis*, *Pachytodes erraticus, all four Stenurella species, Pseudovadonia livida* etc. However, due to the presence of other vegetation (like mullein, thistles, spurge and other herbaceous plants), this habitat is characteristic of many other (mainly monofagous) species such *Agapanthia cynarae,* A. kirbyi, A. *maculicornis,* A. *violacea,* A. *vilosoviridiscens, Phytoecia virgula, Oberea erythrocephala, Vadonia moesiaca* etc. Couple of representatives of genus *Dorcadion* also occur here (*D. aethiops* and Balkan endemic species *D. lineatocolle*).

Orthoptera: This habitat is second richest in Orthoptera diversity, although at first glance it is very similar to the degraded oak and hornbeam forest, and generally includes the same species. Common species can be found here like *Tylopsis lilifolia, Ancistrura nigrovittata, Polysarcus denticauda, Tettigonia viridissima, Decticus albifrons, Decticus verrucivorus, Platycleis affinis, Bucephaloptera bucephala, Oecanthus pellucens, Gryllus campestris, Dociostaurus brevicollis, Omocestus rufipes, Chorthippus bornhalmi, Acrida ungarica,* but also Balkan endemic species *Saga hellenica,* East mediteranean species like *Asiotmethis limbatus* and *Gampsocleis abbreviata* and *Paracaloptenus caloptenoides*, which is on Bern Convention.

Hill Pastures with Sparse Shrubs

Reference to EUNIS Habitats: **E1.33 East Mediterranean xeric grassland** (E1.332 Heleno-Balkanic shrot grass and therophyte communities)
Reference to EU HD Annex I: **6220 Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea**
Reference to CoE BC Res. No. 4 1996: **34.5 Mediterranean xeric grasslands**

General characteristics

This grassland type is represented by areas covered by herb vegetation surrounded by oak forest of different degradation stages. Shrubs are represented with species from the extremely degraded forest trees (*Quercus frainetto, Quercus pubescens, Quercus cerris*, *Fraxinus ornus*), small trees from the subordinate layers of forests (*Carpinus orientalis, Cornus mas, Crataegus monogyna, Pyrus pyraster, Pyrus amygdaliformis, Ulmus sp.)* or true shrub species (*Prunus spinosa, Paliurus spina shristi, Rosa* spp., *Colutea arborescens, Coronilla emeroides, Evonymus europaeus*) etc. The species composition of herb plants is more or less the same with typical hill pastures. Shrubby grasslands are mostly developed from pastures that have not been grazed recently given that cattle-breeding is not very popular in Macedonia lately or they represent the last remainder of the previous forest vegetation (*Figure 5-105*).

Distribution in the area of the railway corridor

Hill pastures with sparse shrubs cover almost the whole area of the corridor, but they are discontinuous, often mixed with other cultural or natural grassland biotopes. Such habitat occupies large areas in the vicinity of the villages of Beljakovce, Dimonce, Rudare, Krilatica, Petralica, Tlminci, Krklja, Uzem and others (see Appendix IV - Habitat Map).

Figure 5-105 Hill pastures with sparse shrubs near Rudare village

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: Fungal composition in this habitat is characterized by domination of grassland species such as *Agaricus campestris, Astraeus hygrometricus, Bovista plumbea, Calvatia excipuliformis, Hygrocybe conica, Marasmius oreades* etc. Occasionally certain mycorrhizal species from the genera *Amanita*, *Cortinarius, Lactarius, Russula* are also found.

Fauna: The distribution of grasslands with shrubs along the railway line is irregular and they are mixed with hill pastures. This kind of biotope gives more possibilities for breeding and feeding to animals, and consequently is richer concerning animal biodiversity. Insect fauna is more or less similar compared to the one of hill pastures.

Mammals: Mammal fauna is similar to the one of the previous habitat. The Balkan short-tailed mouse (*Mus macedonicus*) is characteristic for terrains with sparse bushy vegetation.

Birds: Sparse shrubs in the hill pastures offer more nesting and roosting sites for birds. There are five resident species which from the most important is the Imperial Eagle (*Aquila heliaca*). The number of breeders is low, as well (5 species). The greatest number of species (17) is for foragers as in the case of hill pastures.

Reptiles and amphibians: The composition of species of amphibians and reptiles is the same as the list noted in the Degraded Forest of Pubescent Oak and Oriental Hornbeam.

Butterflies and longhorn beetles: These fauna species are similar to the previous habitat.

Ground beetles: Most of the species are the one of the hill pastures without shrubs. However, some of the forest dwellers can be met in this type of habitat. Thus, the diversity is relatively high.

Orthoptera: Orthopteran fauna is similar to the previous habitat, but richer in species that occur mainly on *Rubus,* like *Odontopodisma decipiens, Eupholidoptera chabrieri* and *Poecilimon thoracicus.*

Hill pastures on stony ground

Reference to EUNIS Habitats: **E1.A Open Mediterranean dry acid and neutral grassland** (**E1.A22 Helleno-Balkanic supra-Mediterranean siliceous grasslands**)
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This habitat type occupies stony or sandy open ground with vernal therophytes, forbs and grasses. The plant community that represents the habitat is open perennial grassland and pasture colonizing siliceous, usually poorly developed skeletal soils of the supra-Mediterranean levels. Species composition of the biocenosis is very similar to that of the neighboring hill pasture community. However, numerous species characteristic for the rocky areas can be found as well (*Figure 5-106*).

Regional distribution

The hill pastures on rocky sites biotope are distributed in the central-eastern and southeast parts of Macedonia.

Distribution in the area of the railway corridor

In the initial part of the corridor, right after Kumanovo, in the vicinity of the Kumanovska river, it occupies a larger area (between Kumanovska Banja and Golem Rid). In the valley of the Kriva river, there are well-developed areas near the villages of Beljakovce, Dimonce, Rudare and Vetunica, and very small areas in the surroundings of Uzem village (see Appendix IV - Habitat Map).

Figure 5-106 Hill pastures on stony ground near Rudare village

Flora, fungia and fauna

Flora and fungia: This vegetation type is characterized by typical lithophytic **mosses** such as *Tortula muralis* and *Grimmia pulvinata* and a great variety of petricolous species of **lichenoid fungi** such as *Rhizocarpon geographicum, Rinodina lecanorina* and *Xanthoparmelia stenophylla.* For more details concerning flora and fungia.

Fauna: The extended list of animal species is provided in Anexes.

Mammals: Typical species for this habitat are: rock mouse (*Apodemus mystacinus*) and beech marten (*Martes foina*). The red fox (*Vulpes vulpes*) is often choosing littering sites in the rocky areas close to rivers.

Birds: This habitat differs from the hill pastures with/without shrubs. The number of breeding species is significantly higher (15) and it is more similar to the habitats of degraded Pubescent oak forests. Characteristic for the hill pastures on the rocky sites is the presence of *Northern Wheatear Oenanthe oenanthe* and *Black-eared Wheatear Oenanthe hispanica*.

Reptiles and amphibians: These habitats are not suitable for the amphibians in general. Only the Common Toad (*Bufo bufo*) and Green Toad (*Pseudepidalea viridis*) live here, usually under the stones. Due to the lack of vegetation which reptiles are using as a shelter from predators and the heat, only three species of reptiles are recorded in this habitat and they are: Hermanns Tortoise (*Eurotestudo hermanni*), Erhard's Wall Lizard (*Lacerta erhardii*) and Nose Horned Viper (*Vipera ammodytes*).

Butterflies: Cliff and rock vegetation offer unique plant diversity, thus hosting some specific and non-specific butterfly species for this habitat. *Scolitantides orion, Lasiommata maera, L. megera, Hesperia comma and Carcharodus flocciferus* are a typical species found in this habitat. Also, *Argynnis niobe, Zerynthia polyxena, Iphiclides podalirius, Papilio machaon, Parnassius mnemosyne, Colias alfacariensis, C. crocea, Pyrgus sidae, Hyponephele lycaon, Lasiommata petropolitana, Vanessa atalanta, Lycaena thersamon* and many other species can be registered in this habitat.

Ground beetles: Hill pastures on rocky sites are extreme habitats for the majority of ground beetles. The number of species is low and the diversity is low. Dominant species are Cymindis *axillaris, Harpalus triseriatus, Microlestes fissuralis, Carabus graecus morio* etc.

Longhorn beetles and orthopterans: Both faunas are similar to the ones of the previous habitat, but significantly poorer due to the lack of vegetation.

Unmanaged Mesic Grasslands

Reference to EUNIS Habitats: **E2.7 Unmanaged mesic grassland**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This habitat type comprises grassland that is not currently mown or used for pasture. They occur in patchy areas in mesophilous oak forest and beech forest in the higher elevations of the corridor. It is characterised by 100 % plant cover and larger amount of biomass due to more humid climate. Plant species characteristic for mesophilic grasslands and mesophile meadows are abundant, but plant species from the neighboring forest vegetation are present as well.

Distribution in the area of the railway corridor

Such grassland from mesophilous oak forests are common on the stretch Uzem village – Bulgarian border, while in beech forests they are common in the surroundings of Kostur village (see *Annex 5 - Habitat Map*).

Flora, fungia and fauna

Flora and **fauna** elements from neighbouring oak and beech forest are regularly present. **Fungal** composition in the unmanaged mesic grasslands is identical with the hill pastures habitat type, the difference here being the greater presence of mycorrhizal species owing to the vicinity of the well-developed forest associations.

Butterfly fauna of these grasslands is considerably rich in species. Frequently found species in these habitats are: *Boloria euphrosyne*, *Thymelicus sylvestris, Ochlodes sylvanus, Cyaniris semiargus, Pararge aegeria, Argynnis paphia, A. aglaja, A. adippe, Melanargia galathea, M. larissa, Pieris napi, P. mannii, Chazara briseis, Erebia euryale, E. medusa, E. ligea, Parnassius mnemosyne, Phengaris arion, Euphydryas aurinia, Neptis sappho, Nymphalis polychloros, Vanessa atalanta, Pyrgus alveus, Apanthopus hyperantus, P. serratulae, Satyrium accaiae, Pyronia tithonus, Carcharodus flocciferus, Coenonympha leander, C. arcania, Spialia orbifer, Hamearris lucina etc.*

Ground beetles in this habitat differ considerably from the surrounding beech forests. The dominant species are the praticole species as *Calathus distinguendus, Calathus fuscipes, Calathus melanocephalus, Amara convexior*.

Wet Meadows

Reference to EUNIS Habitats: **E3.31 Helleno-Moesian riverine and humid [*Trifolium*] meadows**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Wet meadows in the studied corridor have a specific structure of plant and animal species, or species from the neighboring grassland and forest habitats may prevail in the floristic and fauna structure. According to Micevski 1964, these meadows belong to the so-called lowland meadows, and syntaxonomically they belong to the alliance **Trifolion resupinati** Mic**.** (1964). Their distinctive feature is that a range of different species of clover (*Trifolium* spp.) are dominant in the floristic structure, different from continental European meadows, where different grass species prevail (Poaceae). The most common sedges are *Carex hirta* and *Carex distans* (*Figure 5-113*). Other characteristic plant species are: *Trifolium resupinatum*, *Myosotis caespitosa* ssp. *laxa*, *Orchis laxiflora*, *Ranunculus repens*, *Carex vulpina*, *Lysimachia vulgaris*, *Convolvulus arvensis*, *Tragopogon pratensis*, *Achillea millefolium* and many others.

Distribution in the area of the railway corridor

The greatest areas of wet meadows are located along the Pcinja river near the villages of Suplji Kamen and Klecovce, while in the Kriva river valley there are smaller areas, specifically, near the villages of Beljakovce, Trnovec, Vetunica and Psaca (see Annex 5 - Habitat Map).

Figure 5-107 Typical wet meadow with domination of *Carex* species

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Flora: Plant species characteristic of this habitat are a number of clover species (*Trifolium resupinatum*, *T. balanae*, *T. nigrescens*, *T. filiforme*, *T. patens*, *T. repens*, *T. pratense)*, then grasses (*Cynosurus cristatus*, *Anthoxanthum odoratum*, *Agrostis alba*, *Alopecurus utriculatus*, *A. pratensis*, *Bromus racemosus*), sedges (*Carex hirta*, *C. vulpina*, *C. distans*, *C. divisa*), as well as *Lychnis flos-cuculi*, *Ranunculus acris*, *R. velutinus*, *Cirsium canum*, *Inula britanica* and many other meadow species.

Fungia: The grassland species dominate in the area, in particular non-mycorrhizal saprotrophic species such as *Agaricus* spp.*, Bovista plumbea, Entoloma sepium, Hygrocybe conica, Marasmius oreades Pleurotus eringii, Bolbitius vitellinus, Entoloma sericeum, Stropharia coronilla, Vascellum pratense,* etc*.* Some edible species such as *Marasmius oreades, Agaricus campestris, A. arvensis, Macrolepiota procera* and *M. mastoidea* are common in this habitat. Occasionally certain mycorrhizal species from the genera *Russula, Lactarius, Tricholoma, Cortinarius* are also found*.*

Mammals: Most common and typical inhabitants of this habitat are the Yellow-necked mouse (*Apodemus flavicollis*), Fat dormouse (*Glis glis*) and the beech marten (*Martes foina*). This habitat is very important for the typical forest mammals since it provides additional food sources.

Birds: The fauna of birds is richer in species compared to the surrounding forest habitat. In total, there are about 55 species that are connected to meadows. Many of them forage in meadows, perch or nest on the solitary trees in the meadows (woodpeckers, shrikes, etc.)

Reptiles and amphibians: Meadows are very favourable habitat for both amphibians and reptiles. In total, eight amphibian and eight reptile species are found in this habitat.

Butterflies: Butterflies rarely inhabit forested areas. Thus, meadows are the spots of high butterfly diversity in the forested matrix of the mountains and foothill areas. The most characteristic butterfly species are *Parnassius mnemosyne, Thymelicus sylvestris, Issoria lathonia, Pieris brassicae, Maniola jurtina*, several *Erebia* species etc.

Ground beetles: Typical ground beetles for meadows are many *Calathus*, *Amara* and *Harpalus* species. Many of these species use only meadows and rarely enter the forest habitats. However, many of the forest dwellers use meadow in search for food, especially during the night. In a result, species of *Molops, Tapinopterus, Myas, Carabus* can be found in meadows, although their primary habitat are forests.

Longhorn beetles: Longhorn beetles can often be found feeding on flowers or flying through the meadows. These are species that develop as larvae in the wood inside the forests. Most common are *Alosterna tabacicolor, Rutpela maculata, Cerambyx scopolii, Xylotrechus rusticus, Morimus funereus.*

Orthoptera: The number of orthopteran species in meadows is interesting. Worth mentioning are mesophile species like Balkan endemites *Isophya speciosa* and *Pholidoptera rhodopensis*.

Meadows

Reference to EUNIS Habitats: **E2.238 Southwestern Moesian submontane hay meadows**
Reference to EU HD Annex I: **6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This habitat type differs from previous one. It is more dry and with a smaller quantity of biomass. Most of the meadows in the studied corridor are regularly managed and more or less intensively managed, whereas a minor part of them are extensively managed or have been abandoned a number of years before. Dependent on the intensity of mowing, meadows can have a specific structure of plant and animal species, or species from the neighboring grassland and forest habitats may prevail in the floristic and fauna structure.

The plant community characteristic for this habitat type belongs to the same alliance as in the case with the wet meadow's community – **Trifolion resupinati** Micev. 1964. However in the floristic composition of this mesophilic habitat sedges are not represented with high abundance and cover like in the wet meadows (*Figure 5-108*). Cloveer species (*Trifolim resupinatum*, *T. balansae*, *T. filiforme* and others) have higher abundance and coverage. Some grass species (*Alopecurus utriculatus*, *Agrostis alba*, *Poa sylvicola*) are also common.

Figure 5-108 Meadow near Klecovce village

Regional distribution

The meadow habitats are widespread in the valleys in Macedonia, but a large proportion of their areas are threatened by extinction due to the abandonment of mowing.

Distribution in the area of the railway corridor

Most of the meadows are along the Kriva river. There are larger areas next to the river in the vicinity of the Zidilovo village, and there are smaller areas near the villages of Trnovec, Vetunica, Psaca, Krklja, and also on the stretch between the villages Uzem and Kostur. In the Pcinja river valley there are meadows only near Klecovce village (see Annex 5 - Habitat Map).

Flora, fungia and fauna

In the aspects of animal and fungal species this habitat is similar with the previous one. The extended list of plant, animal and fungal species growing in this biotope is given in the Appendices I, II and III.

ROCKY SITES

Rocky and stony areas are characterised by extremely low biological production, but are very important for biodiversity of certain area. The mineral composition of the rocks and extreme ecological conditions offer unfavourable habitat, and present plant and animal communities are adapted to this habitat.

Chasmophytic Vegetation on Cliffs and Rocks

Reference to EUNIS Habitats: **H3.62 Sparsely vegetated weathered rock and outcrop habitats**
Reference to EU HD Annex I: **8230 Siliceous rock with pioneer vegetation of the Sedo-Scleranthion or of the Sedo albi-Veronicion dillenii**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The physiognomy of the habitat is defined by the shape and appearance of the rocks, while plant cover has only sporadic role. The main characteristic of the vegetation is the presence of lithophytic mosses and a number of petricolous lichenoid fungi. Characteristic plants are chasmophytic species from the genera *Jovibarba* and *Sedum*. Other grass and forb species are numerous as well, but the coverage is very low (*Figure 5-109*).

Distribution in the area of the railway corridor

Stony areas appear in many places along the upper parts of the river valleys as a result of the erosion. The best-developed areas occur along the Pcinja river in the vicinity of Klecovce village, at the spots where the Kriva river flows into the Pcinja river. In the Kriva river valley, this type of areas occur near the villages of Beljakovce and Vetunica (confluence of the Vetunica river and the Kriva river), and very small areas in the surroundings of the Krklja village.

Figure 5-109 Typical clif formation at the upper course of the Kriva river.

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Flora: The most common species of mosses are as follows: *Tortula muralis*, *Schistidium apocarpum* and *Grimmia pulvinata* (*Figure 5-110*).

Fungia: The fungal composition is represented by typical petricolous lichenoid fungi specialized on siliceous rocks (*Figure 5-111*). The most common species were *Aspicilia cinerea, Dermatocarpon miniatum, Hypogymnia tubulosa, Lecidea fuscoatra, Lichenostigma cosmopolites, Lobaria scrobiculata, Physcia dubia, Rhizocarpon geographicum, Rinodina lecanorina* and *Xanthoparmelia stenophylla.*

Mammals: Mammal fauna is similar to that of the hill pastures on rocky sites.

Birds: The number of species is not high (only 23 species), whichfrom seven are residents and 15 are breeders. However, the most important characteristics is the presence of the species of prey. The most important birds of prey are Long-legged Buzzard *Buteo rufinus,* Peregrine Falcon *Falco peregrinus, Falcon Falco biarmicus* and formerly Egyptian Vulture *Neophron percnopterus*. The breeding pairs of the Black stork (*Ciconia nigra*) and Eurasian Eagle Owl (*Bubo bubo*) are especially important. Several species of swallows and martins, Rock Sparrow *Petronia petronia,* Western Rock Nuthatch *Sitta neumayer,* Rufous-tailed Rock Thrush *Monticola saxatilis,* Blue Rock Thrush *Monticola solitarius,* Common Swift *Apus apus*, Black Redstart *Phoenicurus ochruros* are dominant on the cliffs and rocks in the railway corridor area.

Figure 5-110 Lithophytic mosses on rock

Figure 5-111 Different species of petricolous lichens

Reptiles and amphibians: The composition of amphibians and reptiles is the same as in the hill pastures on rocky sites with the addition of one reptile species Balkan Green Lizard (*Lacerta trilineata*).

Butterflies: Butterfly fauna similar to the one of the hill pastures on rocky sites.

Figure 5-112 Fox cub exiting the den site - rocky terrain near the railway terace

WETLANDS/ WATER HABITATS

Rivers and streams

There are several types of water bodies in the area of interest. The assignment of a proper typology according to Water Framework Directive (WFD) is an on-going process in Macedonia. Preliminary results from the studies of this process will be used for the purposes of the current study.

Epipotamal Streams - Rivers (approximately wider than 5 m)

Reference to EUNIS Habitats: **C2.31 Epipotamal streams**
Reference to EU HD Annex I: **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**
Reference to CoE BC Res. No. 4 1996: **none**
Reference to Water Framework Directive (EEC 60/2000): **Lowland medium/small river type**

General characteristics

Water courses that can fulfil the aforementioned criteria for "river" in the area of the railway corridor are the Pcinja and Kriva rivers. Vascular vegetation that gives the physiognomy of the river banks and of the water close to the banks is not well-developed. Anyway, there is some plant species related to the water ecosystem. These are *Ranunculus trichophyllus*, *Myosotis scorpioides* etc. Stony banks enable development of populations of *Cladophora spp*, during summer, and rich epilithic diatoms communities and cyanophytes, during winter and spring.

Figure 5-113 A view of the Kriva river near Krilatica village

Mammals: The typical mammal species that inhabits bigger rivers is Otter (*Lutra lutra*).

Birds: The only characteristic breeding bird species is the *Common Kingfisher* (*Alcedo atthis*). There are no resident birds. A number of species use rivers for foraging (Heron, White and Black Stork) or during migration (some species of ducks, egretts and cormorants).

Amphibians: This habitat is favourable for the amphibians in general and less for the reptiles. Three species of amphibians, such as Yellow Belied Toad (*Bombina variegata),* Balkan Stream Frog (*Rana graeca*) and

Marsh Frog (*Pelophylax ridibundus*) and two species of reptiles, Grass Snake (*Natrix natrix*) and Dice Snake (*Natrix tessellata*) are present in this habitat.

Fish: There is an abundant fish population in the rivers, especially in the Kriva river. According to the information from the anglers, the following fish species are present in this area: *Squalius cephalus* L., *Chondrostoma nasus* L., *Gobio gobio* L., *Barbus macedonicus* Karam., *Barbus balcanicus* Kotlik et al., *Vimba melanops* Heck., Alb*urnus alburnus* L*., Cobitis taenia* L., *Salmo trutta* (only in the upper flow of Kriva river).

Dragonflies: Larvae of dragonflies develop in the aquatic ecosystems. There are many species that lay their eggs in the running waters of rivers and streams.

Hiporhithral Streams - Rivers (approximately narrower than 5 m)

Reference to EUNIS Habitats: **C2.22 Hiporhithral streams**
Reference to EU HD Annex I: HD Annex I: **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The area of the railway corridor is characterised by a well-developed hydrographical network. It can be subdivided into two catchment basins: catchment basin of the Pcinja River and catchment basin of the Kriva River. The main effluent of the region is the Pcinja, which flows into the Vardar north-west of Veles.

The following streams with permanent flow can be identified in the railway corridor area:

- Catchment basin of Pcinja: Kumanovska river;
- Catchment basin of the Kriva river: Duracka, Kratovska, Povisnica, Vrlej, Kiselicka, Gaberska, Rankovecka, Vetunicka, Drzava and Zivusa.

Fauna

The vertebrate fauna that is present in this habitat is more or less the same in large rivers and streams.

Birds: The fauna of birds of smaller rivers and streams is similar to the one of lowland rivers (Kriva and Pcinja). More specific is the *White-throated Dipper* (*Cinclus cinclus*).

Amphibians: There are few species of amphibians and reptiles in this habitat, mostly semi-aquatic ones. Two species of frogs, Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*), and the Grass Snake (*Natrix natrix*) as a representative from the reptiles.

Epirhithral and metarhithral streams – Montane streams

Reference to EUNIS Habitats: **C2.21 Epirhithral and metarhithral streams**
Reference to EU HD Annex I: HD Annex I: **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Montane streams are permanent water courses with fast-flowing turbulent water, and their associated animal and microscopic algal pelagic and benthic communities. Here are included some small to medium-sized streams in the upper course of the Kriva river. The bed is typically composed of rocks, stones or gravel with only occasional sandy and silty patches.

Fauna

The vertebrate fauna present in this habitat is generally not very different from the previous water habitats. Nonetheless, species adapted to rapid, flowing and clear waters occur here. As for the amphibian species, the frog *Rana temporaria* is typical of such a habitat. Very rare and endemic species of benthic organisms such as larvae of *Plecoptera* and *Odonata* are also found here.

Figure 5-114 The Kriva river in its upper course

Intermittent streams

Reference to EUNIS Habitats: **C2.5 Temporary running waters**
Reference to EU HD Annex I: HD Annex I: **3290 Intermittently flowing Mediterranean rivers of the Paspalo-Agrostidion**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

These streams characterise numerous ravines in the railway corridor region on the left and right slopes of Kriva river valley. The water flow exists only during the humid period of the year (See *Annex 5 - Habitat map*). They have high water level after snow melting in early spring, and a half of the year (more or less) these streams are characterised by a dry bed. That is the reason why these streams do not have great importance as water ecosystems. But, the ravines through which they flow are regularly covered by denser or sparser willow forests or belts, thus strongly differing from surrounding grassland or agricultural habitats.

Fauna

Amphibians: Amphibian species present in this habitat are: Yellow Belied Toad (*Bombina variegata),* Common Toad (*Bufo bufo*) and Green Toad (*Pseudepidalea viridis*).

Butterflies: Common species for this habitat are: *Carcharodus flocciferus, Pygus alveus, P. sidae, Spialia orbifer, Parnassius mnemosyne, Zerynthia cerisy, Apanthopus hyperantus, Arethusana arethusa, Lasiommata petropolitana, Pyronia tithonus,Vanessa atalanta* etc.

Figure 5-115 Intermittent stream on the right side of the Kriva river (Vetunica stream)

Gravely and Sandy Riverbanks

Reference to EUNIS Habitats: **C3.62 Unvegetated river gravel banks**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **24.2 River gravel banks**
and
Reference to EUNIS Habitats: **C3.61 Unvegetated river sand banks**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This biotope represents a very specific type of grassland developing on the riverbanks or smaller permanent river islands. The ground consists of gravely soil or the soil in the process of formation. These areas are occasionally flooded and the wetland shrubland or forest vegetation cannot be ascertained (*Figure 5-116*). The vegetation does not cover the whole ground, it is sparse and represented by herb species, mainly *Gramineae*, then many pioneer plant species adapted to sandy ground from *Polygonaceae, Chenopodiaceae* and other families. The presence of small, young tamarisk sprouts also contributes to the physiognomy of this biotope.

Regional distribution

This biotope is common for almost all lowland rivers in Macedonia.

Distribution in the area of the railway corridor

This kind of biotope is typical of the rivers Pcinja and Kriva valleys and the lower course of their tributaries. It is more or less a common biotope. Along the course of the Kriva river, these habitats occur in the surroundings of Beljakovce village, the confluence of the Vetunica river into the Kriva river, Drenje village etc., while along the Pcinja river they mainly occur in the vicinity of Klecovce (see Appendix IV - Habitat Map).

Flora and fauna

The extended list of plant and animal species growing in this biotope is given in the Appendices I and III.

Mammals: This habitat is characterized by the following species: otter (*Lutra lutra*), guenther's vole (*Microtus guentheri*), sibling vole (*M. rossiaemeridionalis*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*A. agrarius*), fox (*Vulpes vulpes*), wolf (*Canis lupus*) etc.

Birds: The fauna of birds is poor in this habitat. There are no resident species and only four breeders: *Little Ringed Plover Charadrius dubius, Common Sandpiper Actitis hypoleucos, Grey Wagtail Motacilla cinerea, White Wagtail Motacilla alba.* Sandy and gavel river banks are foraging sites for six species of herons, egrets and storks.

Reptiles and amphibians: This habitat is mostly inhabited by amphibian and reptile species that are semi-aquatic, in total three species of amphibians and two species of reptiles are found. The amphibians found are Marsh Frog (*Pelophylax ridibundus)*, Balkan Stream Frog (*Rana graeca*) and European Tree Frog (*Hyla arborea*). The reptiles found are Grass Snake (*Natrix natrix*) and Dice Snake (*Natrix tessellata*).

Butterflies: One of the most typical members for this habitat, which can be found in the investigated area, is the Northern Wall Brown, *Lasiommata petropolitana.* Presence of *Scolitantides orion, Aporia crategi, Pseudophilotes vicrama, Zerynthia cerisy, Phengaris aion, Erebia medusa, Pyronia tithonus, Polyommatus icarus, Cupido osiris, Plebeius sephirus, Colias alfacariensis, Pyrgus sidae, Argynnis aglaja, Brintesia circe, Hipparchia syriaca, H. statilinus* and *Maniola jurtina* is also evidenced.

Figure 5-116 Gravely riverbank along the Pcinja river

Ground beetles: These habitats are very rich in ground beetles species due to the greater diversity within some genera, especially *Bembidion*. However, all of these species are widespread in Europe or the Balkans. The dominant species in the river banks of the lowland rivers are *Bembidions subcostatum vau, Bembidion decorum, Bembidion lampros* and *Nebria brevicollis*. On the river banks of small rivers and streams, some other species increase their dominance: *Platynus scrobiculatus* and *Limodromus assimilis*.

Dragonflies: Dragonfly fauna derives from the fauna of willow woodlands and tamarisk habitats. However, only certain numbers of species use this habitat during the hunting and mating.

Orthoptera: Although they are relatively small areas, these habitats are characteristic of certain species of this order which are highly specialized for life in this conditions like at least four species of genus *Tetrix* – *T.*

bolivari, T. tuerki, T. tenuicornis and T. depressa, cricket *Pteronemobius heydenii, Aiolopus strepens* etc. Also, due to sandy soil, species more specific for rocky sites like *Acrotylus insubricus, Oedipoda germanica* and *Oedipoda caerulescen*, can be found here.

Stagnant Water Biotopes

The biotopes representing the area along or around the slow-flowing water are not very frequent in the area of the railway corridor. Usually they are represented by swampy areas in the scope of the river arms and reed belts along the rivers.

Artificial Ponds

Reference to EUNIS Habitats: **C1.61 Lime-deficient oligotrophic temporary waters** and **C1.62 Mesotrophic temporary waters**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

These habitats are very important for the amphibians because they have a role as reproductive centres during the spring period, when the mating season of this class species. The last goes especially for the localities where the neighbouring habitats are hill pastures or degraded oak forests. The amphibians that are present in the stagnant waters are Common Newt (*Lissotriton vulgaris*), Yellow Belied Toad (*Bombina variegata*) (*Figure 5-118*), Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*), Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*).

Figure 5-117 Gravely riverbank along the Pcinja river Small temporary pool along the railway track.

Figure 5-118 Gravely riverbank along the Pcinja river Yellow Belied Toad (*Bombina variegata*).

Reed Bed (Phragmites australis)

Reference to EUNIS Habitats: **D5.1 Reedbeds normally without free-standing water**, including: D5.11 [*Phragmites australis*] beds normally without free-standing water and D5.13 [*Typha*] beds normally without free-standing water
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The reed stands in the projected railway corridor do not represent the typical reed biotope in most cases. They develop as narrow belts along the slow-flowing water in some areas of the rivers (*Figure 5-119*). Such reed stands are usually fragments of ***Scirpo-Phragmitetum*** W. Koch 1926 swamp plant association (as in the previous habitat). The most characteristic plants are *Typha latifolia* and *Phragmites australis*. Among other vascular plant species associated with water *Veronica anagalis-aquatica*, *Veronica beccabunga*, *Stelaria aquatica*, *Lycopus europaeus*, *Myosotis scorpioides*, *Alisma plantago-aquatica*, *Rumex cristatus*, *Polygonum hydropiper* and *Ranunculus repens* are the most common. In some stands reed dominates while in others bulrush (*Figure 5-120*).

Regional distribution

This biotope is common for almost all lowland rivers in Macedonia.

Distribution in the area of the railway corridor

Fragments of reed bed can be found in a few places along the rivers Kriva and Pcinja. As a result of their small dimensions, these reed beds could not be mapped.

Figure 5-119 Gravely riverbank along the Pcinja river Reed bed near Suplji Kamen village

Figure 5-120 Gravely riverbank along the Pcinja river Bulrush (*Typha latifolia*)

Flora and fauna

The extended list of plant and animal species growing in this biotope is given in the Appendices I and III.

Mammals: Typical species for this habitat is the striped field mouse (*Apodemus agrarius*). Presence of *Crocidura suaeveolans, Microtus rossiaemeridionalis* is to be expected.

Birds: The only breeding bird species is *Great Reed Warbler Acrocephalus arundinaces*, and probably *Little Bittern Ixobrychus minutus*. Other species (same as in the case of rivers) use small swamps for foraging and during migration. Generally, the number of species and diversity of birs is considerably low.

Amphibians: This habitat is preferred by amphibians and there are 6 species: Yellow Belied Toad (*Bombina variegata),* Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*), Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*).

Reptiles: Only two species of reptiles are present in this habitat - Grass Snake (*Natrix natrix*) and Dice Snake (*Natrix tessellata*).

Butterflies: Swampy areas are also very favourable butterfly habitats due to their diverse flora. In the investigated area the following species are present: *Lycaena dispar, L. tityrus, L. candens, Apatura ilia, Thymelicus lineola, Argynnis pandora, A. paphia*, *Papilio machaon, Celastrina argiolus, Polyommatus icarus, Argynnis aglaja, Colias crocea, Pontia edusa, Aglais io, Carcharodus alceae*, etc.

Ground beetles: Almost 40 species were recorded in the swampy reed habitats in the railway corridor area. The fauna composition is determined by the presence of water in the biotope and as a consequence it is very similar to the fauna of willow woodlands. Dominant species are *Carabus granulatus*, several *Chlaenius* and *Agonum* species, *Stenolophus mixtus, Poecilus cupreus*, etc.

Dragonflies: Dragonfly fauna consisted of 16 species. The most characteristic are *Libelulla depressa, Lestes virens, Pyrrhosoma nympula, Sympetrum sanguineum,* and *Orthetrum cancellatum*.

ANTHROPOGENIC HABITATS

This part of the chapter describes the anthropogenic habitats such as urban and rural settlements as well as plantations of conifers and deciduous trees and agricultural land (fields, orchards, vineyards, fallow fields).

TREE PLANTATIONS

The forests planted by man in the studied corridor are mostly composed of black locust (*Robinia pseudoacacia*) and black pine (*Pinus nigra*). *Pinus nigra* is usually planted because of its capability to grow in dry and very unfavourable conditions. The same applies to *Robinia pseudoacacia* but it is planted to stabilise the soil, too. Very seldom Canadian poplar (*Populus X canadensis*) and high-stemmed *Populus nigra* cultivars represent the broadleaf plantations in the railway corridor. Along the railway, certain small stands of *Ailanthus glandulosa* can be found. However, the latter can be included in the ruderal sites. This habitat tipes are interesting for both amphibians and reptiles. They usually are inhabited from the neighboring habitats. Amphibians prefer it because of the constant humidity due to irrigation. The amphibians present here are Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*) and Marsh Frog (*Pelophylax ridibundus*). Reptiles also prefer this habitat because it is rich with prey (grasshoppers, bugs, worms, rodents). The reptile species found here are Green lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Whip Snake (*Dolichophis caspius*), Aesculapian Snake (*Zamenis longissimus*) and Nose Horned Viper (*Vipera ammodytes*).

Black Locust's Plantation

Reference to EUNIS Habitats: **G1.C3 [Robinia] plantations**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The forest-like stands of this biotope are comon in the studied corridor but the belts of black locust along the railway line are more common. In some places black locust's stands are very open and ground vegetation is well-developed, and it is similar to that of the neighbouring grasslands. Many ruderal elements are present here on account of their proximity to the roads and settlements.

Regional distribution

Black locust's forests and woodlands are widespread in the Republic of Macedonia by reason of the fast growing characteristics of the species and the great resistance to unfavourable conditions. Many areas were afforested in order to prevent eolian and alluvial erosion processes.

Distribution in the area of the railway corridor

Fragments of black locust's forests can be found in many places along the railway corridor. The best-developed areas occur in the vicinity of Kriva Palanka where, in some places, black locust is a dominant tree and forms a virtually clear forest.

Figure 5-121 Black locust’s plantation in the vicinity of Kriva Palanka

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Appendices I, II and III.

Fungia: Black locust's biotope is characterised by the presence of some lignicolous fungi, which are not common in the other biotopes that have already been mentioned, such are *Phellinus robiniae*, *Phellinus torulosus*, *Ganoderma resinaceum* etc. Quite common terricolous fungal species in this biotope are the edible mushrooms *Macrolepiota procera* and several *Agaricus* species.

Mammals: Common mammal species registered in this habitat are: red squirrel (*Sciurus vulgaris*), lesser mole rat (*Nanospalax leucodon*), yellow-necked mouse (*Apodemus flavicollis*), striped field mouse (*Apodemus agrarius*), fat dormaous (*Glis glis*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), western polecat (*Mustela putorius*), badger (*Meles meles*), wild cat (*Felis sylvestris*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds: The fauna of birds resembles the one of natural oak forest. However, the number of species and population numbers are much lower due to the smaller surface of this habitat.

Amphibians: This is typical habitat of thermophilous species and therefore reptiles prefer it more than amphibians. Two species of amphibians are present here: Common Toad (*Bufo bufo*) and Green Toad (*Pseudepidalea viridis*).

Reptiles: Seven species of reptiles live in this habitat such as Wall Lizard (*Podarcis muralis*), Balkan Wall Lizard (*Podarcis erhardii*), Green lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Whip Snake (*Dolichophis caspius*), Aesculapian Snake (*Zamenis longissimus*) and Nose Horned Viper (*Vipera ammodytes*).

Butterflies: In the railway-corridor, following species can be found occupying this habitat: *Callophrys rubi, Libythea celtis, Aglais urticae, Erebia medusa, Pararge aegeria, Melitaea cinxia, Anthocharis cardamines, Pieris brassicae, Zerynthia polyxena.*

Ground beetles: The fauna of Black Locust's stands is very poor in species. Only few species are known to inhabit these stands.

Conifer Tree Plantations (Black Pine)

Reference to EUNIS Habitats: **G3.F12 Native pine plantations**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Black pine tree is very well acclimatised to the soil and climate conditions in the region under consideration, and it is very often used in plantations. It is planted mainly on the southern slopes of the hills. It was not possible to establish the great difference in the ground layer because the forest has elements from the neighbouring vegetation types.

Regional distribution

The plantations of this type are very common in the Republic of Macedonia.

Distribution in the area of the railway corridor

A sizable part of the projected railway corridor passes through this type of habitat. In the corridor area they are mainly distributed on the right side of the Kriva river, starting from Petralica village to Uzem village. The largest areas are in the surroundings of Petralica village, at the locality known as Korija (see *Annex 5 - Habitat Map*).

Figure 5-122 Black pine plantations in the vicinity of Kriva Palanka

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the Annexes 6, 7, 8.1 and 8.2.

Fungia: The black pine plantations are characterised by the presence of some lignicolous fungi that are specific to different pine species, such are *Meruliopsis taxicola*, *Peniophora pini*, *Phellinus pini* etc. This biotope is characterised by the occurence of mycorrhizal terricolous fungal species, connected to the pine root systems. The most characteristic are *Suilus granulatus*, *Suilus luteus*, *Lactarius deliciosus* etc.

Mammals: Pine marten (*Martes martes*) and the rock mouse (*Apodemus mystacinus*) are the most typical species registered in the pine plantations. Presence of red squirrel (*Sciurus vulgais*) is also expected.

Birds: The size and structure of the Black pine forests in the railway corridor area do not allow permanent presence of some specific bird species for coniferous forests. Thus, the fauna of birds originates from the neighbouring forests.

Reptiles and amphibians: There are no typical representatives from amphibians and reptilians in this habitat. The species from these classes are the same as the neighboring habitats.

Butterflies: Often recorded butterflies in pine woodlands are: *Kirinia roxelana, Hipparchia statilinus* and *H. syriaca.* However, species characteristic for woodland clearings can be also spotted in this habitat: *Coenonympha arcania, Pyronia tithonus, Pararge aegeria, Pyrgus alveus, Anthocharis cardamines, Satyrium spini, Vanessa atalanta, Phengaris arion.*

Ground beetles: Black pine plantations are the richest habitat in ground beetles species out of the anthropogenic habitats. Compared to natural forests, they show lower diversity. The species have origin from surrounding habitats (Italian and Turkey oak forests, submontane beech forests). Several endemic species thrive in the Black pine plantations.

Mixed Conifer and Black Locust's Plantation with Oak Trees

Reference to EUNIS Habitats: **G4.F Mixed forestry plantations**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Black locust and pine are combined with natural oak forest and develop in the larger areas. This habitat type is appears as mixed conifer-deciduous forest community admixed with a number of plant species from the neighboring oak belt (*Figure 5-123*). The extended list of plant, animal and fungal species growing in this biotope is provided in Appendices I, II and III.

Distribution in the area of the railway corridor

In the corridor area, the best areas with this type of habitat are situated in close proximity to Krklja village. It is a well-formed mixed forest association with a specific structure of species (see *Annex 5 - Habitat Map*).

Figure 5-123 Black pine plantations in the vicinity of Kriva Palanka

Small Broadleaf Tree Plantation

Reference to EUNIS Habitats: **G5.2 Small broadleaved deciduous anthropogenic woodlands**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

This biotop is defined as plantations and small intensively-managed woods of deciduous broadleaved trees less than about 0.5 ha in area. Such habitat type is characterized mainly by the plantations of Canadian poplar (*Populus* X *canadensis*). Very often individual Lombardian poplar trees (*Populus* "*italica"*) are planted on the field or acre boundaries (*Figure 5-124*). The stands are usually open and ground vegetation is well developed. It is very similar to that from neighbouring grasslands or other communities.

Regional distribution

Poplar plantations are widespread in the Republic of Macedonia. They are intensively planted due to their high and fast biomass production. Many field and garden edges in Macedonia were planted with Italian poplar in order to prevent wind blowing and to produce shade for farmers.

Distribution in the area of the railway corridor

In the investigated railway corridor the small stands of Canadian poplar and Lombardian poplar, as well as tree belts, are evenly distributed throughout the whole corridor.

Figure 5-124 Poplar plantations near the Kriva river

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Fungia: The poplar forest biotope is characterised by the presence of some lignicolous fungi that are common on planted old poplar trees, such are: *Ganoderma adspersum*, *Pleurotus ostreatus*, *Agrocybe aegerita* etc.

Fauna: The fauna of broadleaf treer plantations somewhat resembles the natural willow woodlands, but the number of species is certainly lower. Poplar trees offer good sites for nesting and roosting of birds. The amphibians and reptiles species in this habitat are the same as the neighboring habitats.

Anthropogenic Tree Belts and Lines

Reference to EUNIS Habitats: **G5.1 Lines of trees**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Tree lines along the roads may not create a specific plant community or separate habitat. The importance of such vegetation, together with the tree lines on the edges of fields, acres and gardens is great because they may serve as corridors for spreading of many species.

Distribution in the area of the railway corridor

Tree lines are scattered irregularly throughout the whole area of study. The most typical ones can be found in the plain area between the villages of Rankovce to Uzem.

Flora, fungia and fauna

Flora: The tree and shrub species constituting this biotope have both natural and anthropogenic origin. Some of the tree species resemble natural vegetation (*Ulmus minor*, *Pyrus amygdalyformis*, *Prunus spinosa*, *Crataegus monogyna*, *Rosa canina*, *Rubus spp*. etc.) and some of the species have been introduced by people (*Prunus cerasifera*, *Robinia pseudoacacia*, *Ailanthus altissima* etc.). The herb species are represented by the elements from the neighbouring ruderal or agricultural communities.

Fungia: Such habitat type is characterised by the presence of some lignicolous fungi, parasitic or saprobes on different tree and shrub species. The most common species are *Phellinus puncatus* (on *Prunus cerasifera), Peniophora incarnate* and *P. lycii (*on *Pyrus amygdalyformis), Vuilleminia cystidiata (*on *Crataegus monogyna),* etc.

Mammals: There is no typical mammal fauna for this habitat. However, one can expect the following species in it: sibling vole (*Microtus rossiaemeridionalis*), guenther's vole (*Microtus guentheri*), lesser mole rat (*Nanospalax leucodon*), yellow-necked mouse (*Apodemus flavicollis*), striped field mouse (*Apodemus agrarius*), fat dormaous (*Glis glis*), black rat (*Rattus rattus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), beech marten (*Martes foina*), badger (*Meles meles*), wild cat (*Felis sylvestris*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds: The fauna of birds represents a combination of the species of oak forests and willow woodlands. However, the general diversity is lower.

Reptiles and amphibians: The amphibians and reptiles species in this habitat are the same as the neighboring habitats.

Butterflies and ground beetles: Butterfly and ground beetle faunas are similar to the one of the of Black Locust stands.

Longhorn beetles: A number of polyphagous species on various deciduous trees usually inhabit the tree lines, such as: *Xylotrechus rusticus, Hylotrupes bajulus, Clytus rhamni* etc.

GRASSLANDS OF ANTHROPOGENIC ORIGIN

Most of the grasslands in the area of the railway corridor are of anthropogenic origin. Similar to the grasslands of natural origin, they occupy small areas since most of the agricultural land is usually permanently arable.

Ruderal Vegetation and Trampled Area

Reference to EUNIS Habitats: **E5.1 Anthropogenic herb stands**, including: E5.11 Lowland habitats colonized by tall nitrophilous herbs; E5.12 Weed communities of recently abandoned urban and suburban constructions; E5.13 Weed communities of recently abandoned rural constructions; E5.14 Weed communities of recently abandoned extractive industrial sites
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Concerning the floral composition, the most significant feature of this biotope is the domination of weedy and ruderal plant species over herb species typical of grassland communities. The vegetation cover is more or less closed, thus indicating that the fields have been abandoned for many years (*Figure 5-125*).

Distribution in the area of the railway corridor

The remarks pertaining to the previous habitat also apply to the current one. This habitat has a pattern of distribution in the area of the railway corridor identical with the previous one (see *Annex 5- Habitat Map*).

Figure 5-125 Ruderal vegetation near Suplji Kamen village

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

Flora: Grass species like *Cynodon dactilon*, *Lolium spp*., *Bromus spp*., *Hordeum vulgare* etc. form the herb cover. *Anthemis arvensis* often penetrate from natural grassland areas. Tall herbs like *Arctium lappa*, *Hyosciamus niger*, *Datura stramonium*, *Cichorium intybus, Xantium spinosum, Onopordon sp., Cirsium spp*. and many others are quite common.

Fungia: The presence of grassland fungi is the main attribute of this habitat from a mycological aspect. The most common species belong to the non-mycorrhizal genera such as *Agaricus, Coprinus, Entoloma, Psathyrella, Stropharia* etc.

Mammals: Most common mammal species in this habitat are: eastern hedgehog (*Erinaceus concolor*), common mole (*Talpa europea*), sibling vole (*Microtus rossiaemeridionalis*), guenther's vole (*Microtus guentheri*), striped field mouse (*Apodemus agrarius*), lesser white-toaded shrew (*Crocidura suaeveolans*), wood mouse (*Apodemus sylvaticus*), western house mouse (*Mus domesticus*), beech marten (*Martes foina*), Balkan short-tailed mouse (*Mus macedonicus*), brown hare (*Lepus europeus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), badger (*Meles meles*), wild boar (*Sus scrofa*), roe deer (*Capreolus capreolus*).

Birds: Ornithofauna of abandoned fields is very similar to the one of hill pastures. Dominant are species such as *Grey Partridge Perdix perdix, Calandra Lark Melanocorypha calandra, Common Quail Coturnix coturnix, Eurasian Skylark Alauda arvensis, Tawny Pipit Anthus campestris* etc.

Reptiles and amphibians: The amphibians and reptiles species in this habitat are the same as the Hill pastures habitat or the same as the neighboring habitats.

Butterflies: Abandoned fields and meadows are one of the most visited habitats by the butterflies. Common species in this habitat are: *Maniola jurtina, Pieris rapae, P. brassicae, P. mannii, Pontia edusa, Zerynthia polyxena, Iphiclides podalirius, Aglais io, Erebia medusa, Polygonia c-album, Argynnis pandora, A. niobe, Vanessa cardui,V. atalanta, Polyommatus icarus, Colias crocea, Brintesia circe, Plebeius argus, Melanargia galathea, Arethusana arethusa, Coenonympha pamphilus, Pyrgus malvae, P. serratulae, Lycaena tityrus, Aporia crategi, Euphydryas aurinia, Parnassius mnemosyne* etc.

Ground beetles: About 15 species are known to occur in the abandoned fields. Dominant species are *Amara aenea, Calathus fuscipes, Calathus melanocephalus, Cicindela campestris, Harpalus affinis, Harpalus attenuatus, Harpalus rufipes, Harpalus serripes serripes, Harpalus tardus, Microlestes fissuralis* and *Poecilus cupreus*.

Longhorn beetles: Due to the presence of herbaceous vegetation like mullein, spurge and thistles, this habitat is also caracteristic for some of species that occurs in pastures: *Agapanthia cynarae*, *A. maculicornis, A. violacea, A. vilosoviridiscens, Phytoecia virgula, Oberea erythrocephala, Vadonia moesiaca* etc.

Orthoptera: Because these habitats are often adjacent or relatively close to open terrains of natural origin, it is expected that species of hill pastures can be found here. Some of them are *Leptophyes albovittata, Ancistrura nigrovittata, Poecilimon thoracicus, Poecilimon brunneri, Melanogryllus desertus* etc.

Abandoned Arable Land

Reference to EUNIS Habitats: **E5.1 Anthropogenic herb stands**, including: E5.11 Lowland habitats colonized by tall nitrophilous herbs
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none** and
Reference to EUNIS Habitats: **I1.53 Fallow un-inundated fields with annual and perennial weed communities**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Abandoning the arable land has been a rather common process in Macedonia in recent decades. This variation originates from the abandoned fields, with development of several tree and bush species as a consequence of natural succession. Although very similar to the previous habitat, it has been treated as a different one since the presence of shrubs offers niches for many animal species, especially for food and shelter. In addition to the distinctive herb plants defining this habitat mentioned in relation to the previous biotope type, the shrub species growing here (*Paliurus spina Christi*, *Rosa spp*., *Prunus spinosa* etc.) define its physiognomy.

In the aspects of fungi, this habitat is identical with the previous one. The fauna is almost identical with the fauna of the previous habitat, with more favourable conditions for the presence of orthopterans and more bird species. Thus, *Lanius* and *Sylvia* are species are much more abundant. For more detailed data on the species composition, please refer to *Annex 6, 7, 8.1 and 8.2.*

Figure 5-126 Abandoned arable land cavered with ruderal vegetation

Regional distribution

The abandoned fields and meadows habitat is common in Macedonia. It is very similar throughout the area of its distribution but differs in many specific characteristics as regards species composition, rising from the different grassland communities adjacent to this biotope in different areas.

Distribution in the area of the railway corridor

Abandoned fields and meadows in the area of the railway corridor are represented by small areas, distributed in a patchy pattern within the scope of the agricultural land (see *Annex 5 - Habitat Map*).

AGRICULTURAL LAND

The agricultural land, in general, is characterised by smaller or larger areas planted with only a single plant species. Biomass production is huge compared to similar natural ecosystems, but it is of low biodiversity value. From a nature conservation and preservation point of view, smaller plots of land are more suitable than large fields and plantations.

The agro-ecosystems along the railway corridor are represented mostly by individual parcels of different types of fields, acres, gardens and meadows. Only a small percentage is represented by large monoculture plantations. The biodiversity value of the agricultural land in this area has increased with the presence of natural or fruit trees at the boundaries of the fields, which is a very common occurrence (more than half of the fields are of this type). That is the reason why particular attention to this phenomenon has been paid during the biotope mapping.

Orchards

Reference to EUNIS Habitats: **G1.D4 Fruit orchards and FB.31 Shrub and low-stem tree orchards**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Orchards in the area of the railway corridor are not a characteristic type of agricultural activity, and the majority of them are small individual parcels separated by fields. The composition is very diverse and they are primarily of the mixed type. Apricots, apples, cherries, peaches, pears, plums, walnuts, etc. are the most frequent plantations and almost regularly mixed, often by domination of certain species. Fruit trees are usually planted in the villages and in their close proximity. The production is intended only for individual use. Therefore, orchards occur only sporadically in the studied corridor, and they do not have considerable dimensions.

Regional distribution

This type of orchards (habitat) is widespread in the rural flat and hilly regions in Macedonia.

Distribution in the area of the railway corridor

Orchards in the observed railway corridor cover a small area. Typical orhard that covers larger area is abandoned one located close to the Rankovce village (*Figure 5-127*) (see *Habitat map-Annex 5*).

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Anexes.*

In the aspect of biodiversity, the animal species are important for this habitat.

Mammals: Species found in the prchards can also be found in other agricultural terrains. Most common are: eastern hedgehog (*Erinaceus concolor*), lesser white-toaded shrew (*Crocidura suaeveolans*), common mole (*Talpa europea*), red squirrel (Sciurus vulgaris), sibling vole (*Microtus rossiaemeridionalis*), lesser mole rat (*Nanospalax leucodon*), fat dormaous (*Glis glis*), Balkan short-tailed mouse (*Mus macedonicus*), brown hare (*Lepus europeus*), fox (*Vulpes vulpes*), wild boar (*Sus scrofa*), weasel (*Mustela nivalis*), roe deer (*Capreolus capreolus*).

Birds: Very few species are present in orchards. *European Bee-eater Merops apiaster, Eurasian Hoopoe Upupa epops, Crested Lark Galerida cristata* and *Northern Wheatear Oenanthe oenanthe* nest in the orchards; other species use these habitats for foraging.

Reptiles and amphibians: The species of amphibians and reptiles are the same as in the Plantations habitat.

Butterflies: Depending on the intensiveness of agriculture in the orchards, several species can be registered in this habitat: *Iphiclides podalirius, Pyrgus malvae, Aglais io, Melanargia galathea, Maniola jurtina, Pontia edusa, Plebeius agestis, Melitaea phoebe, Erynnis tages, Lycaena phleas, Pyrgus alveus, Vanessa cardui, Pieris brassicae, P. mannii, Polyomatus icarus* etc.

Ground beetles: The species that inhabit orchards (and vineyards) are widespread eurytopic species. The number of species is low. Commons species are: *Amara aenea, Calathus melanocephalus, Carabus coriaceus cerisyi, Harpalus affinis, Harpalus rufipes, Harpalus serripes, Harpalus tardus* and *Poecilus cupreus*.

Figure 5-127 Abandoned orhard close to the Rankovce village

Vineyards

Reference to EUNIS Habitats: **FB.41 Traditional vineyards**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

Vineyards are not characteristic of the studied area and of this part of Macedonia, and consequently only make up a small percentage of the area. The proportion of small parcels and plantations is the same as for orchards and fields. The vineyard that covers the larger area is located close to the Klecovce village (see *Habitat map-Annex 5*).

As far as biodiversity is concerned, vineyards are of higher relevance than fields and gardens. The fauna (vertebrates and invertebrates) of vineyards is almost identical with the one of orchards. The extended list of plant, fungal and animal species growing in this biotope is given in the *Annex 6, 7, 8.1 and 8.2*.

Fields and Acres

Reference to EUNIS Habitats: **I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Plantations of monocultures have smaller biodiversity value than individual fields. The monotypic structure of the community, ecological conditions controlled by man, and the usage of a significant quantity of pesticides and fertilisers dictate a development of biocenosis with low species diversity. Fields and acres in the area of the projected railway corridor are mostly represented by wheat and corn culture. Industrial plants are cultivated very seldom except for some fields and acres of sunflower. More interesting is the fact that fields are very often planted with 1) fruit trees inside or at the boundaries, or 2) they contain remainders of wild trees from natural forests besides fruit trees, or 3) they are surrounded by poplar and willow trees. Certain mixtures of fields and gardens significantly enhance the biodiversity value of these biotope types. Typical gardens in the studied area are very rare. They are usually mixed with fields and almost regularly surrounded by fruit trees.

Distribution in the area of the railway corridor

Fields and acres are widely distributed throughout the corridor area.

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Annex 6, 7, 8.1 and 8.2*.

Fungia: There are some fungal species typical of various types of agricultural land such as *Agaricus campestris*, *Coprinus* spp., *Psathyrella* spp. etc. The species composition is identical in all types of agricultural land.

Mammals – Driven by the food supply, fields and acres are home for many mammal species such as: lesser white-toaded shrew (*Crocidura suaeveolans*), common mole (*Talpa europea*), sibling vole (*Microtus rossiaemeridionalis*), guenther's vole (*Microtus guentheri*), lesser mole rat (*Nanospalax leucodon*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), fat dormaous (*Glis glis*), black rat (*Rattus rattus*), Balkan short-tailed mouse (*Mus macedonicus*), brown hare (*Lepus europeus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), badger (*Meles meles*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds: About 25 bird species can be listed for the habitats of fields and acres. Three of them are resident (*Grey Partridge Perdix perdix, Corn Bunting Miliaria calandra* and *Crested Lark Galerida cristata*) and 11 more species are breeders. Other bird species use field and acres for foraging.

Reptiles and amphibians: Only two species of amphibians are found here and they are: Common toad (*Bufo bufo)* and green toad (*Pseudepidalea viridis*). This habitat is also rich in reptile species, among and the species composition is very similar to that of the dry pastures and abandoned fields.

Butterflies: This habitat is not suitable for butterflies. However, sporadic occurrences of species from Pieridae family can be registered.

Ground beetles: The structure of the community is characterized by the presence of few species with great dominance: *Amara aenea, Calathus melanocephalus, Harpalus serripes, Harpalus rufipes* and *Poecilus cupreus*.

Figure 5-128 Fields and acres in the Kriva river valey

URBAN OR URBANISED AREAS

The area along the railway line is not very densely populated but the population is relatively regularly dispersed. There are two urban centres, Kumanovo and Kriva Palanka, at both ends of the raiway line, and villages and settlements along the valleys, especially in the broader parts. The dispersed type of village settlements in north-eastern Macedonia causes distribution of very sparse small groups of houses over large areas, which form villages. The presence of isolated houses is also common. These parts are hardly urbanised, they are enclosed by fields, vineyards, orchards, meadows, natural vegetation and individual trees.

The primary feature of urbanised areas as a biotope type is the presence of allochtonous plant species, essentially decorative trees and shrubs, but also fruit trees and vegetable plants. It is also significant that many plant and animal species are strictly adapted to urban conditions such as ruderal and weed plants, specific bird and mammal species etc. Taking into account the impact of settlements as biotopes on many plants (especially) and animal species, they have been grouped in several biotope types.

Rural Settlements - Villages

Reference to EUNIS Habitats: **J1.2 Residential buildings of villages and urban peripheries; I1.22 Small-scale market gardens and horticulture, including allotments**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

Village settlements along the railway corridor are characterized by rural features. As a rule, the houses in these villages are surrounded by small gardens and fruit trees even in their central part. In such conditions, many wild animal species are adapted to living close to human presence.

The peripheral parts of the villages in the area of the railway corridor are characterized by sparsely distributed houses with small meadows, grasslands and sparse trees around (*Figure 5-129*). The participation of natural vegetation is high. Besides cultural and decorative plant species, vegetation is primarily represented by elements from the neighbouring biotopes and ruderal and weed species (see Appendix I). Some of the villages or parts of the villages are more urbanised (Suplji Kamen, Ginovci, Uzem) and are less important from a biodiversity standpoint.

Flora, fungia and fauna

The extended list of plant, fungal and animal species growing in this biotope is given in the *Annex 6.7, 8.1 and 8.2*. In the aspect of biodiversity, the animal species are most important for this habitat.

Mammals: Villages are suitable mammal habitats. Viriety of vegetable, livestock and poultry offer food supply for both, herbivore and carnivore mammals. Most common species are: lesser white-toaded shrew (*Crocidura suaeveolans*), red squirrel (*Sciurus vulgaris*), yellow-necked mouse (*Apodemus flavicollis*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), fat dormaous (*Glis glis*), black rat (*Rattus rattus*), western house mouse (*Mus domesticus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), western polecat (*Mustela putorius*), beech marten (*Martes foina*), badger (*Meles meles*), wild cat (*Felis sylvestris*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Figure 5-129 Typical village with sparcelly distribute houses

Birds: There are about 40 bird species that occur in the villages. This number is higher even compared to some of the natural habitats. There are 10 resident and 31 breeding species, most of them tightly connected to antrhopogenic habitats: *Black-billed Magpie Pica pica, Eurasian Jackdaw Corvus monedula, Hooded Crow Corvus cornix, Common Raven Corvus corax, House Sparrow Passer domesticus, Eurasian Tree Sparrow Passer montanus, White Stork Ciconia ciconia, Common Kestrel Falco tinnunculus, Rock Pigeon Columba livia, Eurasian Collared Dove Streptopelia decaocto, Barn Owl Tyto alba, Common Scops Owl Otus scops, Little Owl Athene noctua, Long-eared Owl Asio otus, Barn Swallow Hirundo rustica, Red-rumped Swallow Hirundo daurica, Northern House Martin Delichon urbica, Blackcap Sylvia atricapilla, Blue Tit Parus caeruleus, Great Tit Parus major, Eurasian Golden Oriole Oriolus oriolus* and *Spanish Sparrow Passer hispaniolensis*.

Reptiles and amphibians: The rural settlements are rich in amphibians because usually there are small gardens with constant water supply (wells and springs) near the households. Therefore, many amphibian species are present here such as Common Newt (*Lissotriton vulgaris),* Agile Frog *(Rana dalmatina),* Yellow Belly Toad (*Bombina variegata),* Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*) and Marsh Frog (*Pelophylax ridibundus*). These habitats are preferred by the reptiles as well. Seven species of reptiles are present such as Hermanns Tortoise (*Eurotestudo hermanni*), Slow Worm (*Anguis fragilis*), Erhard's Wall Lizard (*Lacerta erhardii*), Wall Lizard (*Podarcis muralis*), Balkan Green Lizard (*Lacerta trilineata*), Green Lizard (Lacerta viridis), Whip Snake (*Dolochopis caspius),* Aesculapian snake *(Zamenis longissimus)* and Nose-horned Viper *(Vipera ammodytes)*.

Butterflies: Compared to the towns and cities, rural areas contain much more diverse butterfly fauna due to the natural environment around them and the unique features like the gardens and ruderal sites, which are common gathering places for butterflies. Typical and frequent dwellers in this habitat are: *Lycaena virgaureae, Lycaena tityrus, Polyommatus belargus, P. icarus, Leptidea sinapis, Plebeius argus, Pieris brassicae, P. napi, Coenonympha papmphilus, C. arcania, Maniola jurtina, Argynnis paphia, Satyrium acaciae, Colias crocea, Arethusana arethusa, Nymphalis polychloros, Erebia medusa, Vanessa cardui, V. atalanta, Cupido osiris, Erynnis tages, Polygonia c-album, Pseudophilotes vicrama, Hamearis lucina, Pyrgus alveus, Aglais urticae, Aporia crategi* etc.

Ground beetles: It is interesting that the fauna of the villages is very similar to the one of the agricultural land (orchard, vineyards, fields and acres). All of these species are connected to human activities. The most common are: *Amara aenea, Calathus melanocephalus, Calathus fuscipes, Microlestes fissuralis, Harpalus serripes, Harpalus rufipes* and *Poecilus cupreus*.

Longhorn beetles: Because these areas include gardens, fruit trees, various plants in flower, stored firewood, a significant number of species can be found here, mainly similar to abandoned fields and tree lines.

Urban Settlements

Reference to EUNIS Habitats: **J1.2 Residential buildings of villages and urban peripheries; J1.41 Urban and suburban commercial units**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

In the aspect of biodiversity, the animal species are most important for this habitat. Fauna of urbanised settlements along the projected railway corridor mostly consists of common species, both invertebrates and vertebrates. Thus, there are not many species that demand greater emphasis (for more data see *Anexes).*

Mammals: Urbanized areas are non-suitable habitat for the survival of the mammals. However, species like red squirrel (*Sciurus vulgaris*), black rat (*Rattus rattus*), striped field mouse (*Apodemus agrarius*), western house mouse (*Mus domesticus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), beech marten (*Martes foina*) and badger (*Meles meles*) can be found in this habitat.

Birds: Bird fauna of towns in the railway corridor are is much poorer than the one of the villages. Only 16 species were recorded: resident and breeding birds represented both by eight species.

Reptiles and amphibians: Amphibians are in constantly present because of the Kriva river in Kriva Palanka. Four species are found: Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*) and Marsh Frog (*Pelophylax ridibundus*). The reptiles are usually in the periphery of the towns and they are represented with Hermanns Tortoise (*Eurotestudo hermanni*), Erhard's Wall Lizard (*Lacerta erhardii)*, Wall Lizard (*Podarcis muralis*) and Balkan Green Lizard (*Lacerta trilineata*).

Butterflies: Urban areas do not offer good living conditions for the butterflies. Yet, several species can be found in this habitat. Most of these species have wide range of habitat preferences: *Pontia edusa, Libythea celtis, Polygonia c-album, Pieris brassicae, P. mannii, P.rapae, Polyommatus icarus, Nymphalis antiopa, Vanessa atalanta, Aglais io, Iphiclides podalirius, Colias crocea* etc.

Ground beetles: The fauna of urban settlements is not much different of the one in the villages. The population abundance is probably lower, but the number of species is almost the same. Dominant species are: *Amara aenea, Calathus melanocephalus, Calathus fuscipes, Microlestes fissuralis, Harpalus serripes* and *Harpalus rufipes*.

Parks

Reference to EUNIS Habitats: **I2.23 Small parks and city squares**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

Typical parks scarcely occur in the corridor area, and as man-made structures they do not bear some purport in relation to biodiversity. These are non-autochthonous decorative plant species of primarily an aesthetic value. In the corridor area, the larger park area is situated near the town of Kumanovo, in close proximity to Kumanovska Banja (see *Annex 5 – Habitat Map*). In such habitat type there are not many species that demand greater emphasis.

Man-Made Structures

Reference to EUNIS Habitats: **J3.2 Active opencast mineral extraction sites, including quarries; J3.3 Recently abandoned above-ground spaces of extractive industrial sites; J1.4 Urban and suburban industrial and commercial sites still in active use**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

This includes a variety of industrial facilities, glasshouses for early crops, quarries, dumps, sand exploitation localities etc. Such facilities occur in a number of locations in the corridor area, most often in the settlements or in their vicinity. The most outstanding facilities are the ones in the surroundings of the following villages: Dobrosane, Klecovce, Dobrosane, Rudare, between Rankovce and Petralica and other places (see *Annex 5 – Habitat Map*). However, these structures do not have greater relevance from biodiversity point of view.

Figure 5-130 Sheepfold on the route of projected railway corridor

Urbanized areas: roads and railway line

Reference to EUNIS Habitats: **J4.2 Road networks; J4.6 Pavements, and recreation areas**
Reference to EU HD Annex I: **none**
Reference to CoE BC Res. No. 4 1996: **none**

The distinctive quality of this biotope is the common presence of a special type of natural vegetation dictated by the anthropogenic influence. The presence of certain neophytes coupled by native plants is also common. Some of ruderal plant communities are strictly adapted to development along the railway line and roads.

Distribution in the area of the railway corridor

The habitats of this type are spread along all roads and the existing old railway line (Kumanovo-Beljakovce). Nonetheless, they have not been included in the biotope mapping given that they occupy a very narrow area, and it is impossible to present them on the 1:25.000 scale maps. In view of the fact that they are not specific to the area, they are not of high relevance to the overall biodiversity of the region.

In the aspect of biodiversity, the animal species are most important for this habitat.

Mammals: Mammal fauna in this habitat is similar to the previos one: sibling vole (*Microtus rossiaemeridionalis*), wood mouse (*Apodemus sylvaticus*), black rat (*Rattus rattus*), western house mouse (*Mus domesticus*), Balkan short-tailed mouse (*Mus macedonicus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), beech marten (*Martes foina*) and badger (*Meles meles*).

Figure 5-131 Ruderal vegetation along the roads and railway line

5.1.7.8 FLORA BASELINE CONDITIONS

A description of the flora species present along the railway corridor has been provided with the description of habitats in the previous section. For a complete list of the plant species of the habitats present along the railway corridor the reader is referred to Annex 6 - Plant species, of this ESIA.

5.1.7.9 FAUNA BASELINE CONDITIONS

As for flora species, fauna species present along the railway corridor has been provided with the description of habitats in the previous section. For a complete list of the fauna species recorded for the habitats present along the railway corridor the reader is referred to:

- Annex 8.1 – Vertebrates (Amphibians, Reptiles, Birds, Mammals);
- Annex 8.2 – Invertebrates (Dragonflies, Ground beetles, Daily butterflies, Grasshoppers).

In addition to the fauna species mentioned in the description of habitats, bat species were also observed to be present in the railway corridor study area.

Bat species were not included in the description of the habitats due to the lack of concrete data of their distribution. It can be assumed that bat species occur in almost all of the habitats, in search for food. Their shelters can be found in various habitats, including natural or artificial caves, rock crevices, tree holes, roofs of houses, etc.

The Great Horseshoe bat, *Rhinolophus ferrumequinum,* (see Figure below) was reported in the already constructed tunnels of the railway during the field surveys carried out for the research study of the area

(May-June 2011). Only individual specimens and no significant colonies were found. It is assumed that during wintertime some of the tunnels may be inhabited by bat colonies.

Figure 5-132 The Greater Horseshoe Bat (*Rhinolophus ferrumequinum*)

5.1.8 CULTURAL HERITAGE AND ARCHAEOLOGY

5.1.8.1 STUDY AREA ('INVESTIGATION AREA')

The study area for the cultural heritage and archaeological aspects extends approximately 5 kilometres at each side of the railway alignment. This distance is considered sufficient for adequately defining and studying the cultural and archaeological setting of the railway corridor. In some cases the area has been extended to a greater distance in order to account for sites considered to have a significant value for the region.

5.1.8.2 LEGISLATION, REGULATORY & POLICY CONSIDERATIONS

The main regulation in the Republic of Macedonia applied in the field of cultural heritage and archaeology is Law on Preservation of Cultural Heritage (Official Gazette of the Republic of Macedonia No. 20/04).

The preservation of the cultural heritage in its genuine condition is one of the main goals of the law, and is to be achieved through the carrying out of activities to prevent actions, events and effects, which produce or may cause damage, destruction, disarrangement, loss, degradation and illegal seizure of the cultural heritage.

Articles 31 through 42 establish the procedure to proclaim Cultural Monuments, a category including, according to Article 12, "the single buildings, i.e. works of architecture and civil engineering or their parts and residues, including the elements and structures of archaeological nature, sculpture, paintings, or works of applied art and of the technical culture, permanently connected to certain surrounding, titles, cave habitations, tomb monuments, memorial objects and designations related to important events and renowned persons, other particular immovable goods of cultural and historical significance together with the installations, ornamental elements and other movable items which are permanently attached to the building itself or permanently serve to its utilization."

Article 45 establishes the National registry of cultural heritage, a registry system including a registry of proclamated Cultural Monuments as well as a registry of goods under temporary protection, where the archaeological discoveries are included (Article 38).

With regards to Project Railway Corridor VIII-Eastern Section, a most pertaining part of the Law corresponds to Article 65, which refers to the obligations of the investor during excavation or construction works, should an archaeological finding occur. In this case, the investor is obliged to:

a) Report the discovery of archaeological site or any item with archaeological significance to the Administration on Protection of Cultural Heritage;
b) Stop operations in vicinity of that site and to secure the site from possible damage and destruction,
c) Not to allow the unauthorized access within the site;
d) Preserve the discovered archaeological items in place and condition they were found;
e) Provide all relevant information regarding to the location and position of objects at the time of discovery to the relevant institution.

Taking into account the importance of the archaeological site, the Administration on Protection of Cultural Heritage may issue the decision on continuation of the construction works under the supervision of their experts, or the decision on temporary suspension of works in order to perform the archaeological excavations and research and take protective measures.

The EBRD recognises the importance of cultural heritage for present and future generations. The objectives of Performance Requirement 8 “Cultural Heritage” are, among others, to support the conservation of cultural heritage in the context of EBRD-financed projects, and to protect cultural heritage from adverse impacts of project activities. This Policy applies when a project is likely to affect irreplaceable cultural heritage, whether or not the cultural heritage has been legally protected or previously disturbed. The need to preserve cultural heritage and adequately assessing the potential damages to cultural heritage aspects when carrying out a project, are also extensively treated in EIB’s Environmental and Social Practices Handbook and in IFC’s Policy on Social & Environmental Sustainability (Performance Standard 8: Cultural Heritage).

5.1.8.3 DATA SOURCES

Data source for Cultural Monuments in the study area: National Registry of Cultural Heritage.

Data source for archaeological sites in section 1: National Registry of Cultural Heritage.

Data source for archaeological sites in Section 2: Archaelogical investigations carried out at several locations along section 2 in 1995 and 2003, in the context previous to construction works.

Data source for archaeological sites in section 3: “Archaeological Map of Macedonia” (Book I and II issued by the Macedonian Academy of Science and Arts, 1994).

5.1.8.4 BASELINE DATA COLLECTION METHODOLOGY (INCLUDING SURVEY/FIELD VISITS)

The baseline data collection for the description of the cultural heritage and archaeological aspects has been based on a desk study comprising the review of the sources indicated in subchapter 5.1.8.3.

In addition, the investor (PERI) has contacted the Administration for Protection of Cultural Heritage (Ministry of Culture) to determine the presence or not of archaeological sites in the vicinity of section 3.

5.1.8.5 BASELINE ASSUMPTIONS & LIMITATIONS

No assumptions have been made or limitations encountered.

5.1.8.6 CULTURAL HERITAGE & ARCHAEOLOGY BASELINE CONDITIONS

The Northeastern region of the Republic of Macedonia abounds with cultural monuments and archaeological sites that are located in all six communities (municipalities) that form this region. Numerous cultural and historical artifacts and monuments testify the rich cultural and spiritual past of this region. Many cultures interbred and contributed to create a value that today characterizes this area.

According to the official data in the Archaeological map of Macedonia, there are 4800 archaeological sites in Macedonia and only 102 are proclaimed Cultural Monuments (these include the architectural objects - churches, memory houses, bridges, etc.).

The Cultural Monuments found in the railway corridor study area are presented in *Table 5-30* below. An indication of the distance with respect to the railway alignment is provided in this table. Their location is shown in *Figure 5-140*.

Municipality	Cultural monument	Location (distance from the railway alignment)
Section 1 Kumanovo	Eski mosque	in Kumanovo city centre
	St. Nikola church	in Kumanovo city centre
	Observatory Kokino	around 4 km North
Section 2 Kratovo	Early christianity basilica Rotonda	around 1km South
	Prehistoric observatory Cocev Kamen	around 1 km South
	Locality of Kuklica	around 2 km North
	Bridge Radin	in Kratovo city centre around 17 km South
Section 2 Rankovce	St. Nikola church in village of Opila	around 2 km South
	St. Paraskeva church in the village of Radibush	around 4 km North
	Locality of Gradishte	around 1 km South
Section 3 Kriva Palanka	St, Joakim Osogovski monastery	around 3 km South
	St. Dimitrija church	around 2 km North

Table 5-30 List of Cultural Monuments and archaeological sites in Railway Corridor VIII-Northeastern Section study area

The sites listed in Table 30 are briefly described below.

Section 1 - Municipality of Kumanovo

Eski mosque. Building dating from 1532. It is the oldest preserved building of cultural - historical significance located in the city center. It was built by Tatar Sinan Bey and exudes the mystery and beauty of the typical architecture of the period in which it was built.

Church St. Nikola. Also known as Old Church, built in 1851. It is the work of the most famous XIX century Macedonian architect, Andrea Damjanov. It is surrounded by magnificent porches, a rich interior, and a gallery of icons and iconostasis characteristic of the time it was built.


Figure 5-133 Eski mosque and Church St. Nikola

Megalithic observatory Kokino. Considered to be 3800 years old; ranked by NASA as 4th on the list of old observatories. The site covers an area of 5,000 m^2, located on volcanic hills, in which the weather and erosion have made cracks. It includes special stone markers through which the cycles of the sun and the moon were followed and time was measured.

Figure 5-134 Megalithic Observatory Kokino

Section 2 – Kratovo

Rotonda. An early Christian basilica in the village Konjuh.

Cocev Kamen. A prehistoric observatory.

Locality of Kuklica. The stone towers near the village of Kuklica is a natural monument very characteristic. Among the religious buildings, the most characteristic are: St. John Church, built in 1836, and the St. Gorge Kratovski, built in 1925.

Radin Bridge. The municipality of Kratovo is characteristic for its old Macedonian architecture. Its main characteristics can be seen in the Kratovo city’s old houses and medieval stone towers, recognized as symbols of the city of Kratovo and located in its central area. They are embedded in the city surroundings, as stone and bricks. From the former 12 towers, there are only 6 towers left. No less important are the city's landmark stone bridges that are part of the former Old Town. Radin Bridge is the most representative bridge. Built in 1833 by Pasha Havzi, it is protected by the Law on Protection of Cultural and Historical Monuments.


Figure 5-135 Rotonda and Cocev Stone


Figure 5-136 Stone towers Kuklica and Radin Bridge

Section 2 - Rankovce

Church St. Nicholas in the village Opila. Building dating from XIII century; it is a unique church in Macedonia whose entrance is built on the eastern side.

Church St. Paraskeva in the village Radibush. Building dating from the XIX century.

Gradishte archaeological site. Located 2 km northwest of the village of Opila. Early Byzantine fortress is built on a 9 m high and steep hill, partly fortified and inaccessible, with a castle inside - a place with room for living, an underground tunnel and ladders. So far at the site, items of bronze and pottery from Iron Age, 6th century BC, have been found, namely: a massive bracelet, a ring and two ceramic containers.


Figure 5-137 Monuments from the locality of Gradishte

Figure 5-138 Church St. Nikola, village Opila and Church St. Paraskeva, village Radibush

Section 3 - Municipality of Kriva Palanka

St. Joakim Osogovski monastery. The municipality of Kriva Palanka is characterized by an important cultural - historical heritage, and a mark which is a synonym for the municipality is the Monastery St. Joakim Osogovski, built in 1848, located 3 km northeast of the town of Kriva Palanka. The interior and the porch are painted by the four most important Macedonian painters at the time. The most important part of the frescoes is located on the West side of the church, where the mural is painted with the impressive folk costume of Kriva Palanka. Its disposition is a monumental architectural basilica, which carries over 12 domes.

St. Dimitrija church. Built in 1833.

Figure 5-139 Church St. Dimitrija and Monastery St. Joakim Osogovski

Figure 5-140 Map of locations of Cultural Monuments in the railway corridor study area

With regards to archaeological sites, the following sites are registered for each section of the railway.

Section 1

In the territory of the Municipality of Kumanovo there are several archaeological sites, including:

- Pribovce, in the village of Bedinje (excavated in 1978)
- Drezga, in the village of Lopate (excavated in 1978, 1979, 1980)
- Kosoperska Karpa (excavated in 1983 and 1987)
- Na breg (excavated in 1968)
- Kodra Zulfi, in the village of Nikustak (excavated in 1991)
- Gradiste, in the village of Pelince (excavated in 1989, 1990 and 1994)

None of them are on the footprint of the railway project.

Section 2

The investor has already had an experience with the national procedure for protection of cultural and archaeological sites before the construction work started. In 1995, before starting the construction of Section 2 (Bejlakovci - Ginovce), the PERI submitted a request for opinion from the relevant institution on cultural/archaeological heritage (Ministry of culture/Administration on Protection of Cultural Heritage) to identify any archaeological site near the railway route, and if any research archaeological excavations were needed.

Based on the decision issued by the Administration on Protection of Cultural Heritage, a series of archaeological research excavations were performed in several designated locations along Section 2 (from Beljakovce, at K.P. 30+610 to Ginovci, at K.P. 56+700) These locations, five, are shown in *Figure 5-141*.

Figure 5-141 Archaeological sites found in 1995 relevant for the construction of the railway alignment (Section II)

A few other excavations were undetaken in year 2003 as an extension to the research in 1995 (e.g. at the Gradishte site near village Opila and at the Chiflachishte district).

Once the archaelogical investigations concluded, the archaeological sites were preserved and the decision to allow continuing with railway construction works was issued by the Republic Institute for Protection of Cultural Heritage. The investor continued with the construction works.

The location of the archaeological sites and their general characteristics are presented in *Table 5-31*. In following figures, the locations of the archaeological sites are identified on the topographic maps prepared by the relevant institution when the research archaeological excavations took place. Photos of excavated archaeological artefacts from one site – Gradishte in village Opila – are shown in *Figure 5-148*.

Location	Name	General description
km 33+600 – km 34+500	Locality Gradishte village Konjuh	Late antique period settlement with plenty of Christian symbols on the houses. Representative and a great religious and strategic town in the middle century.
km 48+400 – km 48+700	Savin Rid/Breg village Krilatica	Located on the left bank of Kriva river, typical roman settlement and necropolis from the II and III centuries, artifacts discovered: Greek plates, pottery and old roman coins. The dimensions of the archaeological site are 600 x 800 meters.
km 50+806 – km 52+700	Locality Gradishte village Opila	Originates from late ancient period, has a soft rock structure with living spaces like stairs and rooms dug in it. Large quantities of pottery and old construction materials were found. The necropolis Chiflachishte discovered in 2003 is located nearby.
km 53+700 – km 54+200	Mal Kamlesh village Rankovci	This is a Neolithic and Bronze period settlement. Potery and construction materials were discovered.
km 55+600 – km 55+800	Locality Crkvishte st. Marijana village LJubinci	Settlement and necropolis from the late ancient period. Along the surface pottery the old construction materials were found. Several graves with tombstones were found as well.

Table 5-31 Archaeological sites investigated in 1995 during the research archaeological excavations carried out for Section 2 of the alignment

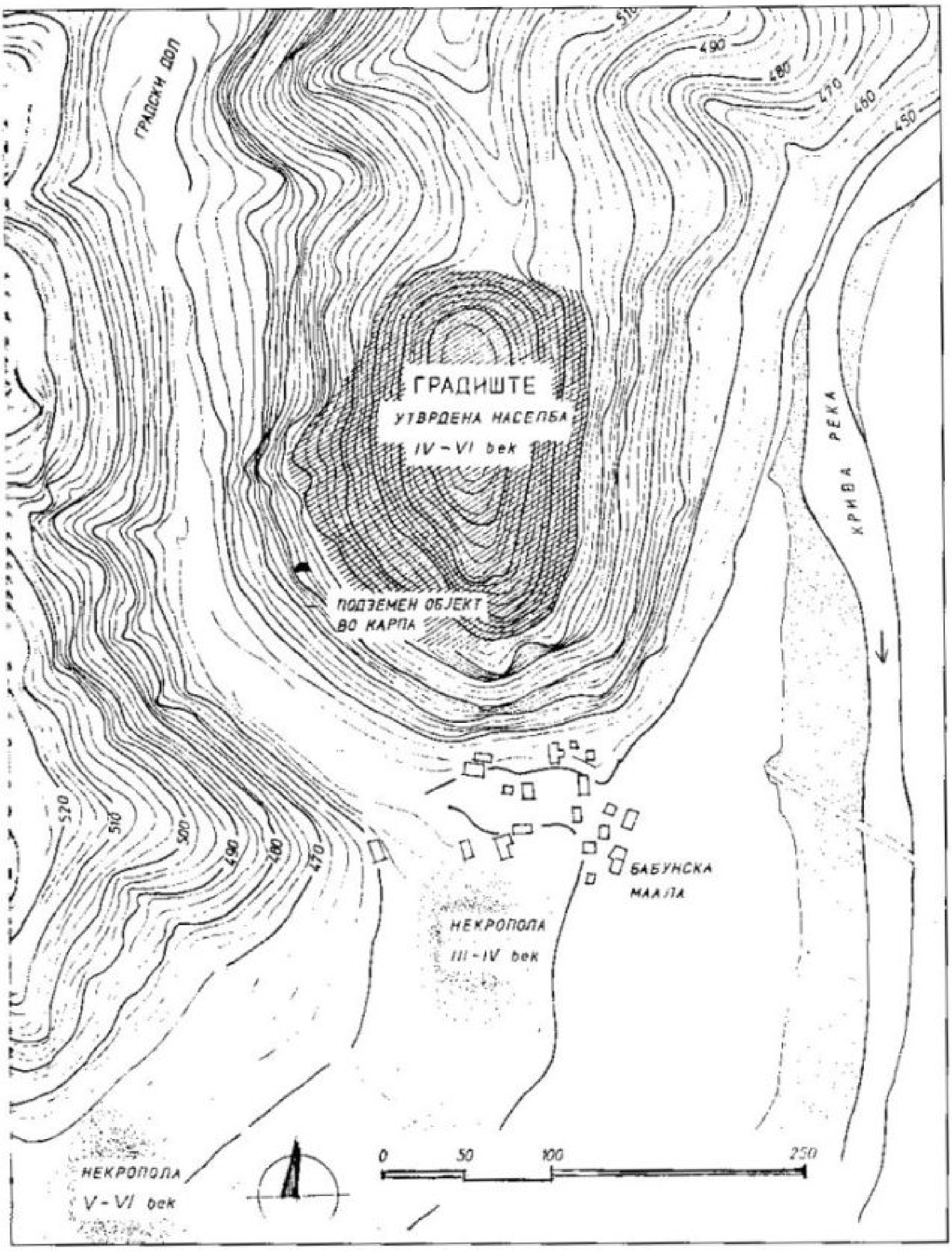


Figure 5-142 Locality Gradishte, village Opila, settlement and necropolis dated from VII century

Figure 5-143 Locality Gradishte, village Opila, late ancient necropolis (excavated in 1995)

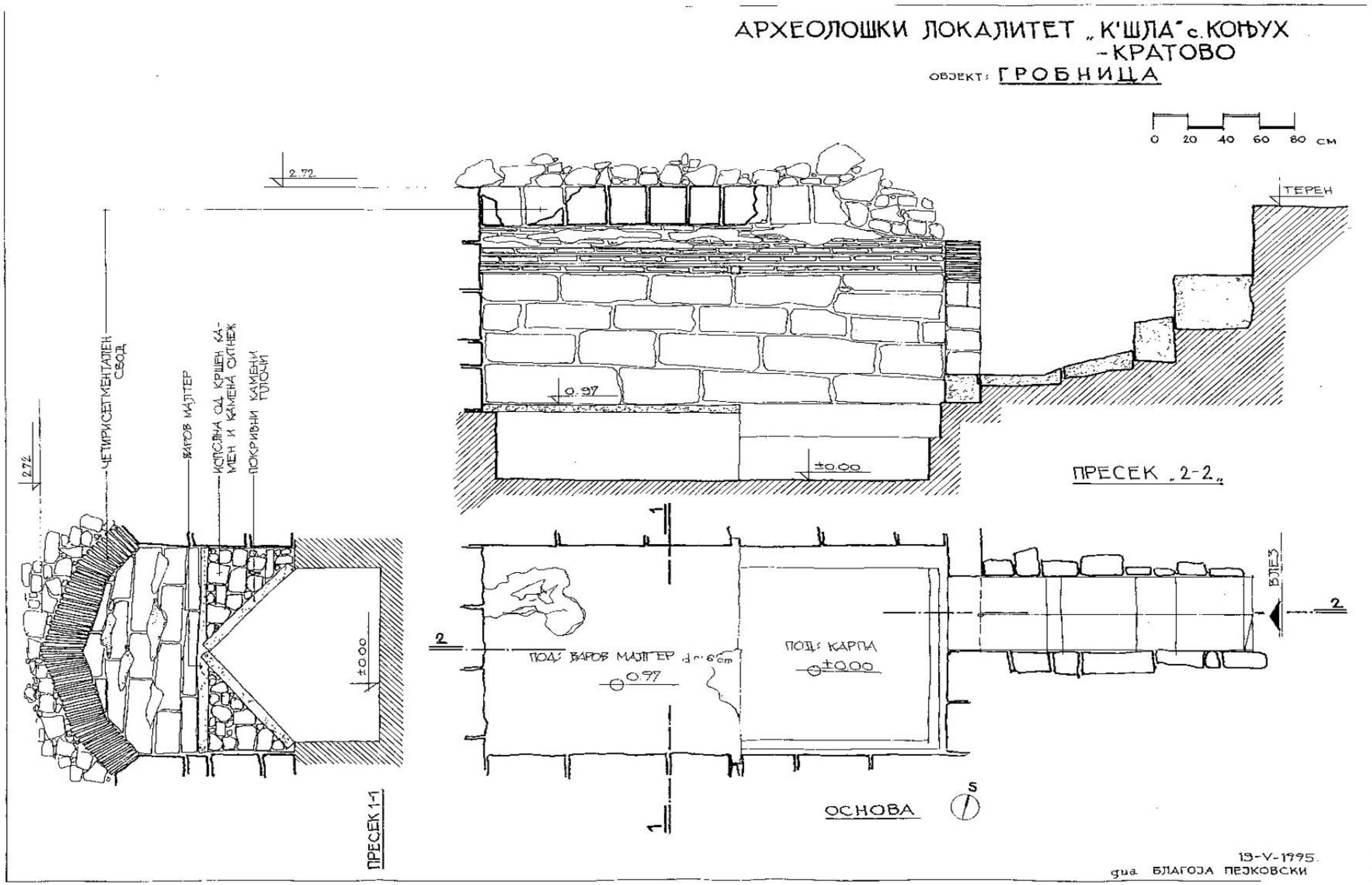


Figure 5-144 Locality Gradishte, village Konjuh, site "K'shla", K.P. 33+600 – K.P. 33+760

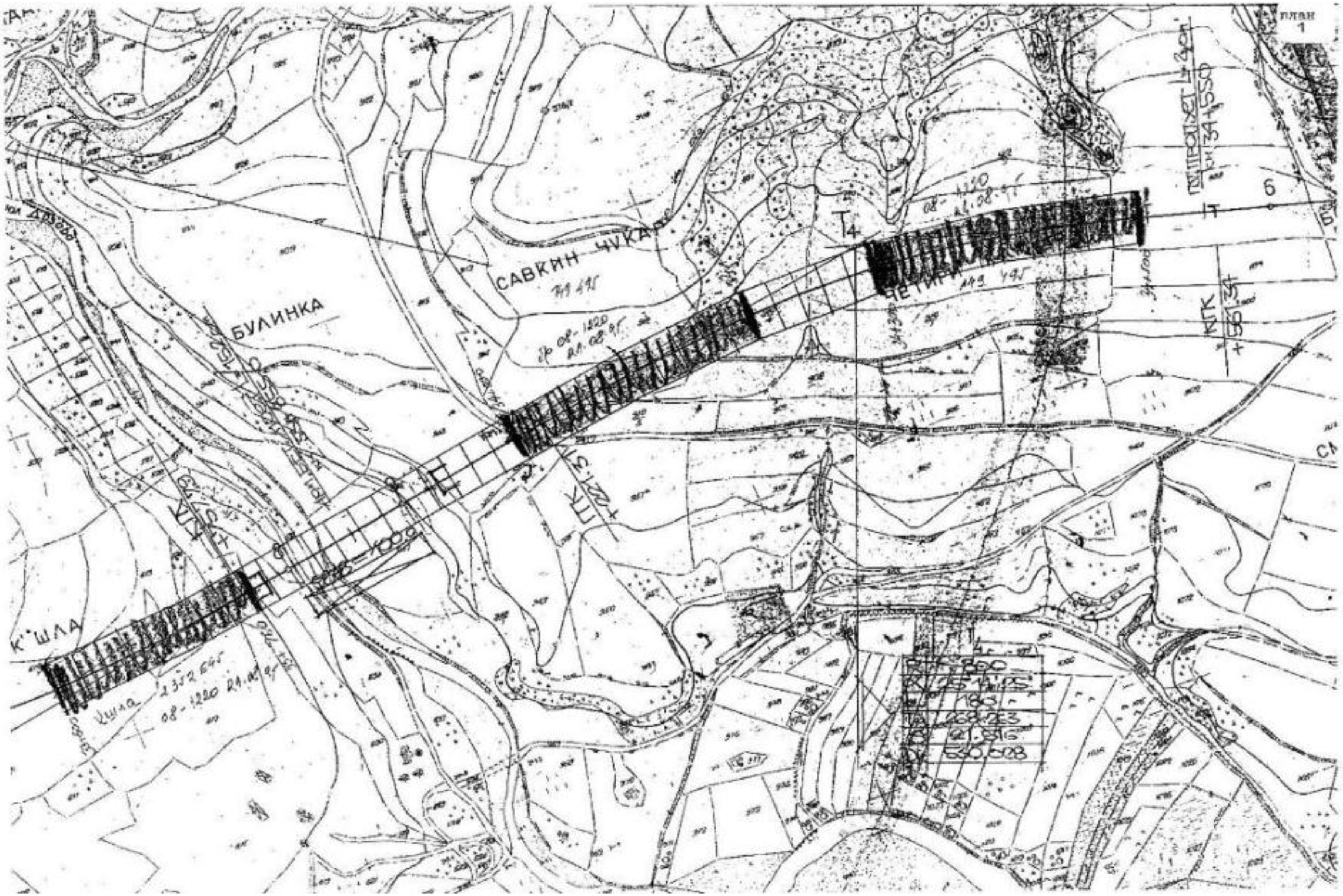


Figure 5-145 Locality Gradishte, village Konjuh, site "Savkin Chukar", K.P. 34+000 – K.P. 34+200

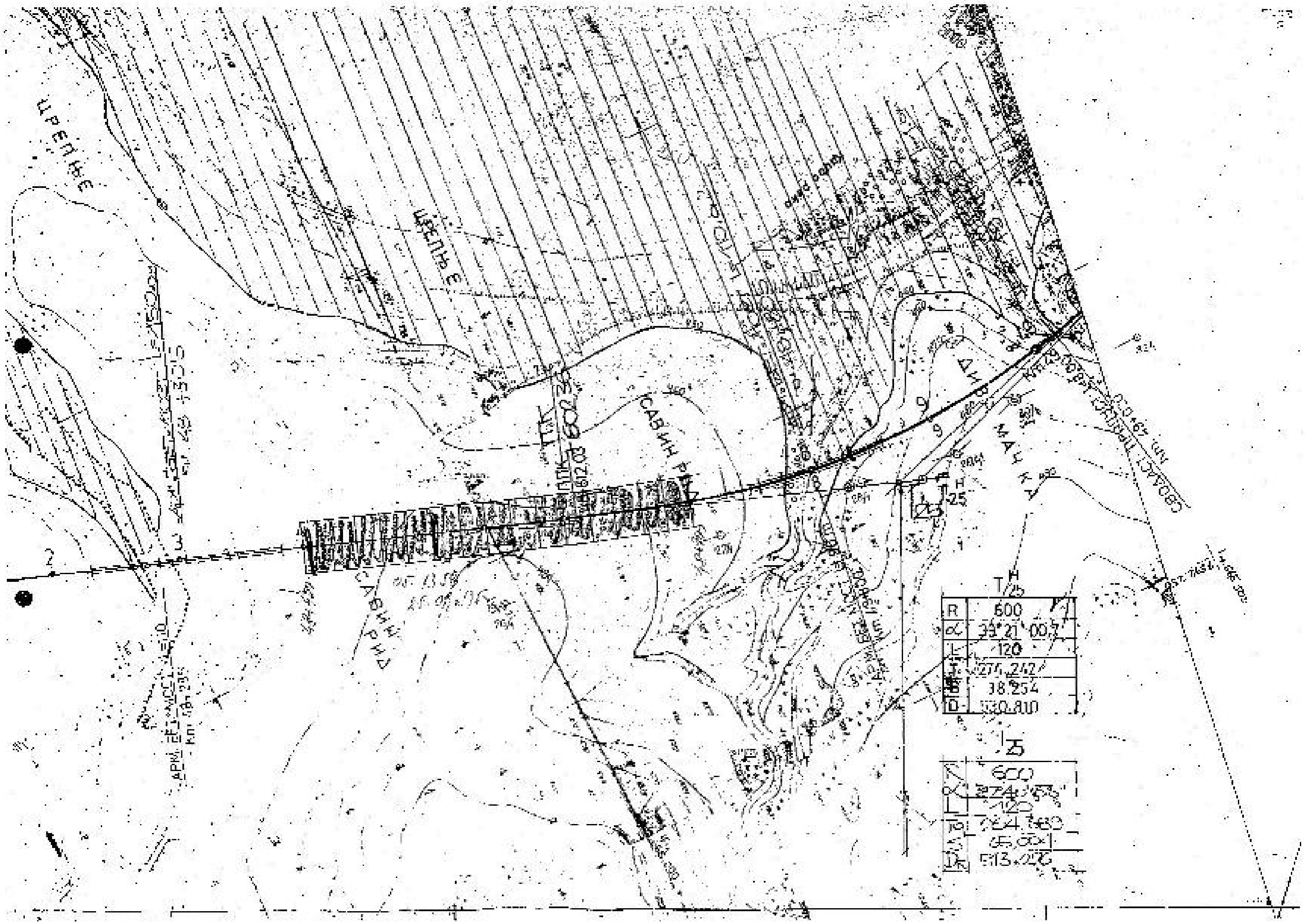


Figure 5-146 Locality “Savin Rid”, village Krilatica, K.P. 48+400 – K.P. 48+700

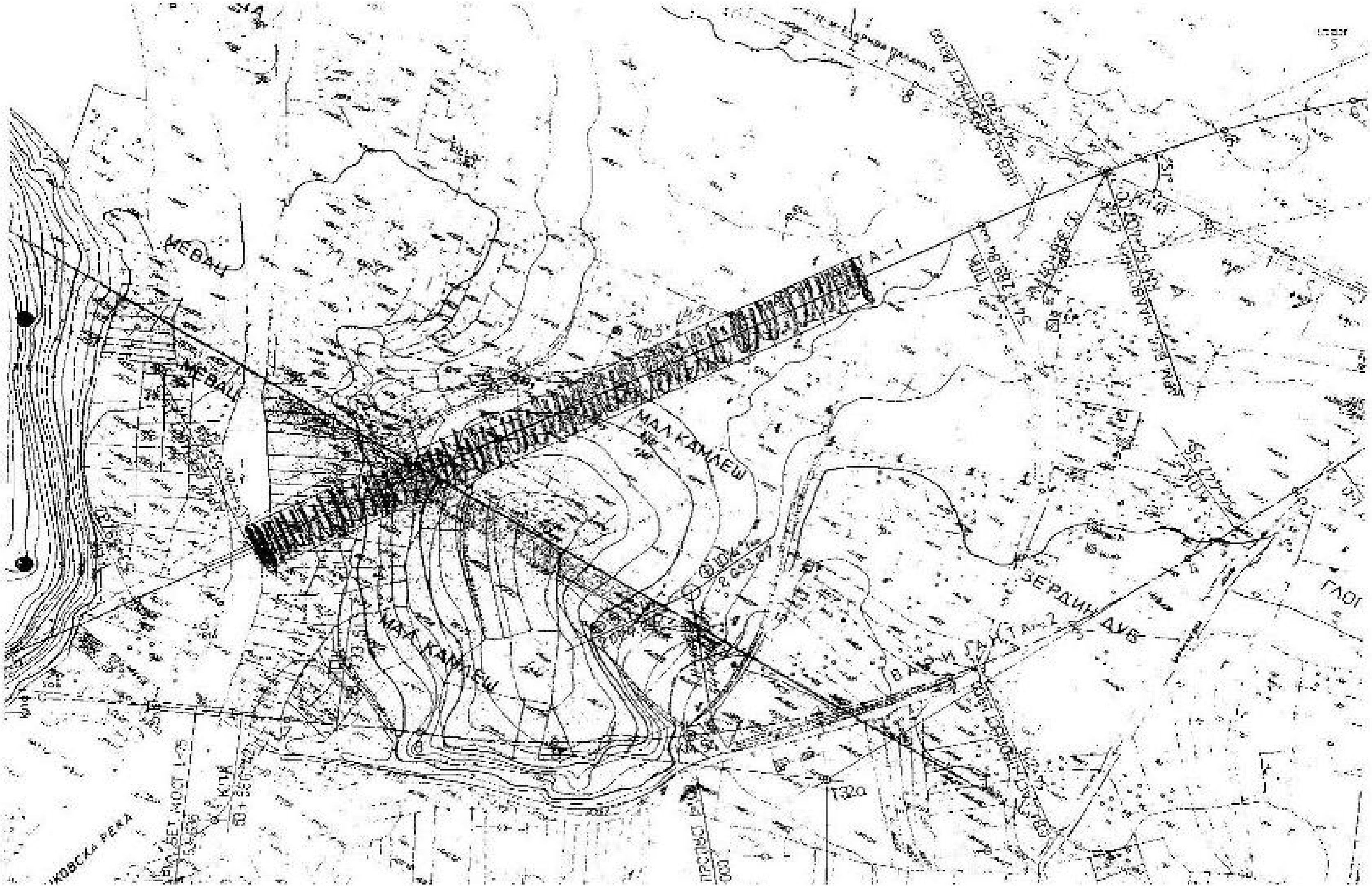


Figure 5-147 Locality "Mal Kamlesh", village Rankovce, K.P. 53+700 – K.P. 54+200

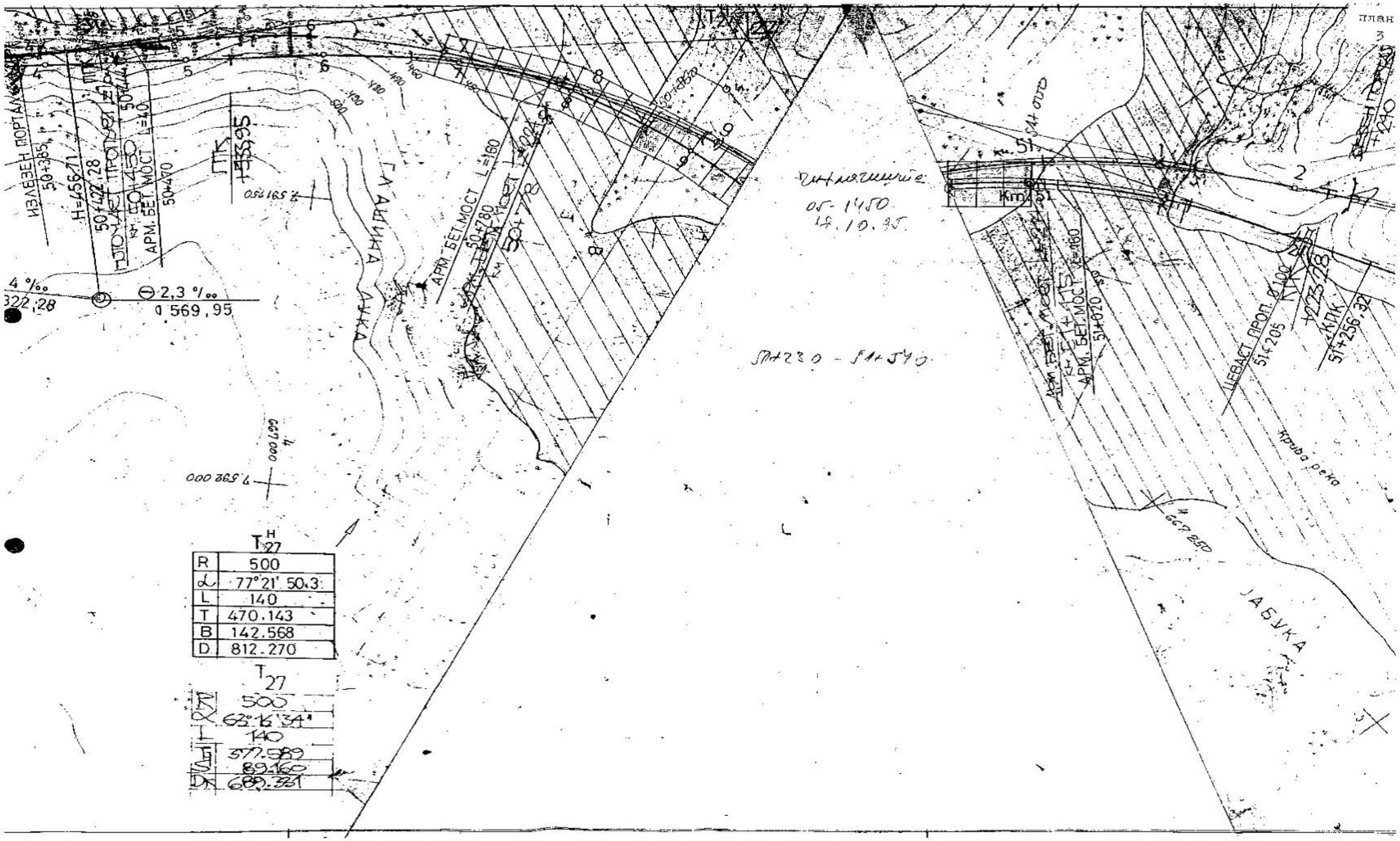
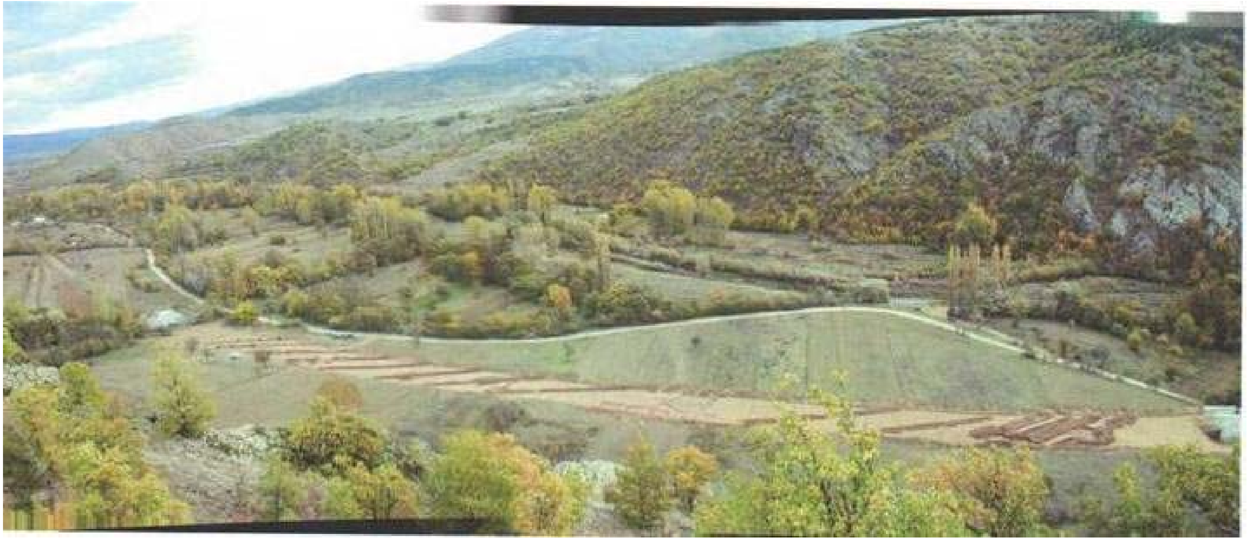


Figure 5-148 Locality “Chiflachishte”, village Opila, excavated in 2003



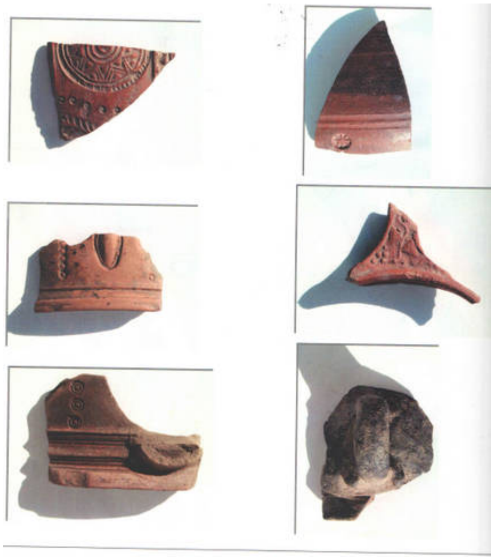


Figure 5-149 Photos of archaeological findings in Locality Chiflachishte, village Opila (2003)

Section 3

With regards to Section 3, there has not been official correspondence among the investor and the Administration for Protection of Cultural Heritage in order to identify whether there may be any archaeological sites in the vicinity of the railway alignment.

In the “Archaeological Map of Macedonia“(Book I and II, issued by the Macedonian Academy of Science and Arts, 1994) there are four cultural and archaeological sites that lay in the vicinity of the alignment:

- Three settlements from the late antic period: Gradishte, Podishte and Tavan, in the village of Konopnica.
- Kale – a small castle from late antic period, in Kriva Palanka;

The locations of all three sites are in the village of Konopnica are on the right side of the motorway Kumanovo-Kriva Palanka at a minimum distance of 500 m from the road and even farther from the railway alignment, which runs along the mountain side above the Kriva river, on the left side of the motorway.

The investor, PERI; has contacted the Administration for Protection of Cultural Heritage of the Ministry of Cuture in order to identify if any archaeological sites are in the vicinity of the construction area, and if any research and excavations are needed. The Administration for Protection of Cultural Heritage has responded that, to their knowledge and information available in their records, there are no archaeological sites in the vicinity of the railway alignment that could be affected.

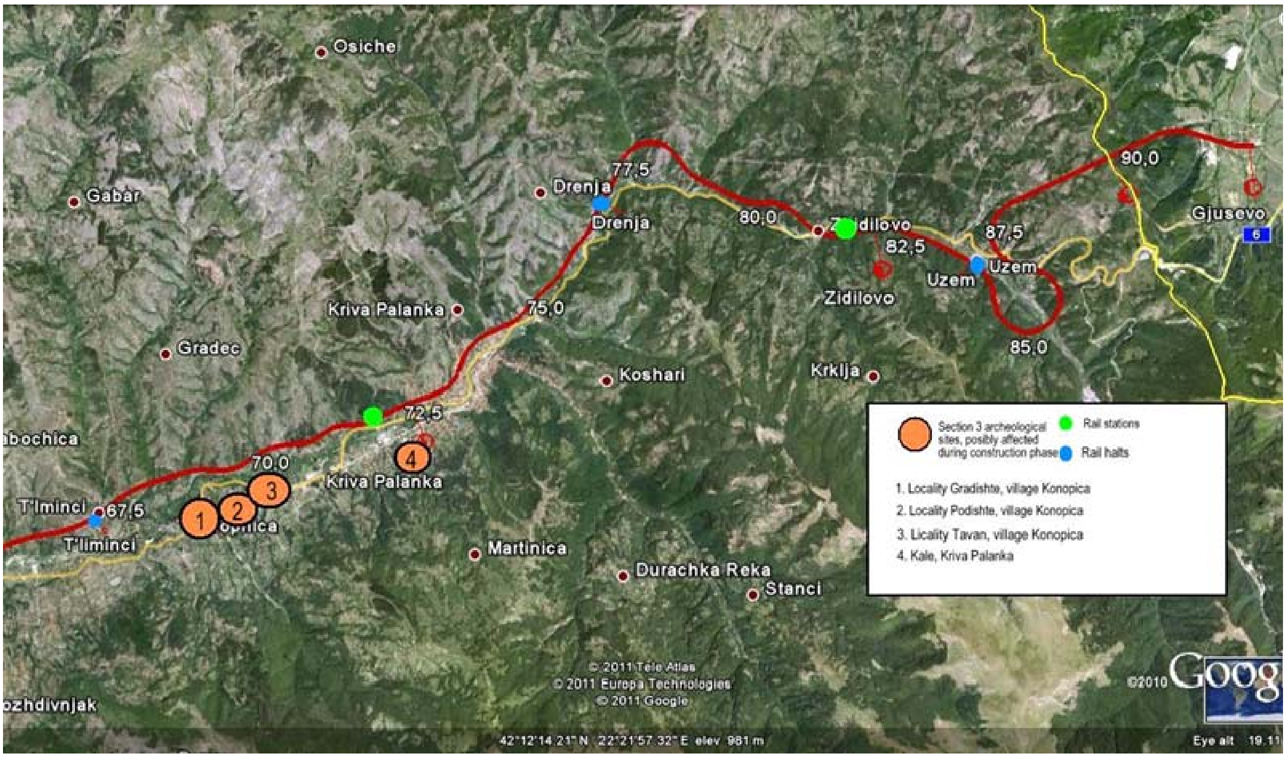


Figure 5-150 Archaeological sites in Section 3 of the railway alignment

5.2 BASELINE SOCIAL CONDITIONS

5.2.1 INTRODUCTION

This Chapter of the ESIA describes the socio-economic and land use baseline conditions in the wider region and locally in the Project potentially affected area. Furthermore the communities, their facilities and services, cultural, religious facilities and transport networks (public transport and pedestrian routes) which may be potentially affected by the Project are described.

Preparing a social baseline is a central part of the planning and implementation process. It provides key benchmark against which project performance and positive and negative impacts on people and communities can be assessed through periodic monitoring and evaluation during the life of the project. It is also a key element of the strategic social impact assessment and the evaluation of the Railway Project.

The Baseline study for the Project has been undertaken for all potentially impacted areas, and in particular the areas and communities likely to be positively and negatively, directly or indirectly influenced by the Project. Groups that need to be considered along the railway alignment are identified in the baseline study including: communities that may be displaced or affected, prospective host communities, vulnerable groups and other infrastructure areas.

Corridor VIII starts from the ports of Bari and Brindisi in Italy, and through the port of Durres and Vlore in Albania reaches the capital Tirana. The rail connection continues on towards the boundary between Albania and Macedonia. After crossing the border between Albania and Macedonia, the main route continues northward, passing through the city of Tetovo and ultimately reaching the capital city of Skopje; from there the route continues moving east, running along the main line, which crosses all of northern Macedonia, up to the zone bordering Bulgaria. Having crossed the border, the route continues in Bulgaria moving northeast and reaching the capital, Sofia; from here it moves eastward once more, passing through all of central Bulgaria, crossing cities and towns such as Plovdiv and Stara Zagora, until it reaches the port of Burgas on the Black Sea.

Large projects like this one should be considered as an opportunity for building transboundary, regional and local capacity (in relevant government agencies, academic and research institutions, and civil society organisations) to undertake social assessment and monitoring.

5.2.2 DATA SOURCES & METHODOLOGY

The baseline data collected has been used in conjunction with the defined assessment methodology to identify the presence of sensitive receptors, assist with determining the significance of the potential environmental and social impacts associated with the Project, and to determine where specific mitigation and monitoring measures are required.

The information required for the baseline section of the ESIA has been obtained from a number of sources, the main ones being:

- National strategies, reports, programs and analysis and documentations from the Macedonian Government, Parliament and ministries for the decisions and legislative base for construction of the railway part of the Corridor VIII in the Republic of Macedonia;
- Secretariat of the Pan European Corridor VIII, studies on the development of the railway axis;
- PERI documentation;
- Studies prepared in different periods (Feasibility Study for Railway links in Macedonia) for the necessity for construction of the rail line East-West;
- Consultation and data gathering exercises in the Republic of Macedonia (4th and 5th May 2011)
- State Statistical office of the Republic of Macedonia;
- Surveys and literature reviews;
- Field surveys;

- Aerial photos;
- Satellite imagery; and
- Geographic Information Systems (GIS).

Information used to characterize overall baseline economic and demographic conditions in the study area were assembled from data sources above and specifically available reports and publications. Secondary data was used to describe current conditions and historic trends in data such as total population, total households, household size, ethnic/minority population, total employment, employment by sector, earnings by sector, labour force, unemployment rates, household income and other general economic and demographic metrics.

Where applicable, the methods for obtaining data and for characterising baseline conditions have:

- Used internationally accepted techniques;
- Been undertaken in accordance with the environmental policy and legislation of the Republic of Macedonia; and
- Been carried out with reference to the EBRD policy requirements, EIB, IFC and the EU policies for environmental and social issues.

Consultation and data gathering has involved a number of sources, including personnel from the governmental authority, (government departments/ministries), municipalities, mayors and local communities, various NGOs and local interest groups.

A combination of methodologies has been applied to assess the potential socio-economic impacts:

a) Review of available technical specifications related to the proposed railway alignment to predetermine potential social impacts and affected individuals and groups.
b) General observations of land use on and in close proximity to the proposed alignment.
c) Potentially affected individuals and groups have been identified from the onset and also in the process of conducting the assessment. Conducting consultation meetings with representatives of stakeholder groups is forming the main trust of this assessment. The potential affected stakeholders include:
    - Local authorities;
    - Local institutions;
    - NGOs;
    - Private companies;
    - Individual households living on and nearby the projected alignment;
    - Individual households with private ownership to land on the projected alignment.
d) Secondary data have been collected and scrutinized. Review of various studies and reports including available statistical material.

Meetings have been carried out with the Municipalities of of Kumanovo, Kratovo, Rankovce, Kriva Palanka and Staro Nagoricane. Information from the municipalities on important issues has been obtained, such as urban plans, importance of the railway for socio-economic development, employment/unemployment situation, migration patterns, business development, main economic activities and Small Medium Enterprises (SMEs).

Public consultations and scoping meetings have been held within the municipalities of Kumanovo, Kratovo, Rankovce and Kriva Palanka (4th and 5th of May 2011). All possible stakeholders within the concerned municipality were invited, i.e. directly affected residents/property owners and related community based organizations from the municipalities, all villages affected by the Project within each Municipality, investors, union representatives, trade & commerce, private companies, municipal administration representatives and NGOs.

5.2.3 SOCIO-ECONOMIC STUDY AREA DEFINITION

The socio-economic study area is defined to include and to assess part of the Trans-European Corridor VIII agreed to be constructed between the countries is South East Europe. The countries in the region and the neighbouring countries will also benefit from the railway development.

The geographical area of influence of the study for the baseline assessment is part of the European Rail Corridor VIII. The socio-economic study is defined to assess all aspects for the realisation of part of this Corridor. The assessment includes baseline conditions of key social resources, positive and negative impacts of the proposed Project, consultation with people who may be affected by the Project, development of design and operating practices that is sufficient to avoid, reduce, or compensate significant adverse social impacts and development of monitoring programs for accomplishing its goals and to develop and refine the effectiveness of mitigation measures. Also the focus of interest is to present findings and data and to offer measures which should be in line with national and international standards.

Rail Corridor VIII *(Figure 5-151*) which connects East with West of the Southern part of Balkan Peninsula has length of 313 km and is not completely finished. Only 154 km (50% of the total lengths) are built. As a result, there is no rail link between Macedonia and neighbouring countries, Albania and Bulgaria.

Rail Corridor VIII together with Road Corridor VIII, as South Eastern European Transnational Axis will significantly develop the transport network in the Balkan Region and it will be a bridge between Europe and the Far East and a factor for peace and development of the intraregional economies.

Corridor VIII for the Republic of Macedonia has great strategic and economic importance. Besides being a railway link between the Black and Adriatic Sea, in addition, this Corridor links large gravitational fields of the East (Romania, Russia, Ukraine, Turkey, Middle East etc.) and West (through ports of Brindisi and Bari in Italy, towards Europe).

Figure 5-151 Transnation Axis Corridor VIII

5.2.4 SOCIO-ECONOMIC REGIONAL STUDY AREA

The socio-economic regional study area is defined to include and to assess territory of Republic of Macedonia with spatial attention towards North–Eastern region of the country. The North-Eastern Statistical Region is one of eight arbitrary statistical regions in the Republic of Macedonia. To the north of this region is spreading to the border with Republic of Serbia, on the East with the border of the Republic of Bulgaria and the boundary with these countries are the same as of the region. Internally, this region borders the Skopje and Eastern statistical regions.

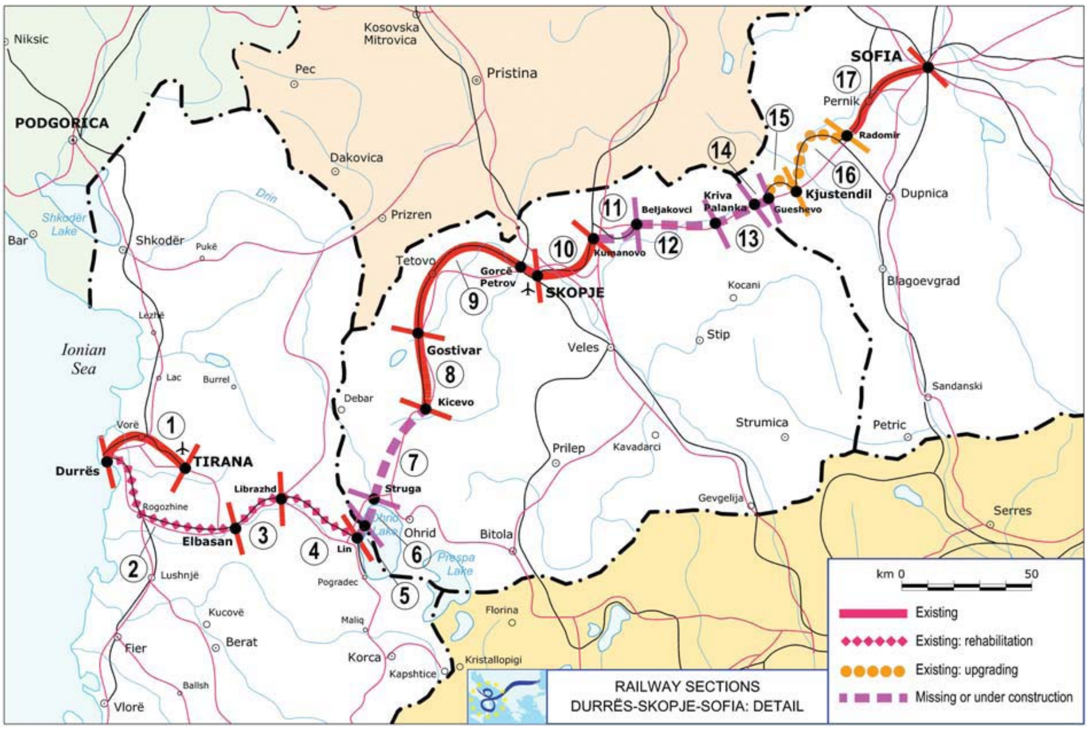


Figure 5-152 Regional part of Corridor VIII

The North-Eastern region as a whole has never been covered by railway services. It is strongly justified, both strategically and economically, to have the corridor East-West completed.

This study area requires comprehensive environmental and/or social impact assessment, to identify and assess the potential future social impacts associated with the proposed Project, identify potential improvement opportunities, and recommend any measures needed to avoid, or where avoidance is not possible, minimize and mitigate adverse impacts. The potential areas of influence are larger than the North Eastern region of Macedonia and represent the Regional Study Area.

Figure 5-153 Transport network in Macedonia

Rail link with connection of important and underdeveloped regions can create additional economic and socials possibilities. The construction of the Corridor will contribute to economic prosperity on the local, regional and national level and prevent migration from these regions. Also the strong orientation in the three neihghbouring countries is created to construct a modern infrastructure of international importance, based on support from the national and European funds.

5.2.5 SOCIO-ECONOMIC LOCAL STUDY AREA

Socio–economic local study comprises six municipalities located at the most remoted northeast part of the Republic of Macedonia (Lipkovo, Kumanovo, Staro Nagoricane, Kratovo, Rankovce and Kriva Palanka (*Figure 5-154*). The Region includes 192 inhabited settlements, 189 of which being rural settlements. The total area of the region comprises 2,310 km^2 and is inhabited by 172.787 residents, i.e. around 9% of the total area and total number of population in the Republic of Macedonia. The population density is 75 residents/km^2 which is almost equal with the average density of the country (81 residents/km^2).

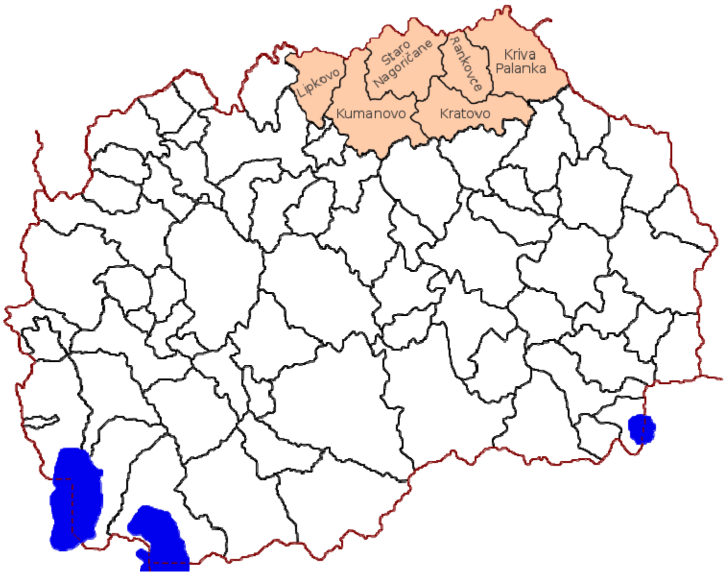


Figure 5-154 Municipalities within North-Eastern region of Macedonia

The following directly or indirectly influenced settlements were identified during preparation of Stakeholder Engagement Plan: Kumanovo, Roma settlement Pero Čičo within town of Kumanovo, Proevce, Dobrochane, Suplji Kamen, Klecovce, Dovezence and Beljakovce within section 1, Kratovo, Dimonce , Ketenovo, Krilatica, Pendak , and Schopsko Rudare, Rankovce, Petralica, Ginovce, Ljubince , Opila, Rankovce within Section 2 and T`lminci, Konopnica, Kriva Palanka, Koshari, Varovischte, Gradec, Lozanovo, Kiselica, Drenje, Zidilovo, Krklja, Uzem and Kostur in Section 3. These settlements comprise Local Study Area (*Figure 5-155*)

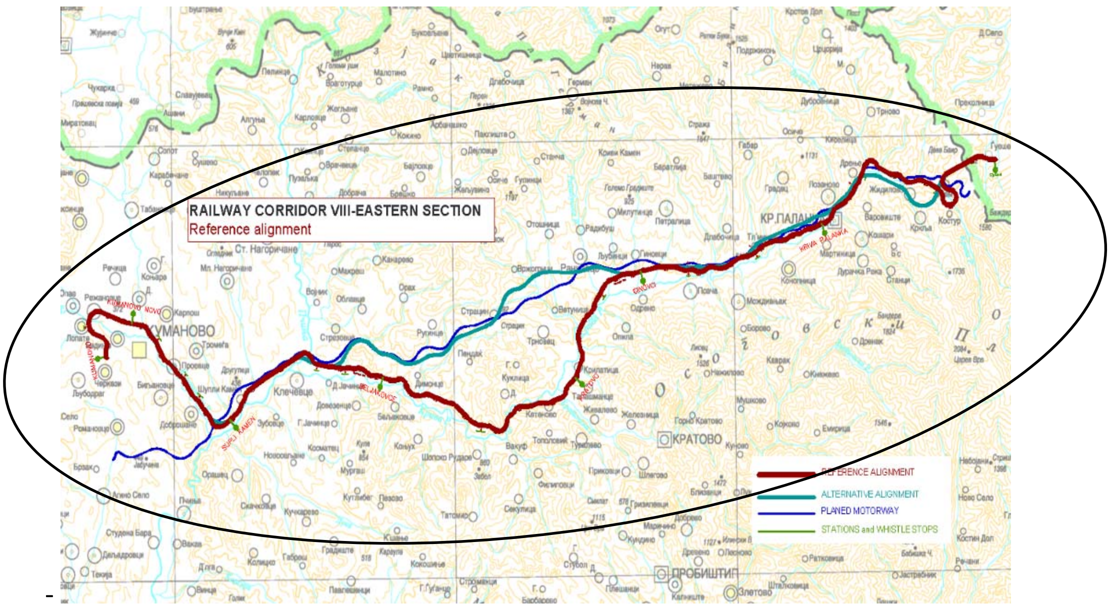


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Figure 5-155 Local Study Area

The North-Eastern planning region comprises 146.346 hectares agricultural area, with 79.800 hectares thereof being tilled soil. The forests cover 49.295 hectares. The most significant rivers in this region are the Lipkovska Reka and the river Pcinja in the western part, then the Kriva Reka in the northeast part, i.e. the Osogovo area of the region. The resources available in this region include: minerals such as copper, lead, chromium, arsenic, antimony and zinc, then the bentonite clays, quartzites and opal breccia, in addition to the hydrographic resources that should not be neglected, such as the thermal waters.

5.2.6 ASSUMPTIONS & LIMITATIONS

A limitation on one of the data set has been the latest available census data is from the Census undertaken in 2002. However all available recent data, from different sources was compiled and used in preparation of this study in order to present more or less the current socio –economic baseline within this region.

5.2.7 LAND USE BASELINE CONDITIONS

5.2.7.1 INTRODUCTION

The North-Eastern planning region is characterized with high heterogeneity and comprises medium productive lands, with high productive lands extending along the course of the Kriva Reka and with the mountainsides covered with high productive lands suitable for cultivation of organic potatoes and beans etc. The mild relief and ravines along the course of the Kriva Reka are suitable for field and garden products, in addition to the high productive pastures extending in abundance are fit for breeding cattle, sheep and goats.

Historically, the investigated area has been populated permanently for millennia. The area is hardly urbanised. Two urban systems touch the investigated corridor, towns Kumanovo and Kriva Palanka. The strong and long-lasting human impact on the environment, especially forests, resulted in different kinds of changes in the sense of degradation of the natural environment and the production of new, managed eco-systems. These are very diverse, mainly small fields and acres, vineyards, orchards, meadows and others. They are developed according to the traditional less intensive way of crop growing which still remains.

The dispersed type of village settlements in north-eastern Macedonia causes distribution of very sparse small groups of houses over large areas. The presence of isolated houses is also common, surrounded by fields, acres, vineyards, orchards, meadows, natural vegetation and individual trees.

The following types of soil are present, namely: clay soil, reduced clay soil, alluvium and eluvium soil of medium percentage of humus varying between 1-3% and being rather scanty of phosphorus, however, suitable for growing all of the agricultural and garden cultures, as well as fruit and wine growing.

In Section 1, the characteristic types of land use are urban settlements and to a lower part rural settlements, agriculture land use, farming, orchards, vineyards, grasslands and meadows.

In Section 2 the land use is mostly pasture and to a smaller degree orchards, viniculture and farming. The wooded areas are not silvicultural managed, with the exception of private usage of firewood. Because this region is very sparsely populated no intensive forms of land use exist.

In Section 3 there are many areas of agricultural land use and orchards. Most of the area though is forest and they are anthropogenic manipulated. Agriculture land can be found along the riversides of the river Kriva Reka in the formerly marshlands. Above the floodplain on the hillsides unmanaged grasslands and hill pastures alternate with forests. Near the border the land use is forestry, and in former times there was also mining.

5.2.7.2 LAND USE TYPES

In Macedonia there are two types of land use, agricultural and construction land. Agricultural land can be following an adequate transforming procedure being turned into construction land.

The Law on Agricultural Land regulates the 'exploitation, disposal, protection and land-use change' of agricultural land.

According to the land use in the area there is the following classification of land: agricultural land, cultivated land, arable land and gardens, orchards, vineyards, meadows and partures. Based on *State Statistical Office, Skopje,* area by category of use in 2008 the North-Eastern region contains the following:

agricultural area 145,286 ha, cultivated land – total 78,749 ha, arable land and gardens 64,540 ha, orchards 954 ha, vineyards 1,620 ha, meadows 11,635 ha and pastures 66,529 ha.

There is classification of arable land according to cadaster culture, according to this the following classifications are applicable: field, rice field, garden, orchard, intensive orchard, vineyards, intensive vineyards, meadows, pastures, forest and fishing rod and marshland. Permanent land take in *Chapter 3* is based on this classification.

5.2.7.3 LEGAL, REGULATORY & POLICY CONSIDERATIONS

Chapter 2 of the ESIA describes the overarching and key national legilsation and policy framework relevant to the Project. Below specific legislation, regulations and policy relevant to the Land Use topic are noted:

- The Law on Expropriation (Official Gazette Nos. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08 and 76/10);
- Law on Property Cadastre (Official Nos. 40/08, 158/10 and 51/11);
- Law on Survey and Land Cadastre (Official Gazette Nos. 34/72 and 13/78);
- Law on Ownership and Other Material Rights (Official Gazette No. 18/01);
- Law on Nature Protection (Official Gazette Nos. 67/04, 14/06 and 84/07);
- Law on Agriculture & Rural Development (Official Gazette No. 49/10);
- Law on Agricultural Land (Official Gazette No. 135/07);
- Law on Forests (Official Gazette No. 64/2009);
- The Law on Vine (Official Gazette No. 69/2004);
- The Law on Organic Agricultural Production (Official Gazette No. 16/2004) deals with the control over the production of organic agricultural products. Its aim is to provide production of food with affirmed quality, to protect the consumers, to protect natural resources from pollution, and to promote the sustainable social, economic and rural development;
- The Law on Agricultural Inspection (Official Gazette No. 38/2004) regulates the manner of organization of the agricultural inspection work, inspectorate's competences, authorizations and modes of performing the work. According to this law the agricultural inspection is carried out by the State Agriculture Inspectorate that is formed as a body within the Ministry of Agriculture Forestry and Water Economy;
- The Law on Plant Health (Official Gazette No. 29/2005) - which is based on the Council Directive 2000/29/EEC and the Law on Plant Protection (Official Gazette No. 25/1998) deals with the measures and obligations in connection with protection of the plants; and
- The Law on Seed and Seedling Material (Official Gazette No. 41/2000) which deals with quality and distribution requirements of seeding material; still needs to be harmonized with the relevant Directives.

5.2.7.4 LAND USE TYPES ALONG RAIL CORRIDOR PER SECTION

Section 1 Kumanovo - Beljakovce

The corridor within the Section 1 from Kumanovo to Beljakovce follows the courses of the rivers Kumanovska and Pcinja. The relief of this region is a smooth to wavy terrain. The ground level elevations vary between 290 to 404 m above sea level. The maximum altitude is 404 m (Golem rid).

The characteristic types of land use are urban settlements and to a lower part rural settlements, agriculture land use, farming, orchards, vineyards, grasslands and meadows. The fraction of none productive or less intensive used areas compared to the other parts of the whole investigation corridor is relatively small. None productive forms of landscape structures are rivers with marshland, willow groves, shrubs and individual trees. The farming areas are small fields and parcels of land. See below *Figure 5-156* Land Use Map for Section 1.

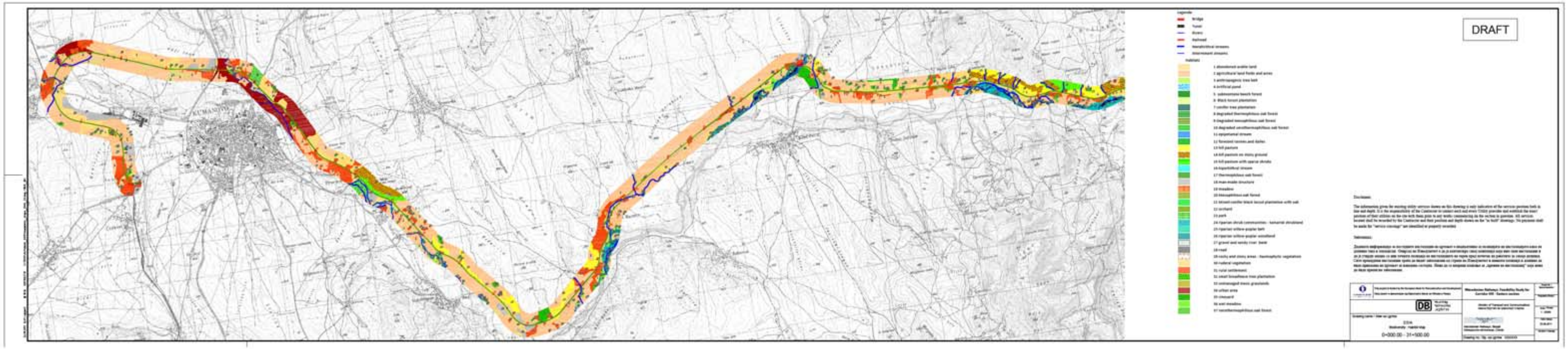


Figure 5-156 Land Use Map Section 1

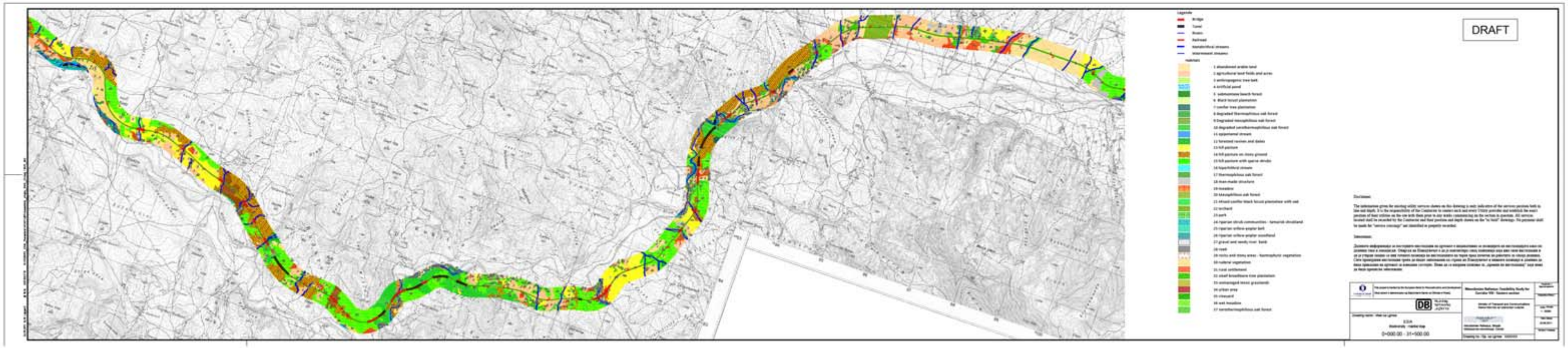


Figure 5-157 Land Use Map for Section 2

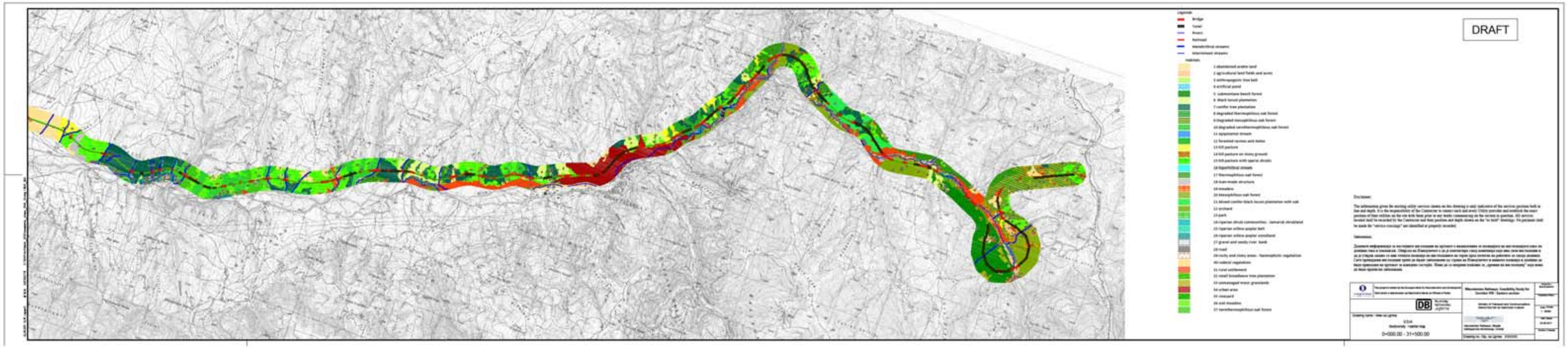


Figure 5-158 Land Use Map for Section 3Detailed

Detailed maps can be found in *Annex 9 – Land use types*

Figure 5-159 Marshland near Supli Kamen in Section 1

Section 2 Beljakovce –Kriva Palanka

Within Section 2 the corridor follows for the most part the valley of the river Kriva Reka. In this middle part of the railway route the valley is a deep cutting canyon with steep slopes. The maximum altitudes are round 670 m. The land use is mostly used as pasture and some smaller areas are used for orchards, viniculture and farming. The wooded areas are not silvicultural managed, with the exception of private usage of firewood. Because this region is very sparsely populated no intensive forms of land use exist. See *Figure 5-157* Land Use Map for Section 2.

Figure 5-160 Hill pastures in the Sopsko Rudare Area in Section 2

Section 3 Kriva Palanka- Bulgaria border

At the beginning of Section 2 of the corridor much of the land is used for agriculture and for orchards, but the largest fruit growing areas near Ginovci have been abandoned. Northwest of Ginovci wooded forest areas increase. Thus coniferous forests dominate. In the last part of Section 3, in the higher mountainous locations oak and beech forests are mainly dominant. Agricultural land can be found along the riversides of the river Kriva Reka in the former marshlands. Above the floodplain on the hillsides unmanaged grasslands and hill pastures alternate with forests. In the region of Kriva Palanka: the topography is a wide open valley with sides flaring out. The maximum altitudes lay round 800 m. In the final part of the section near the Bulgarian border there is a mountainous region with maximum altitudes of 1,125 m. The land use is forestry, and in former times there was also mining (see *Figure 5-158* Land Use Map for Section 3).

Figure 5-161 Small acres, neglected grasslands and deciduous forests near Uzem in Section 3

5.2.7.5 AGRICULTURAL LAND USE

One of the most important sectors for the economy in Macedonia, according to the statistical data is agriculture. Other sectors include mineral extraction and metal processing industries, telecommunications, trade and food production and beverage production.

The agricultural sector plays an important role in Macedonia's economy through its contributions to GDP (agriculture accounts for 16 percent of GDP), employment, trade and the rural economy. Macedonia's comparative advantages in agriculture lie in abundant labour, fertile soils, a range of moderate continental and Mediterranean micro-climates in the south (though with water deficiencies and occasional droughts in parts of the country) and natural upland pastures. About 49 percent of the total land area, or 1.16 million hectares (ha), is agricultural land, split evenly between cultivable land and pastures; a further 37 percent of land is forest, while the rest includes lakes and urban areas. About 80 percent of cultivated land is farmed by approximately 180,000 private family farms that are becoming increasingly commercially-oriented. The remainder is farmed by 136 agricultural enterprises. Agricultural growth is largely determined by a growing but fluctuating crop sub-sector, with livestock making a stable but smaller contribution to agricultural productivity.

Macedonia is a net agricultural importer. As with other countries in the region, increasing trade liberalization and modernization of the economy are transforming Macedonia's agricultural sector. While opportunities presented by increased trade are great, unless producers and agro-processors can become more competitive they will have trouble competing in both external and internal markets, as low-cost, high-quality imports increase. In addition, the agro-processing sector is constrained by out-dated equipment and poor marketing; an inability to meet increasingly important food safety standards; limited access to rural credit markets, and weak extension services capacities.

Effective use of agricultural land in Macedonia is hampered by parcelling and fragmentation stemming from previous limitations on usable areas and ownership, inheritance customs, as well as a tradition of informal relations in the land market.

The most important economic sector within the three municipalities of Kumanovo, Kratovo and Kriva Palanka is agriculture, especially within the investigated corridor. In all three municipalities the private sector owns 85–90 % of the arable land. Mostly everywhere in the investigation area pastures belong to the public sector, for example 70 % in Kumanovo and Kriva Palanka with around 50 % in Kratovo. The forests show an homogeneous public sector-ownership-distribution: 46 % in Kumanovo, 23 % in Kratovo and 72 % in Kriva Palanka .

Land use as "arable land" dominates with 62% in Kumanovo, 40 % in Kratovo and 34 % in Kriva Palanka. The second largest land use as pastures rises to 21 % in Kumanovo, 39 % in Kratovo and 27 % in Kriva Palanka. Woodlands prevail in the mountainous area of Kriva Palanks with 29 %, in comparison with 11 % in Kratovo and only 3 % in the Kumanovo area. The proportion of arable land is obviously much higher in the flat, lowland areas whereas in the hilly areas stock breeding and forestry dominate. About 90 % of the arable land is used as farmland, the rest is used as meadows, orchards, vineyards and quite seldom as gardens.

Today for example in the municipality of Kratovo, there is an intensive production only to a small part of arable land. A large part of the arable land is abandoned as a result of migration of the population.

The agricultural land in general is characterized by smaller or bigger areas with only one plant species. Biomass production is very big compared to similar natural ecosystems, but it has low bio-diversity value. The agro-ecosystems along the planned railway line from Kumanovo to Deve Bair are mostly of the type "small acres and parcels". Only a small percentage is represented with big fields and plantations.

The most of the orchards in the area are small individual parcels separated by fields. Apricots, apples, cherries, peaches, pears, plums and walnuts are the most frequently cultivated fruits.

A very small amount of the land is covered by big fields and plantations, mainly weed and corn. Industrial plants are very seldom cultivated except for some fields of sunflower. Typical gardens don't occur very often in the investigation area, they are usually mixed with fields and regularly surrounded by fruit trees. Vineyards also are very seldom; they are not characteristic for this part of Macedonia and so represent a smaller percent. The ratio of small parcels and plantations is the same as for the orchards and fields.

Agricultural production is organized through small farms and their fragmentation which results in high costs per unit and production inefficiencies. Crop production is outdated; technologies are old which result in low yields/quality of products. There is weak horizontal integration between farmers associations, cooperatives and producer groups, resulting in weak political influence, low bargaining power for purchase of inputs and sale of products. Weak vertical integration between farmers and processors leads to excess supply and wide price variations, inadequate raw material supply in terms of timing, quantity and quality, use of imported raw materials to compensate and under-usage of installed capacities.

There is a low level of farmer education and training, which results in conservative attitudes to innovation. with weak support services such as: market information, credit, research/extension, support policies (which result in weak market orientation, farm under capitalization, low rate of innovation, lack of medium term production planning and organisation). There is also a lack of product quality (market). Processing technologies are outdated resulting in low productivity, high costs and lower quality products.

Natural pastures are a precondition for quality farming and production of milk and dairy products. In Kumanovo there are capacities for processing of meat and dairy products which is a very important development factor for stockbreeding.

Within the *NATIONAL AGRICULTURAL AND RURAL DEVELOPMENT STRATEGY (NARDS) for the period 2007-2013* the usage of the whole of the available agricultural land for production of healthy organic food is seen as the most valued and demanded products in the world market. The North-Eastern region has good predispositions for production of these kinds of agricultural products. The minimal monthly net income for workers in agricultural sector is 5.917,00 Denars (96 Euro).

5.2.8 LOCAL SETTLEMENTS & COMMUNITY FACILITIES/SERVICES BASELINE

5.2.8.1 LOCAL SETTLEMENTS & COMMUNITIES PER PROJECT SECTION

Excluding the towns of Kumanovo and Kriva Palanka which are urbanized, all other settlements (Proevce, Dobrochane, Suplji Kamen, Klecovce, Dovezence and Beljakovce within section 1, Kratovo, Dimonce , Ketenovo, Krilatica, Pendak, Schopsko Rudare, Rankovce, Petralica, Ginovce, Ljubince , Opila, Rankovce within Section 2 and T`lminci, Konopnica, Koshari, Varovischte, Gradec, Lozanovo, Kiselica, Drenje, Zidilovo, Krklja, Uzem and Kostur in Section 3) along the railway line are rural in character, and most of them can be characterized with a very low standard of living in terms of physical and social infrastructure, which results in migration, an ageing population, low education and unemployment of rural population. For some settlements lack of alternative (off-farm) employment/income generation opportunities leads to over-dependence on agriculture as sole source of income, low wages and poverty. The North-Eastern region has an extremely high proportion of children at risk of poverty, reaching over three fifths when measured in relation to household income (more details are presented in 5.2.7). The Plan for the North-Eastern region, includes activities to develop rural tourism as one way to augment the income for the rural population (for more detail please refer to http://www.northeneasttourism.com).

This subchapter describes the local settlements and communities along the line, identified during stakeholder engagement process. More details are given in Subchapter 5.2.7. regional/national socio baseline.

Section 1 Kumanovo Beljakovce

Already established railway line in Section 1 goes through Municipality of Kumanovo. This will be directly or indirectly influenced by the rehabilitation of the railway line within Section 1, the following settlements within Kumanovo Municipality were identified during preparation of Stakeholder Engagement Plan:

Kumanovo, Roma settlement of Pero Cico within Kumanovo town, Proevce, Dobrochane, Suplji Kamen, Klecovce, Dovezence and Beljakovce (see *Figure 5-163*).

Kumanovo is the biggest urban settlement and municipal center with a population of 70,872 . The whole North-Eastern region gravitates towards this city. It is situated in the northeast of the Republic of Macedonia, at an altitude of 340 meters on the very crossroads of the two most important transport corridors in the country, Corridor VIII and Corridor X. According to the municipal area Kumanovo is the largest municipality in Macedonia with 509.48 km^2 and 105,484 citizens.

Figure 5-162 Kumanovo settlement

The vantage geographic point and the road infrastructure led to the fast economic, administrative and cultural development and a transformation of Kumanovo into a modern town. Industry has a leading place, including the industries relating to metallurgy, textiles, footwear, leather, foodstuffs and tobacco, with then agriculture, artisanship and the trade sector following.

The biggest source of employment is registered with private small and medium enterprises. Local Self Government aims to develop projects and programmes in order to increase employment. An Action Plan for employment is in process of preparation aiming to create better conditions for economic development. This Action Plan will consider activities and measures for including people from rural areas in that process of employment.

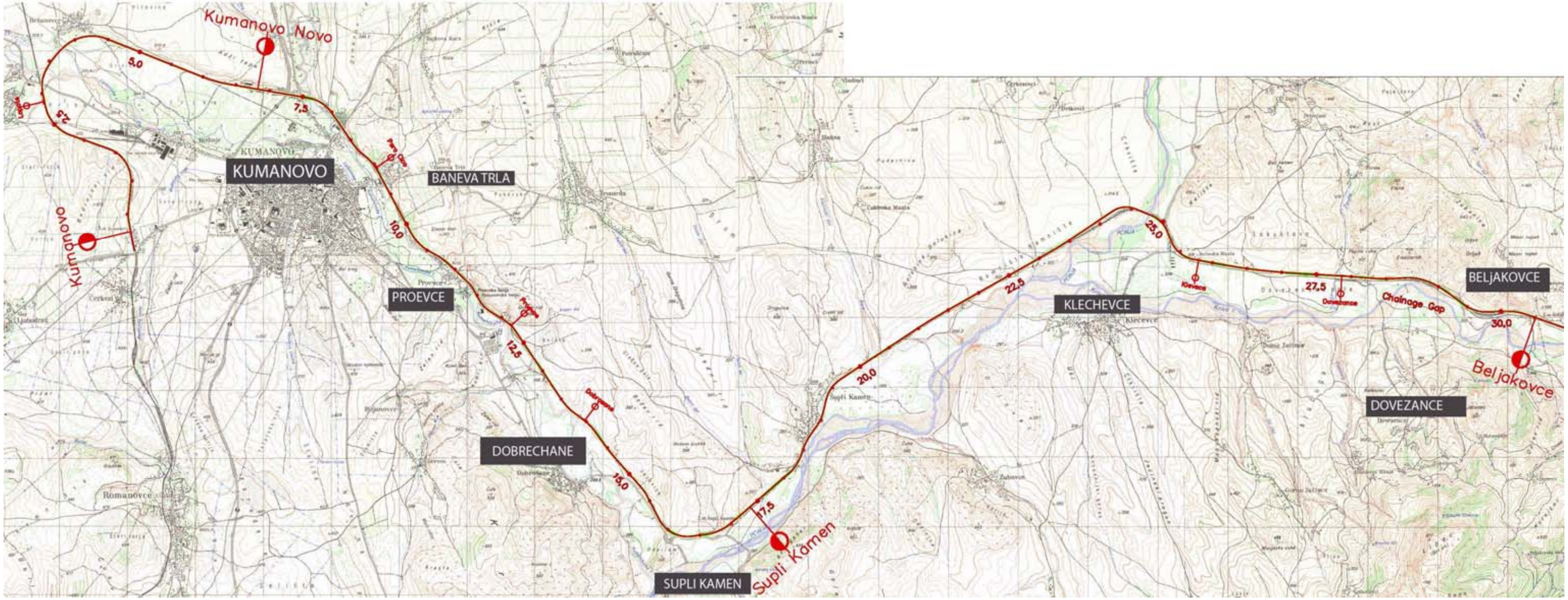


Figure 5-163 Affected settlement in Section 1

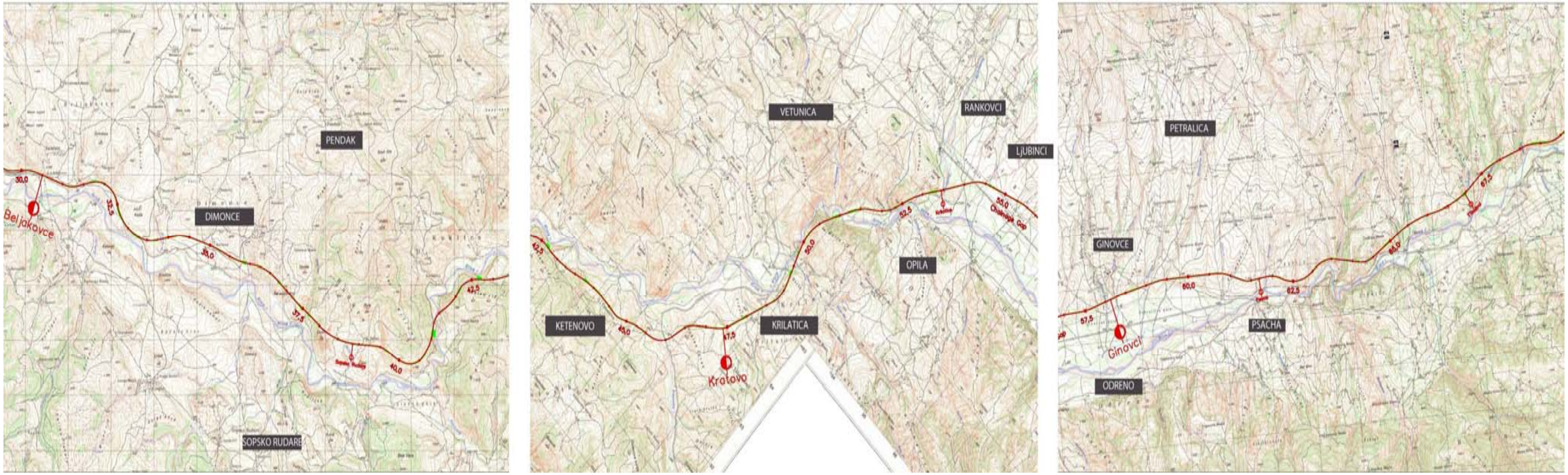


Figure 5-164 Affected settlement in Section 2

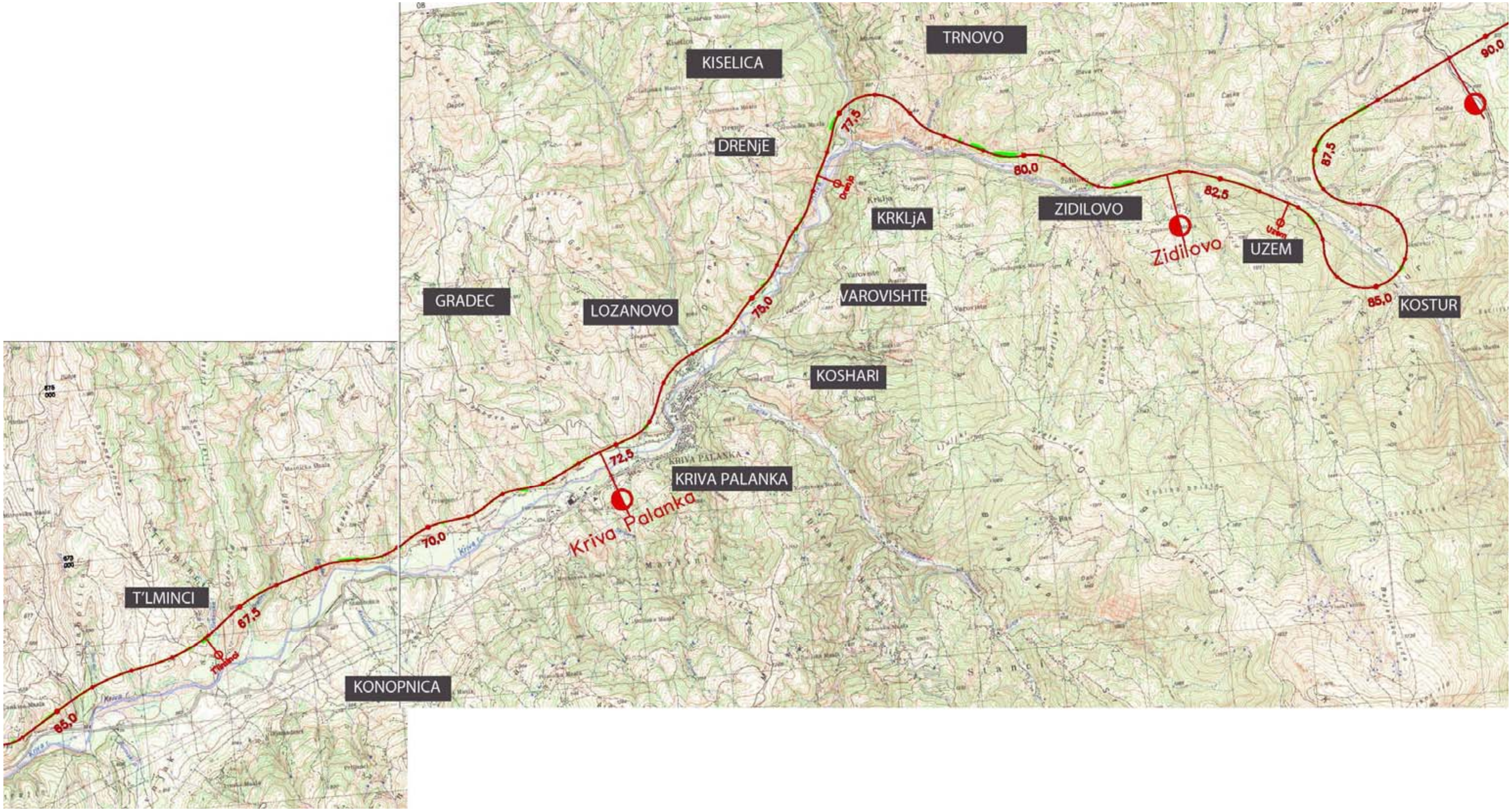


Figure 5-165 Affected settlement in Section 3

During the last decade it became evident that the intensive development of the city took place due to increased financial incomes from remittances from abroad. Namely many citizens from Kumanovo work in Afghanistan. In this way they do not only support families but they invest in construction of real estate and opening of small businesses.

The settlement of Proevce with 2,311 inhabitants is very close to the town and it could be said that due to the growth of the town has become a suburb of the town Kumanovo, with more or less urban characteristics. Dobroschane with 1.655 inhabitants as well is very close to Kumanovo and gravitates to town.

The settlements of Shupli Kamen (81 inhabitants), Klechevce (573 inhabitants), Dovezence (123 inhabitants) and Beljakovce (64 inhabitants) are rural settlements with relatively very low numbers of inhabitants. Most of the inhabitants are older. Younger people whose number is very low beside some agricultural/stockbreeding activities generally work as temporary construction workers in Kumanovo.

As part of the stakeholder identification and baseline data collection process it was determined that for section 1 detailed social mapping would be restricted to the Pero Cico settlement. They are very vulnerable due to their social and economic exclusion in the society. They are mostly unskilled labours working in the cleaning, black market trading, collection and selling used plastic bottles, playing music etc. They use space in front of their houses and at non functional rail track as playground and for storing empty bottles which activities are going to be affected by construction and operation of railway. In close cooperation with the *Center for Social Works* in Kumanovo, the following social mapping of the affected population at a close distance to the rail line has been prepared.

- There are 20 (twenty) families living in 10 houses which are at a distance of less than 10 meters from the railway line. The total number of people within the 10 houses is 88, all of them from the Roma population. On average there are 4.4 members per family;
- The gender distribution is: 39 males and 49 females;
- The biggest family has 11 and the smallest has 2 members;
- Out of the 88 people, 48 are children (below the age of 18). Most of the young children do not go to school. They are helping their parents in collecting plastic bottles for recycling;
- Almost 80% of these persons are without education and only 7 adults have basic education;
- None of the families have any employed household members;
- There are 8 families who are users of social welfare from the *Center of Social Work* in Kumanovo. The others do not receive social benefits. There is one retired person who is receiving pension. The main source for income for those who do not receive social welfare is recovery and separation of waste;
- All houses are illegally built of poor material. The living conditions are low and substandard;
- The total living space for 20 families is 870 m^2 (the average is 43.5 m^2 per family);
- Initially, among the affected families, two elderly persons of more than 60 years of age have been identified as vulnerable persons.

Section 2 Beljakovce – Kriva Palanka

The railway line is more or less established in Section 2 as a result of the previous construction works and passes through two municipalities, Municipality of Rankovce and Municipality of Kratovo.

During preparation of Stakeholder Engagement Plan (SEP) the following directly or indirectly influenced settlements were identified and are shown in *Figure 5-164*:

- Dimonce, Ketenovo, Krilatica, Pendak, Schopsko Rudare within Municipality of Kratovo; and
- Vetunica, Rankovce, Odreno, Ginovci, Psacha, Ljubinci, Opila and Petralica within Municipality of Rankovce.

The Municipality of Kratovo is situated in the North-Eastern region of Macedonia. The territory of the Municipality of Kratovo comprises an area of 374.44 km^2. According to the Census in 2002 there are 10,441 inhabitants in the Municipality of Kratovo. With Kratovo town having 6,924 inhabitants and being the municipal center. The other settlements have a low number of inhabitants namely: Dimonce 51, Ketenovo 216, Krilatica 141, Pendak 45, and Schopsko Rudare 143. The railway line does not go near the town of Kratovo but it is expected that the development of the town will be highly influenced by the railway.

The Municipality has a character of hilly mountain region (see figure below).

Figure 5-166 Town of Kratovo

The municipal area is rich in mineral raw materials. This region was therefore the Balkan mining and metallurgy centre in the past when this sector was the only possibility for employment and income. This area is rich with mines of non metal ores, the famous quartzite ores, the silica with its deposits estimated to about 5 million tons, whereas the annual exploitation reaches approximately 100,000 tons. Kratovo has a natural quartz, deposits of tuffs (the deposits are estimated to 3 million tons, and the annual exploitation reaches 200 tons), granites and other non metal ores. The deposits of metal ores include lead-zinc and copper ores (Plavica), insufficiently explored deposits of gold (Plavica-Zlatica) and partially explored deposits of uranium (Lukovo) etc.

Today only one quartzite mine is in operation. The level of unemployment is very high. Most of the inhabitants from Kratovo who don't work within public administration or in the active mining they are trying to find some job in Kumanovo and Skopje. In villages, remaining old people live from pensions (those who used to work in mining in last period) and some small activities related with agriculture/stockbreeding.

The Municipality of Rankovce is situated in North-Eastern region of Macedonia and emanates from the primary Municipality of Kriva Palanka. The municipality comprises the territory of 239km² with 4.144 inhabitants and it belongs to the category of small-middle municipalities. The Municipal center is village Rankovce. According to the Census 2002 village Rankovce has 1.192 inhabitants, Vetunica 57, Odreno 131, Ginovci 311, Psacha 539, Ljubinci 164, Opila269 and Petralica 669 inhabitants.

Figure 5-167 Municipality of Rankovce

Unemployment level is very high. Lack of appropriate base on one side and the low investment rate is the main reason for the law level of economic development in the Municipality of Rankovce. Today the basic economic branches within Municipality are the agriculture and stockbreeding. The agriculture is common for the population that lives in the hilly area like villages Petralica, Ginovce, Ljubince , Opila, Rankovce while stock breeding is characteristic for the mountain villages. There were no vulnerable groups identified during the stakeholder engagement process in this Section.

Section 3 Kriva Palanka – Bulgarian border

The railway line in Section 3 which needs to be fully constructed as part of the Project passes through the Municipality of Kriva Palanka. During preparation of the Stakeholder Engagement Plan the following directly or indirectly influenced settlements were identified and are shown in *Figure 5-165*: T`lminci, Konopnica, Kriva Palanka, Koshari, Varovischte, Gradec, Lozanovo, Kiselica, Drenje, Zidilovo, Krklja, Uzem and Kostur.

The Municipality of Kriva Palanka is situated in the North-Eastern region of the Republic of Macedonia. The total area of the Municipality is 481km^2 with 20,820 inhabitants. Kriva Palanka town is the municipal center with 14,558 inhabitants. Beside the town of Kriva Palanka, which has urban characteristics, other settlements are rural and the number of inhabitant leaving there is very low: Koshrai 21, Varovischte 87, Drenje 90, Zidilovo 302, Krklja 227, Uzem 256 , Gradec 350 , Lozanovo 150, Kiselica 130, Kostur 38.

The town of Kriva Palanka is directly located on the Corridor VIII, the international road way M2 towards the Republic of Bulgaria, to the northeast and to the north towards the Republic of Serbia.

Town it`s connected with eastern part of Macedonia through town of Kratovo. Distance of the town of Kriva Palanka and the airport in Sofija in Bulgaria is 140km.

Figure 5-168 Municipality Kriva Palanka

The economic situation in this Municipality is the same like in other municipalities within this region. The level of unemploment is very high. The region is rich with minerals and raw materials. This mountain area belongs to one of the most significant mining areas in the Republic of Macedonia. The territory of Kriva Palanka has got a few mines of metal ores (lead, zinc, antimony, copper, silver etc.) and non metal ores (bentonite clays, tuffs, quartz, diatomaceous earth, alluvium etc.). The metal ore mines are located primarily around the mountain area of Osogovo, precisely within the metallo-genetic zone Besna Kobila - Osogovo - Tassos. The largest mine of lead-zinc ore deposit is located within the area of Toranica. The Toranica mine is a rich geologic locality, wherein the ore deposits of lead, zinc, copper and silver have been estimated to 50 years of normal exploitation. There is also the mine deposit Samar, which has been insufficiently explored, however, the investigations show a large percentage of precious metals, i.e. gold and silver, in addition to the lead-zinc mineral deposits. Due to the insufficient exploration of the locality, the mine Krstov Dol of antimony and kiselgur (type of mineral), located close to the above mentioned mine Samar, has been closed.

Due to very high unemployment levels from around 43%, most of the citizens from this Municipality during working days go to Kumanovo and Skopje to look for temporary work, some of them go abroad working mainly as construction workers. Inhabitants from rural settlements are mostly older, they are characterized with typical rural way of life, doing mainly some stockbreeding, harvesting forest food and similar.

Kriva Palanka as a border town recognizes the value of transboundary cooperation. There are many ongoing projects for increasing the transboundary business and economic cooperation between Kriva Palanka and Kustendil, the bordering town in Bulgaria.

This section will be the most affected during the construction of railway. 25 families will lose their houses and other will lose their land. More details are given in *Chapter 3 Project Description* and in *Chapter 13 Resettlement Compensation Framework*.

5.2.8.2 COMMUNITY FACILITIES & SERVICES

Schools/Education Facilities

Education is organized through primary, secondary and higher education. Primary education is structured through primary schools located in towns of Kumanovo, Kratovo and Kriva Palanka and dispersed schools in some of the rural settlements. Secondary education is mostly located in towns. The number of children in rural settlements who go to school from year to year is decreasing. This is the reason why the number of schools in rural areas is in constant rapid decline. Higher education is centered in Skopje. Recently some branched studies from private universities are opened in Kumanovo.

Kumanovo has 16 primary schools, from which 9 are located in the town and others are dispersed in the rural settlements. In the identified local settlements above within Section 1 only in Dobraschane has a primary school. In the town of Kumanovo there are 4 secondary schools.

In Section 2 within the Municipality of Rankovce there is one central primary school in the village of Rankovce and branched primary schools in Petralica, German, Odreno, Opila, Psaca and Radibus. Within the Municipality of Kratovo there is one primary and one secondary school in the town and dispersed primary schools in some settlements: Krilatica, Schopsko Rudare, Zelezni, Turalevo, Stracin, Schlegovo, V`kuf, Sakulica and Konjuh.

In Section 3 within Municiplaity of Kriva Palanka there are two primary schools within the town and in the following villages: Konopnica, Mozdivnjak, Duracka Reka, Stanci, Luke, Ogut, nerav, Podrzikonj, Dubrovnica, uzem, Zidilovo. There is one secondary school in town of Kriva Palanka.

Overview of schools location per Section is given in the *Figure 5-169*.

Children who attend primary schools from rural settlements where there are no school facilities, travel mostly with public transport (buses). For secondary education, which is located in the towns, depending on the social base, some of pupils are traveling using public transport and some of them stay in the towns (i.e. with relatives or renting rooms or in one of the three existing state boarding school in Kumanovo, Kratovo and Kriva Palanka).

More information for education is given in Sub-chapter Education in national/regional socio baseline.

Health Facilities

Compared with other regions, the North-Eastern planning region is characterized with a low coverage of healthcare services, especially regarding the dental and specialist's healthcare services. The National Strategy for Poverty Reduction of 2002, includes the goal that all citizens should be able to reach healthcare witin less than 30 minutes. This goal is far from being reached in the North-Eastern region.

There is no clinical center in the North-Eastern region and the residents have to use the general medical health centers operating in the larger residential areas and the village branch outpatient departments. The nearest Clinical Center is in Skopje. The tertiary healthcare protection, concentrated in the Skopje region, due to the relatively close distance, still offers access to the necessary healthcare services. The most imperiled population are the inhabitants of the rural settlements where no healthcare institutions are operating.

In Section 1, Kumanovo has a hospital with capacity of 150-200 beds with departments for internal medicine, surgery, pediatric, gynecology, cardiology, neurology, ears-nose-throat and an out-patient centre. The medical health care in Kumanovo employs in total around 1200 persons as medical staff and auxiliarries.

Figure 5-169 Overview of schools per section

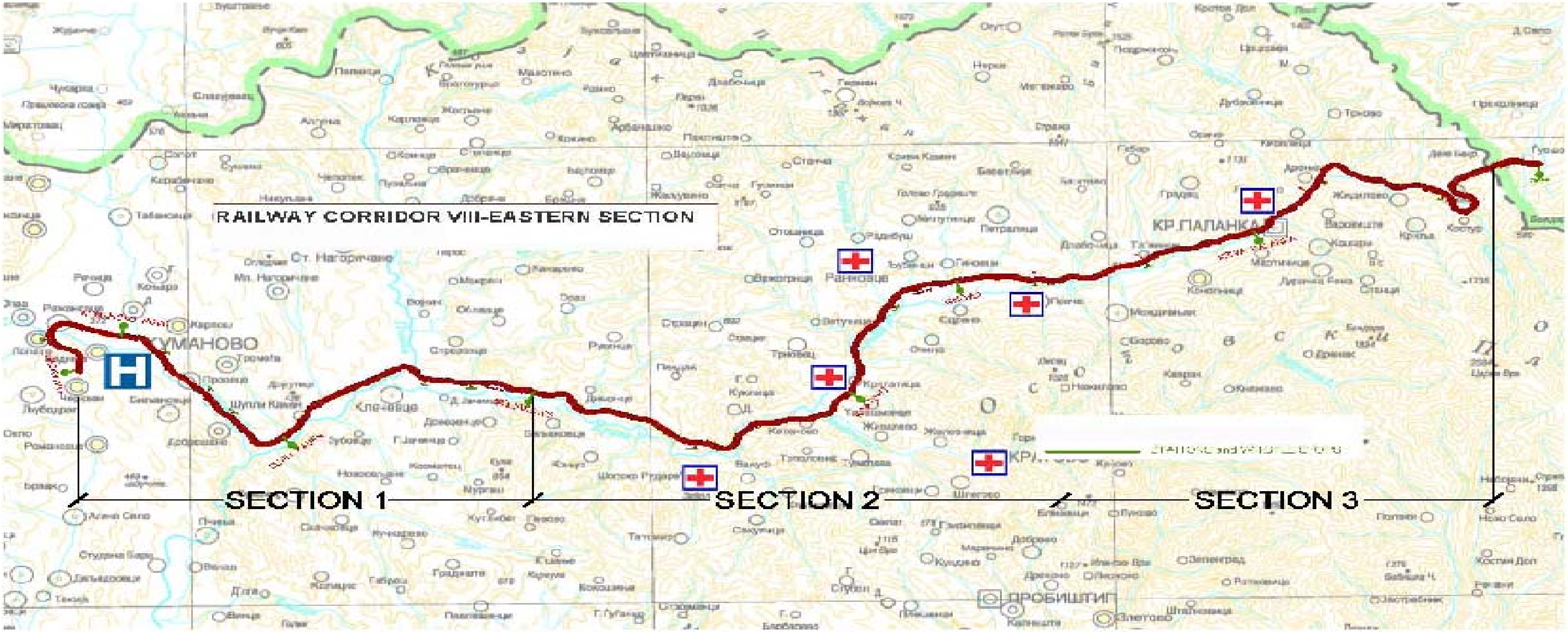


Figure 5-170 Overview of health facilities

Within the other Municipalities there are only health centres with a few doctors located in the towns. In Kratovo there are in total approx. 20 doctors counting both public and private. Dispersed ambulances in Section 2 are given in the above map. In Section 3 there is only one health center located in Kriva Palanka.

Religious/Faith/Cultural Facilities

The table below lists the most important Cultural Monuments and archaeological sites in North-Eastern region which are located near the railway alignment.

Municipality	Cultural monument	Location (distance from the railway alignment)
Section I Kumanovo	Eski mosque	in Kumanovo city centre
	St. Nikola church	in Kumanovo city centre
	Observatory Kokino	around 4 km north
Section II Kratovo	Early christianity basilica Rotonda	around 1km south
	Prehistoric observatory Cocev Kamen	around 1 km south
	Locality of Kuklica	around 2 km north
	Bridge Radin	in Kratovo city centre around 17 km south
Section II Rankovce	St. Nikola church in village of Opila	around 2 km south
	St. Paraskeva church in the village of Radibush	around 4 km north
	Locality of Gradishte	around 1 km south
Section III Kriva Palanka	St, Joakim Osogovski monastery	around 3 km south
	St. Dimitrija church	around 2 km north

Table 5-32 Cultural Monuments and archaeological sites in North-Eastern Region

There are also small churches usually with cementaries located in some of the settlements. Railway Corridor VIII does not directly impact any of these religious/historical monuments.

Most of the inhabitants are Ortodox Christians and in Kumanovo there are also muslims. The communities are practicing religous life in terms of celebrating holidays, visiting each other for the larger holidays such as Easter, Christmas and Bajram.

There is a tradition of mutual respect between members of the different religous groups. That can be noticed through visiting each other during celebrations of christian and muslim holidays when many muslims visit their christian neighbours during christian holidays and vice versa.

More information on cultural heritage is given in *Chapter 5.1 Environmental Baseline Conditions.*

Emergency Services

Emergency services in terms of police stations and fire brigades are located in each town, or municipal center in the region. There are patrol police control covering the area and villages but without stationary offices in the villages. Health emergency services already elaborated above.

Other Community Facilities

Water supply

In the North-Eastern region a significant part of the inhabitants suffer from a lack of potable water, including the Municipality of Kumanovo. Only in towns are there water supply systems. In rural area each village solves the problem for water supply individually, partial and in stages.

Wastewater treatment plants

In the North-Eastern region there is a relatively high coverage of the inhabitants with waste water treatment plants (60%). This high percentage comes from the fact that city of Kumanovo is fully covered with waste water treatment plant. In all other urban and rural areas the wastewaters are without treatment and are discharged directly to land and rivers.

Waste management

As a consequence of not having an integral system for waste management on the national level (through organized collection, transport, treatment and disposal of the waste in modern landfills) the situation is difficult regionally. Bad practices in the past leaded to degradation of the environment and the loss of important resources and potential health risks. Currently the regional landfill project is in the planning phase, this facility which will service the 6 municipalities of this region. This regional landfill will solve the problem with the whole region.

Electricity and power supply

The existing natural gas pipeline system in Macedonia is a part of the Russian transit pipeline that goes through Ukraine, Romania and Bulgaria and is constructed to fulfil the needs of Turkey, Greece and Macedonia. The gas pipeline runs through the municipalities of Kriva Palanka, Kratovo, Kumanovo and Skopje, but only 15% of the total capacity of the system is used, which is significantly low having in mind the potential that gas offers as energy for heating and production of electrical energy. From the point of view of the regional development, the strategy of gas usage is highly supported and considered as very important for the development of the region.

North-Eastern region is covered with electricity supply. During winter most of the inhabitants use woods for heating as most available and at the present cheapest solution.

5.2.8.3 LOCAL TRANSPORT ROUTES, PUBLIC TRANSPORT AND PEDESTRIAN ROUTES

The main traffic infrastructure in the area of the railway corridor is the road Kumanovo – Kriva Palanka-Deve Bair and the regional road to Kratovo and Sveti Nikole. Asphalt roads lead to all villages in the Kumanovo and Kratovo Municipality with the exception of the settlements of Zubovce, Jacince, Dovezence, Dimonce and Kuklica (see *Figure 5-171*). In Kriva Palanka Municipality about 90% of the settlements are not connected by asphalt roads even if the distance to the main road is 2-3km. Nevertheless, the communication by bus transportation services to the respective Municipality’s centers is relatively good, especially between Rankovce and Kriva Palanka.

The present state of main traffic infrastructure is inadequate. The main road that connects the two counties of Kumanovo – Kriva Palanka does not support the increased demand of the economy and trade between the counties as it is only has two lanes and travel time is slow and the road conditions poor at certain times of the year due to route through the mountains.

The quality of the local roads is often low which reduces their durability. This is probably one of the reasons why people tended to move from their original settlements closer to the main road (in a period till 1995), where a bigger number of individual houses are built. This process is pronounced in the area between Rankovce and Kriva Palanka.

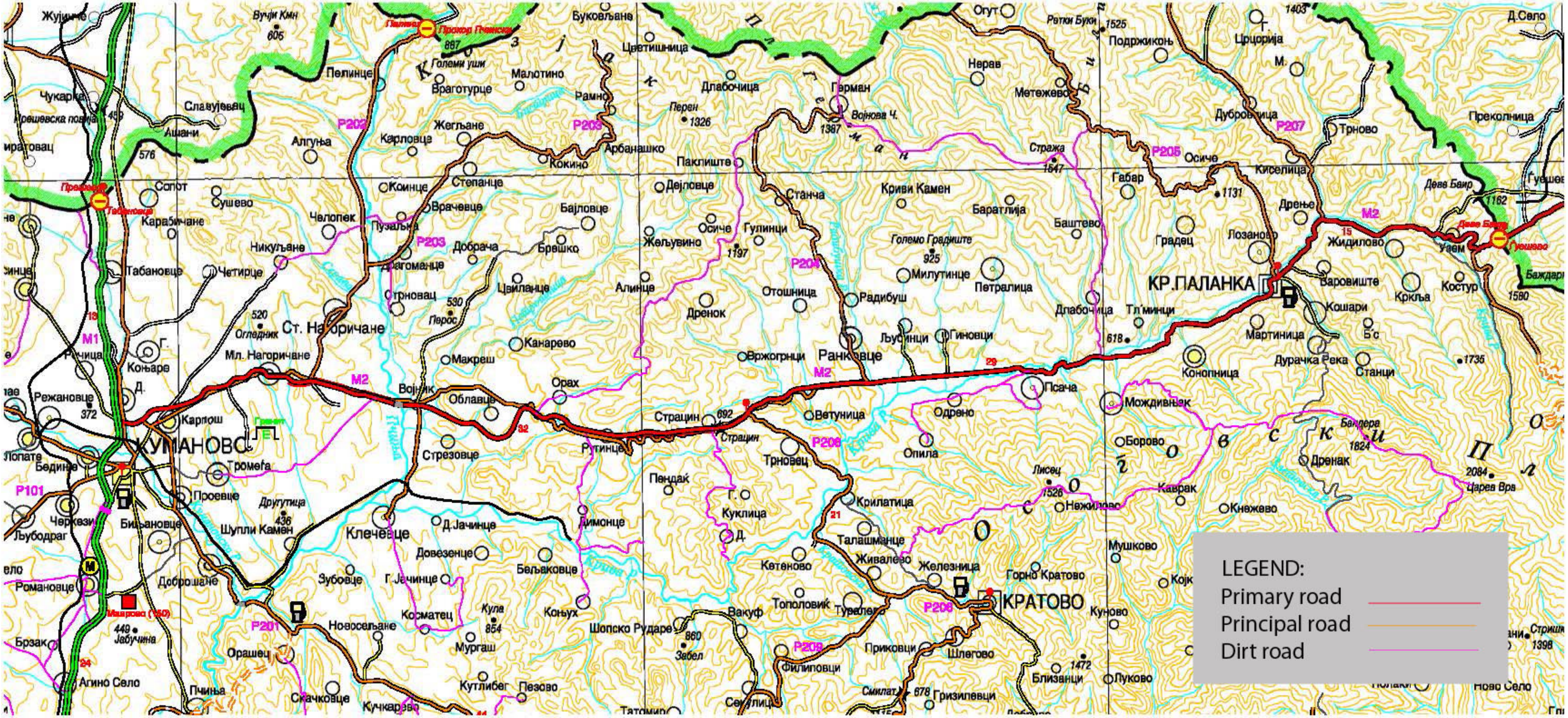


Figure 5-171 Road Network in North-Eastern Region

Public transport is organized with bus transport. The main route is Kumanovo – Kriva Palanka - Kumanovo. At the moment there are buses driving during whole day starting from 07:00 in the morning on each two hours till 19:00 in the evening. From Kumanovo - Kratovo - Kumanovo there are three services during the day, in the morning, in the afternoon and in the evening. Beside this public transport there are many informal taxi drivers who as well operate on these two routes.

People from villages who want to travel to towns must come to the nearest bus station on the main road. Some of them if they are close walk and some of them use small mini bus transport (taxi) organized by local citizens. Due to very small number of passengers in recent years there is no public transport organized to some villages. But when there is a demand during the agricultural season public transport provider may decide to have some additional services to some villages.

Except in the town of Kumanovo and Kriva Palanka there are no defined pedestrian areas in identified settlements. The main reason is their rural character. In villages where the main road goes through, like in Rankovce for example people are walking on the main road. However there is proper signalization to alert drivers of this matter. The main road that goes through to Bulgaria fom the town of Kriva Palanka, mostly bypasses the town. In the part, where it goes through suburbs of the town there is pedestrian refuges (i.e. pavements) and proper signalization for pedestrians.

5.2.9 REGIONAL/NATIONAL SOCIO-ECONOMIC BASELINE

5.2.9.1 DEMOGRAPHIC CHARACTERISTICS

National Population

According to the State Statistical Office, the population of the Republic of Macedonia was 2,052,722 citizens by the end of 2009. The population density is 79.8 inhabitants per km^2, while the territorial distribution of the population shows significant inequality. 57.8% of the population lives in the 34 cities with the biggest concentration in the capital Skopje (20.5 %). For the Skopje Region it is characteristic that moving from rural to urban areas is less common (34.7 %) than moving from urban to rural areas (44.7 %).

The average age of the population in 2009 was 37 years. There have been significant changes in the age structure of the population. In the period 1999-2009, the share of the young population (age group 0-14) in the total population decreased from 22.8 % to 17.7 %, and the share of the old population (age group 65 and over) increased from 9.8 % to 11.6 %.

During the period 1999-2009, there was a constant decline in the number of births in the country, which contributed to a drop in the natural increase to 11.5 % in 2009, compared to 12.4 % in 1999.

Changes in the age structure of the population have an impact on the number of deaths in the country. The number of deceased persons in 2009 increased by 0.4 % compared to the previous year, amounting to 19,060 deaths. Most are males, 10,040 or 52.7 % of the total number of deaths. The average age at death is 68.6 years for males and 73.5 years for females, which means that women live 4.9 years longer on average.

There are two side of the effect of migration on the demographic situation. On the one hand, it directly affects the number, territorial distribution and structure of the population, and on the other hand, it determines the birth rate and mortality due to the effects of the gender and age structure of the population.

With regard to the population dynamics in Macedonia, there are sizeable regional differences. At a regional level (Eurostat - Nomenclature of Territorial Units for Statistics – NUTS 3), there is an increase of the population in all regions except in Pelagonia*,* where the number of inhabitants decreased by 4,478, and the average annual population growth rate is negative 0.23 %. Regarding the other regions, the population increase is marked with large deviations. Namely, in accordance with the population growth rate, it is lowest in the Southeast region, East and Vardar, equal with the average in the country in the Southwest region, somewhat higher in the Northeast and Skopje region, and highest in the Polog.

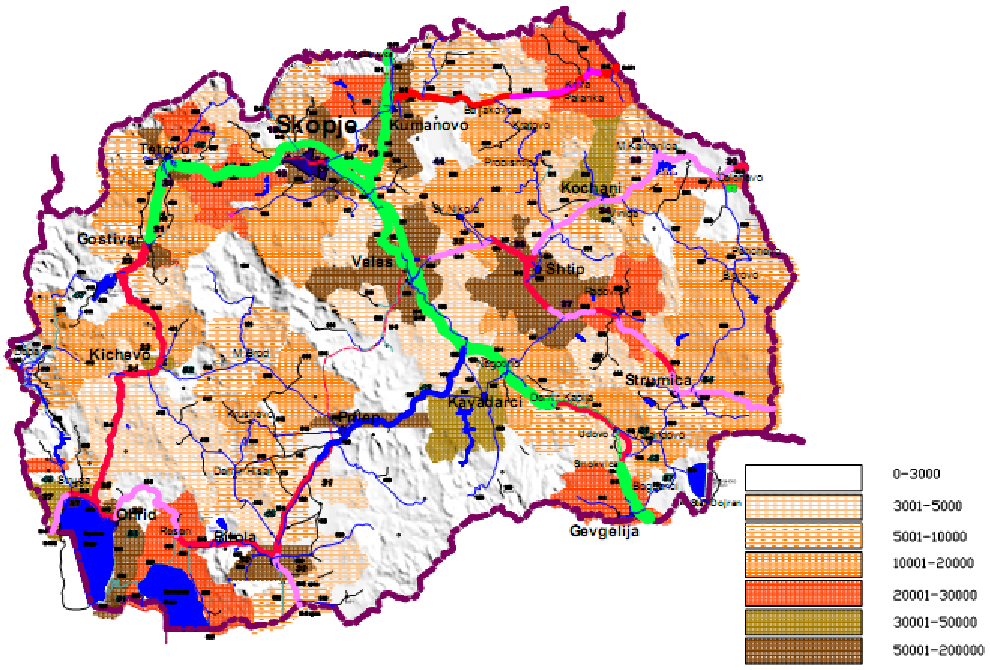


fig m 05: Roads in relations with the inhabitants concentration[1]
сл.м 05: Патиштата во однос на концентрацијата на население.

[1] Source: Republic of Macedonia, Spatial Plan, 2004, (Просторен план на Република Македонија, 2004 година)

Figure 5-172 Roads in relations with the inhabitants' concentration

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
Total population	2 046 898	153 902	180 260	222 142	172 362	234 902	312 607	174 276	596 447
male	1 026 022	78 187	91 280	111 396	87 263	117 560	157 310	88 631	294 395
female	1 020 876	75 715	88 980	110 746	85 099	117 342	155 297	85 645	302 052
Density"	82.2	38.1	51.0	66.5	62.9	49.8	129.4	75.4	329.0
Share of population aged 0-14 (%)	18.3	16.5	15.7	18.8	17.4	16.0	20.9	19.8	18.6
Share of population aged 65+ (%)	11.4	12.6	12.2	10.5	11.7	15.2	8.3	10.8	11.5
Age dependency ratio	42.3	41.0	38.7	41.4	41.1	45.3	41.3	44.1	43.1
Per 1000 population									
livebirths	11.2	10.8	9.2	10.0	11.6	10.4	11.0	11.2	12.7
deaths	9.3	10.4	10.2	9.2	9.5	12.5	7.3	9.2	8.5
marriages	7.2	5.9	6.0	7.9	6.6	6.1	10.1	6.9	6.8
divorces	0.6	0.6	0.6	0.7	0.7	0.7	0.9	0.4	0.4
Infant mortality rate	9.7	10.8	10.2	8.1	10.0	6.2	10.2	7.2	11.3
Live births outside marriage (%)	12.2	7.8	10.7	6.4	13.1	10.3	17.1	17.9	12.0
Mean age of:									
population	37	38	39	36	37	40	33	36	37
of mother at birth of first child	26	25	25	25	24	26	25	25	27
bride at first marriage	25	25	24	23	24	25	24	25	26
of dead	71	70	72	72	71	73	71	71	70

Table 5-33 Basic Demographic Indicators (30.06.2008)

Smaller or larger differences are also present between the municipalities within the regions. Large disparities in the population increase are typical for the municipalities in the Southwest and Northeast region, whose joint percentage of the total number of municipalities corresponds to their individual participation in the total population increase in the analyzed period (22.8 percent).

North-Eastern Region Population

In the *North-Eastern region,* the population increased in only three of the total of six municipalities, being minimal in Kriva Palanka (growth rate of 0.02 percent), and quite large in Kumanovo and Lipkovo (1.09 percent and 1.32 percent, respectively). During this period, the population grew by 9.1 percent in Kumanovo and by 11.1 percent in Lipkovo. Municipality Staro Nagoricane is with the most intensive decrease. The still high natural population increase in certain municipalities of the Northeast, Southwest, Skopje, and Polog regions lies behind the relatively high population increase in these areas, although a part of them are migratory areas.

Compared with the Census of 1994, one may observe a growth of 5.5%, which is a significantly greater growth of the population relative to the average rate in the country, which in 2010 was 2.5%. Large inter-regional differences in the growth of the population exist. Rankovce, Staro Nagoricane and Kratovo have experienced decreased growth rates during the period 1994-2002. Kriva Palanka has shown a minimum growth in the population of 2.3%, while Lipkovo and Kumanovo have shown a rather large growth of the population.

Municipality	Area (km^2)	Residents per km^2	Settlements	Urban population
Kratovo	375	28	31	66,3%
Kriva Palanka	480	43	34	69,9%
Kumanovo	509	207	48	72,3%
Lipkovo	273	99	22	0%
Rankovce	241	17	18	0%
Staro Nagoricane	432	11	39	0%
Total	**2310**	**75**	**192**	**56,6%**

Table 5-34 The municipalities in the Northeastern planning region[4]

The total area of the North-Eastern region is 2.310 km^2, inhabited by 185.468 residents, i.e. around 9% of the total territory and the total number of population in the Republic of Macedonia.

The Region includes 192 inhabited settlements, 189 of which being rural settlements. The population density is 75 residents/km^2 and it is almost equal with the average value of the country (81 residents/km^2).

According to the census of 2002, the North-Eastern planning region counts 172.787 inhabitants equal to 8.4% of the whole population of the Republic of Macedonia. Of the six municipalities (2002 figures), Kumanovo is by far the largest with 105,484 inhabitants (61% of the Regions population) followed by Lipkovo with 27,058 (15.7%), Kriva Palanka with 20,820 (12%) and Kratovo with 10,441 inhabitants (6%). Staro Nagoricane has 4,840 (2.8%) and Rankovce has 4,144 inhabitants (2.4%).

The Region comprises six municipalities (see *Table 5-35*).

[4] State Statistical Office of the Republic of Macedonia (Annual Report, 2007)

	Census 1971	Census 1981	Census 1991	Census 1994	Census 2002	Index 2002 / 1971
(RANKOVTSE)						
VETUNITSA	221	189	83	73	57	25.79
GINOVTSI	376	270	257	257	315	83.78
LJUBINTSI	193	136	141	144	164	84.97
ODRENO	283	171	156	140	131	46.29
OPILA	1020	631	379	288	269	26.37
PETRALITSA	1232	923	677	672	669	54.30
PSACHA	902	692	557	538	539	59.76
RANKOVTSE	1039	744	938	1007	1192	114.73
(KUMANOVO)						
DOBROSHANE	540	930	1386	1384	1655	306.48
KUMANOVO	46363	60842	52204	65233	70842	152.80
PROEVTSE	653	1297	1890	1944	2311	353.91
SHUPLJI KAMEN	504	236	136	124	81	16.07
BELJAKOVTSE	694	355	146	119	64	9.22
DOVEZANTSE	612	392	210	167	123	20.10
KLECHEVTSE	1165	935	694	615	573	49.18
(KRIVA PALANKA)						
VAROVISHTE	186	144	94	108	87	46.77
DRENJE	148	158	107	211	90	60.81
ZHIDILOVO	603	408	292	300	302	50.08
KONOPNITSA	1637	1965	2363	2450	1398	85.40
KOSTUR	150	107	75	67	38	25.33
KOSHARI	149	434	631	605	21	14.09
KRIVA PALANKA	4955	8860	11271	11166	14558	293.80
KRKLJA	904	465	306	318	227	25.11
T'LMINTSI	221	172	124	95	73	33.03
UZEM	494	314	276	272	256	51.82
(KRATOVO)						
DIMONTSE	424	180	96	64	51	12.03
KETENOVO	162	169	205	173	216	133.33
KRILATITSA	449	362	238	228	141	31.40
PENDAK	280	142	64	56	45	16.07
SHOPSKO RUDARE	1093	549	280	239	143	13.08

Table 5-35 Municipality`s basic data

More than a half (57%) of the total population consists of urban population. The North-Eastern region has the highest share of the total rural-urban migration with 41.1%, whereas Polog, with 22.1%, has the smallest share. The Northeastern region is characterized by an increased out migration to other countries, which has become especially intensified during the past decade.

Population by Project Section

In **Section 1** where the railway starts spreads over the territory of the Municipality of Kumanovo, the Kumanoska SPA, near the village of Shupli Kamen and at the village of Klechovce were selected. Population by settlements in this part is presented in the following table:

	Census 1971	Census 1981	Census 1991	Census 1994	Census 2002	Index
(KUMANOVO)						2002/1971
DOBROSHANE	540	930	1386	1384	1655	306.48
KUMANOVO	46363	60842	52204	65233	70842	152.80
PROEVTSE	653	1297	1890	1944	2311	353.91
SHUPLJI KAMEN	504	236	136	124	81	16.07
BELJAKOVTSE	694	355	146	119	64	9.22
DOVEZANTSE	612	392	210	167	123	20.10
KLECHEVTSE	1165	935	694	615	573	49.18

Source: State Statistical Office , Censuses 1971/1981/1991/1994/2002

Table 5-36 Population by Settlements in Section 1

As it can be noticed within the section the population has increased however in certain settlements it has decreased. Specially big increases can be noticed in Dobroshane (206.48%) and in Proeviste (253.91%), as well in City of Kumanovo where number of inhabitants in this period is increased for 52.8%

In Section 2 the railway line passes through municipality of Rankovce and ends in the municipality of Kratovo. In these two municipalities there is constant increase of the number of inhabitants only in settlements of Ketenovo (municipality of Kratovo) and in Rankovce. In all other settlements the number of inhabitants is in constant decrease. The biggest percentage of decrease is 87.97% Dimonste , 83.93% Pendak, 86.92% Sopsko Rudare , 74.21% Vetunista, 73.63% Opila.

	Census 1971	Census 1981	Census 1991	Census 1994	Census 2002	Index
(KRATOVO)						2002/1971
DIMONTSE	424	180	96	64	51	12,03
KETENOVO	162	169	205	173	216	133,33
KRILATITSA	449	362	238	228	141	31,40
PENDAK	280	142	64	56	45	16,07
SHOPSKO RUDARE	1093	549	280	239	143	13,08
(RANKOVTSE)						2002/1971
VETUNITSA	221	189	83	73	57	25,79
GINOVTSI	376	270	257	257	315	83,78
LJUBINTSI	193	136	141	144	164	84,97
ODRENO	283	171	156	140	131	46,29
OPILA	1020	631	379	288	269	26,37
PETRALITSA	1232	923	677	672	669	54,30
PSACHA	902	692	557	538	539	59,76
RANKOVTSE	1039	744	938	1007	1192	114,73

Source: State Statistical Office , Censuses 1971/1981/1991/1994/2002

Table 5-37 Population by settlements in Section 2

Section 3 contains 10 settlements within the Municipality of Kriva Palanka. Number of inhabitants in this settlement is in constant decrease, except in Kriva Palanka where there is increase of 193%, as a result of migration from the villages.

	Census 1971	Census 1981	Census 1991	Census 1994	Census 2002	Index 2002/1971
(KRIVA PALANKA)						
VAROVISHTE	186	144	94	108	87	46,77
DRENJE	148	158	107	211	90	60,81
ZHIDILOVO	603	408	292	300	302	50,08
KONOPNITSA	1637	1965	2363	2450	1398	85,40
KOSTUR	150	107	75	67	38	25,33
KOSHARI	149	434	631	605	21	14,09
KRIVA PALANKA	4955	8860	11271	11166	14558	293,80
KRKLJA	904	465	306	318	227	25,11
T'LMINTSI	221	172	124	95	73	33,03
UZEM	494	314	276	272	256	51,82

Source: State Statistical Office , Censuses 1971/1981/1991/1994/2002,

Table 5-38 Population by settlements in Section 3

North-East Region Ethnic Composition

The ethnic composition of the population in the North-Eastern Region shows greater variety than for the country as such with 59.1% Macedonians, 31.1% Albanians, 6.1% Serbs and 2.9% of Roma origin. In Lipkovo, 97.4% of the populations are Albanians. In Kratovo 97.9%, in Kriva Palanka 95,0%, in Rankovce 97,9 and in Staro Nagoricane 80.7% of the populations are Macedonians.

Municipalities	Population								
	Total	Macedonians	Albanians	Turks	Roma	Vlachs	Serbs	Bosnian	Others
Kratovo	10,441	10,231	-	151	1	33	-	17	
Kriva Palanka	20,820	19,998	-	2	668	3	103	2	44
Kumanovo	105,484	63,746	27,290	292	4,256	147	9,062	20	671
Lipkovo	27,058	169	26,360	-	-	1	370	6	152
Rankovce	4,144	4,058	-	-	57	-	18	-	11
Staro Negoricane	4,840	3,906	1	-	1	-	926	-	6
Total	**172,787**	**102,108** 59.1%	**53,651** 31.1%	**445** 0.3%	**4,983** 2.9%	**184** 0.1%	**10,479** 6.1%	**45** 0.03%	**884** 0.5%

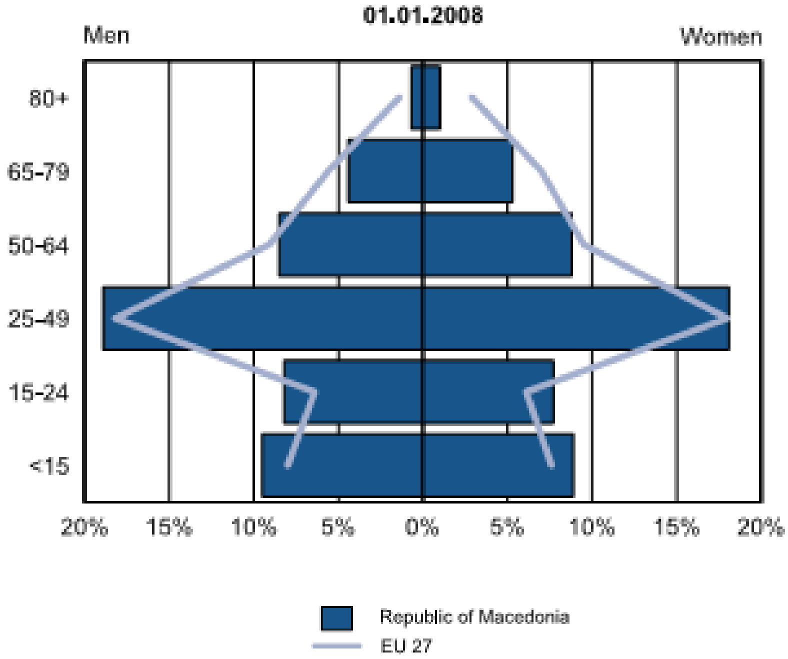
Source: State Statistical Office, Census 2002

Table 5-39 Population in North-Eastern Region by Municipalities

	Census 1971			Census 1981			Census 1991			Census 1994			Census 2002	
(RANKOVTSE)	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All	Male
VETUNITSA	221	123	98	189	104	85	83	44	39	73	39	34	57	30
GINOVTSI	376	215	161	270	150	120	257	140	117	257	146	111	315	173
LJUBINTSI	193	98	95	136	72	64	141	75	66	144	73	71	164	89
ODRENO	283	130	153	171	80	91	156	78	78	140	73	67	131	72
OPILA	1020	518	502	631	319	312	379	187	192	288	145	143	269	138
PETRALITSA	1232	606	626	923	471	452	677	338	339	672	331	341	669	336
PSACHA	902	441	461	692	353	339	557	269	288	538	255	283	539	267
RANKOVTSE	1039	551	488	744	407	337	938	478	460	1007	516	491	1192	635
(KUMANOVO)														
DOBROSHANE	540	281	259	930	468	462	1386	698	688	1384	692	692	1655	845
KUMANOVO	46363	23356	23007	60842	30618	30224	52204	25970	26234	65233	32492	32741	70842	35361
PROEVTSE	653	343	310	1297	669	628	1890	955	935	1944	985	959	2311	1188
SHUPLJI KAMEN	504	232	272	236	127	109	136	71	65	124	64	60	81	44
BELJAKOVTSE	694	359	335	355	189	166	146	80	66	119	64	55	64	34
DOVEZANTSE	612	327	285	392	207	185	210	111	99	167	89	78	123	66
KLECHEVTSE	1165	555	610	935	455	480	694	345	349	615	314	301	573	294
(KRIVA PALANKA)														
VAROVISHTE	186	102	84	144	80	64	94	50	44	108	55	53	87	45
DRENJE	148	67	81	158	78	80	107	54	53	211	116	95	90	45
ZHIDILOVO	603	305	298	408	203	205	292	146	146	300	154	146	302	166
KONOPNITSA	1637	810	827	1965	1011	954	2363	1186	1177	2450	1253	1197	1398	709
KOSTUR	150	77	73	107	58	49	75	40	35	67	35	32	38	21
KOSHARI	149	76	73	434	211	223	631	340	291	605	320	285	21	14
KRIVA PALANKA	4955	2450	2505	8860	4403	4457	11271	5670	5601	11166	5595	5571	14558	7431
KRKLJA	904	471	433	465	244	221	306	168	138	318	164	154	227	126
T'LMINTSI	221	105	116	172	92	80	124	68	56	95	50	45	73	39
UZEM	494	242	252	314	150	164	276	134	142	272	133	139	256	128
(KRATOVO)														
DIMONTSE	424	213	211	180	90	90	96	48	48	64	33	31	51	26
KETENOVO	162	77	85	169	82	87	205	99	106	173	84	89	216	112
KRILATITSA	449	232	217	362	182	180	238	121	117	228	113	115	141	76
PENDAK	280	133	147	142	74	68	64	38	26	56	35	21	45	23
SHOPSKO RUDARE	1093	563	530	549	285	264	280	155	125	239	131	108	143	84

Table 5-40 Gender population by settlements, according to the censuses conducted in settlement along the rail route Corridor VII

Population by Gender and Age



Source: PCA Survey July/August 2008

Figure 5-173 Participation of population by sex and age groups in total population

The impact of the population structure by gender on the economic and social development of a country is reflected in several segments. This is manifested through the impact on the size of the labour, on the burden imposed by the supported population on the economically active part of the population, as well as on the location of certain industrial branches, companies and their plants. The gender structure also has a large impact on the social organization of the life in an area.

In regards with gender issues Macedonian society is quite patriarchal, with most citizens still believing that women are primarily responsible for maintaining the home and raising the children and men are expected to be the breadwinners of the household. Many people feel that Macedonian women are by and large comfortable with the status quo and that many do not want to take on the double burden of work and home. The minority ethnic groups in the country hold more traditional stereotypes than ethnic Macedonians and gender roles are reported to be more traditional in rural areas, among older Macedonians and those with a lower level of education. Mostly men have title of the land/properties especially in rural and undeveloped areas, while the situation in towns is changing. Issues related to employment and economic status was far and away the most frequently cited gender inequality facing Macedonian women. In 2006, the employment rate for women was 27% whereas for men it was 43.5%. Unemployment rates for women and men were quite similar (37.2% and 35.3% respectively). The most dramatic gender gap is in activity rates with only 42.9% of women active in the labor market, versus 67.3% of men. Between the ages of 25 and 54, roughly 80% of women are inactive (the majority of these are housewives, many by choice). Activity rates are also especially low for male and female youth, rural women, people with disabilities, and Roma. While there are dramatic gender differences in employment and activity rates, there are also striking gender differences in type of employment. 79% of those who are classified as “employer” by the GoM are male, as are 83% of those who are classified as self-employed. 60% of those classified as unpaid family workers are female. Women are also more likely than men to work in the informal economy. An analysis revealed that of 28 countries in the E&E region, Macedonia had the third highest gender pay gap; women earned on average only 49% of what men earned even though Macedonian law requires equal pay for equal work. Gender distributions in various sectors of employment are markedly skewed with women making up the majority of workers in the health, social affairs, and education sectors and men predominating in construction, mining, transport, and communication. In the agricultural sector, there are more men than women who work both on individual agricultural holdings and in agricultural businesses. Among seasonal agriculture workers, women are more likely to work on individual holdings, whereas men are more likely to work in agricultural businesses.

The changes in the population structure in terms of gender may be observed through the percentage of men and women in the total population and in the general and specific coefficients of masculinity and femininity. As these are attributive statistical features with alternative forms, the analysis focused on the percentage of men and coefficients of masculinity.

In the period between the censuses in 1994 and 2002, there was an insignificant increase of the percentage of men in the total population in Macedonia (from 50.1 percent to 50.2 percent). At a regional level, there was an increase in the Northeast, Vardar, Southwest, Southeast and Polog regions, a decrease in the Pelagonia and Skopje regions, and a status quo in the East region. In 2002, the percentage of men was higher than that of women in all regions, with the exception of the Skopje region (49.6 percent).

The age structure of the population is not only one of the indicators of the achieved level of development of any population, but also an instrument for learning about the demographic past and predicting the demographic future of an area. The first level of analysis of the age structure of a population is the usual distribution of the population by five-year age groups and by large age groups (0-19, 20-39, 40-59, and 60 and above). As the number of municipalities is rather large, there is no need to go into a more detailed observation of the data (the absolute values and relative percentages) on the five-year age groups, both as a total and by gender.

5.2.9.2 EDUCATION

Literacy levels

The Population aged 15-24 in the Republic of Macedonia is 327,367. Literates are 323,251 and illiterates are 4,116. The literacy rate in the Republic of Macedonia is 98.7%. Kratovo and Lipkovo have slightly higher literacy rates while the remaining municipalities have slightly lower literacy rates than the national average.

Municipality	Population aged 15-24	Literate	Illiterate	Literacy rate
Kratovo	1581	1564	17	98.9
Kriva Palanka	3460	3415	45	98.7
Kumanovo	17144	16791	353	97.9
Lipkovo	4515	4495	20	99.6
Rankovce	594	582	12	98.0
Staro Nagorichane	451	442	9	98.0

Source: State Statistical Office, Census 2002. Method of calculation: literate population 15-24 divided by total population

Table 5-41 Literacy rates in the Municipalities of the Northeastern Region

Educational System

The total number of primary schools in the Republic of Macedonia is 990 and in this region is 98. Generally, the elementary education in the municipalities has been arranged through central schools located in the largest settlement in the municipality, with an appropriate number of local primary schools therewithin. The number of pupils attending the primary schools in Macedonia is 208 980 and in the Northeastern region reads 216 pupils per school, whereas the total number of pupils is 20,575.

The total number of regular secondary schools in the country is 110 and is 8 in the Northeastern region. At the beginning of the school year 2007/2008, the ratio in the Northeastern region with 15 children to one teacher ranks at the medium level. The number of students in the secondary schools in the country is 94,284 and in the Northeastern region reads 8,773 students.

In the year 2009/2020 in the Republic of Macedonia there are 6 schools for higher education with 2,102 students. Also there are 101 faculties with 55,792 students in tertiary education concentrated in 5 public universities and 11 private.

According to the data obtained from the State Statistical Office, the number of registered students in the year 2007, coming from the Northeastern region per 1,000 inhabitants, reads 142, with 54.45% thereof being females.

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
Primary and lower secondary education[11]									
Number of schools	993	83	97	123	119	172	144	99	156
Teachers (%)	100.0	6.9	8.3	12.9	8.5	10.7	17.3	9.4	26.1
Enrolled pupils (%)	100.0	6.9	7.7	10.5	7.8	10.2	16.9	9.5	30.5
Number of pupils per school	218	180	171	184	141	128	254	208	423
Number of pupils per teacher	14	14	13	11	12	13	13	14	16
Upper secondary education[11]									
Number of schools	108	9	13	12	7	17	13	8	29
Teachers (%)	100.0	6.9	9.6	10.8	6.6	12.2	15.4	8.6	29.9
Enrolled pupils (%)	100.0	7.4	8.9	10.3	7.6	11.6	16.5	9.3	28.3
Graduated pupils[2)] in upper secondary education (%)	100.0	7.1	9.5	9.5	6.6	11.9	15.5	8.6	31.3
Number of pupils per teacher	14	15	13	14	16	14	15	15	13

Source: Country Analysis for IPA Programming in the field of HRD, ETF 2006

Table 5-42 Basic data according to the levels of education

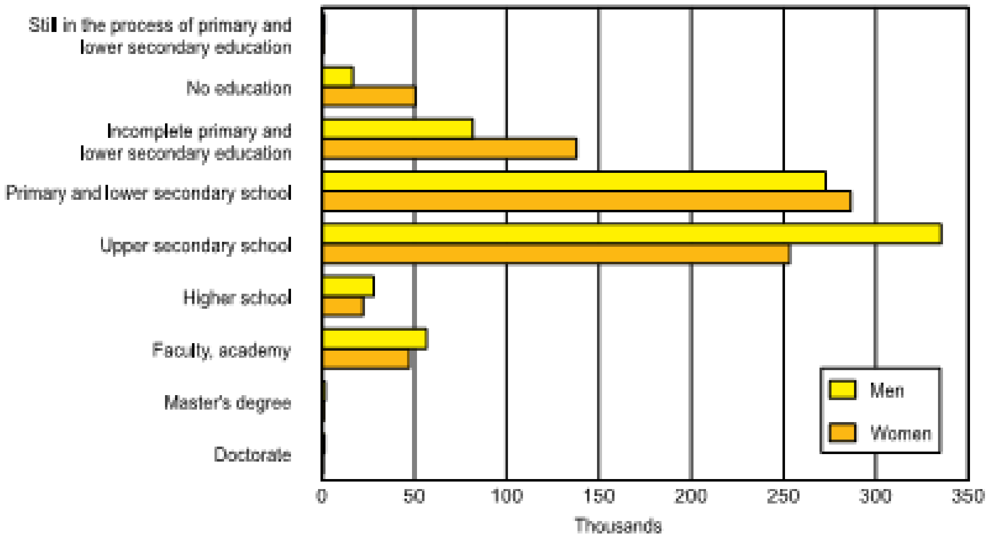
There are three university educational institutions in Kumanovo, including the Faculty of public administration, the Faculty of business administration - these have been dispersed from the National University in Tetovo, and the private university institution - the Euro College. Starting from 2009, a Faculty of information sciences has been opened in Kriva Palanka, as a result of the dispersed studies from the Faculty of natural-mathematical sciences in Skopje.

According to the data obtained from the municipalities, the Northeastern planning region operates almost thirty schools of foreign languages, of which Kratovo operates 3 schools of foreign languages, Kriva Palanka 4, and Kumanovo 20. In addition, the region also operates private schools for teaching computer skills. Vocational training of the labour force is undertaken through the Employment Service Agency, on the basis of the market requirements.

The region also operates boarding schools to accomodate students coming from the other municipalities and rural settlements to the three urban settlements and municipalities: Kumanovo, Kratovo and Kriva Palanka.

Educational Levels

According to the Census of 2002, 11% of the total number of persons over 15 years of age do not have formal education or have a very low level of education (illiterate, with incomplete primary or without primary education). 4.2% of the Macedonian population is without any education, 6.8% have not completed primary education, 35.1% have completed only primary school, 36.9% have completed upper secondary school, 3.2% have completed college-level education and 13.8% have completed higher and tertiary education.



Source: State Statistical Office, Census 2002

Figure 5-174 Population by educational attainment

The gross enrolment rate in rural areas amounts to 62.36% and is significantly lower than in urban areas of 78.52%. Substantial inequalities in educational participation rates exist between ethnic groups, in particular for ethnic Roma, Albanians and Turks. This division is particularly pronounced amongst girls. While in primary education the participation is proportional to the ethnic composition of the population, there are important differences at the higher education levels.

At the beginning of the 2008/2009 school year the highest number of students per school in primary and lower secondary educations (423) were registered in the Skopje Region; fewer students per school were registered in the Polog (254) and Northeast (208).

At the beginning of the 2008/2009 school year the student-teacher ratio in the upper secondary education was highest in South-East Region (16), on national level in North-Eastern Region (14) and lowest in South-West (11).

When comparing with national educational levels, the six Municipalities in the North-Eastern region have considerable lower educational attainment. Thus, 21.7% of the population at 15 years of age is without education or incomplete primary education, 37.8% has completed only primary education, 33.6% have completed secondary school, 2.6% has completed upper secondary school, 3.8% have completed college-level education and 111 persons (0.08%) have completed higher and tertiary education.

Municipality	Total population aged 15	Without education	Incomplete primary education	Primary School	Secondary School	High School	Higher school, faculty, academy	Master degree	Doctorate	Still in the process of primary education
Kratovo	8,669	728	1,937	2,460	2,994	238	303	1	-	8
Kriva Palanka	17,110	1,197	2,357	4,851	7,492	490	707	3	1	12
Kumanovo	82,331	4,535	11,336	28,680	31,119	2,411	4,040	69	27	114
Lipkovo	18,200	903	2,421	12,238	1,968	285	273	9	1	102
Rankovce	3,326	503	871	1,053	817	41	36	-	-	5
Staro Nagorichane	4,074	625	1,572	1,279	562	15	18	-	-	3
Total	**133,710**	**8,491**	**20,494**	**50,561**	**44,952**	**3,480**	**5,104**	**82**	**29**	**244**
		6.40%	15.30%	37.80%	33.60%	2.60%	3.80%	0.06%	0.02%	0.20%

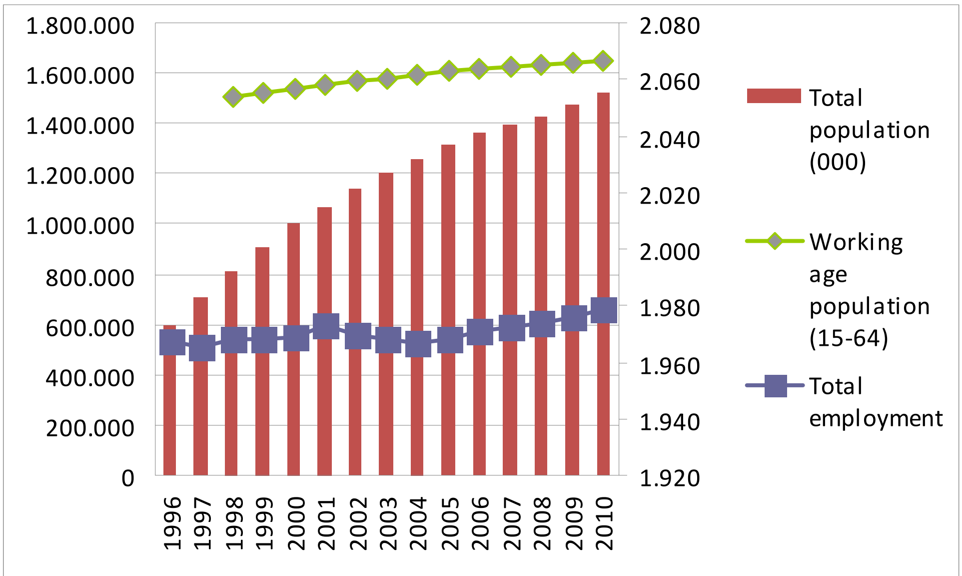
Source: State Statistical Office, Census 2002

Table 5-43 Educational attainment at 15 years of age and over in the Municipalities of the North-Eastern Region

5.2.9.3 EMPLOYMENT

Labour Force

According to the data of the State Statistical Office, in the IV quarter of 2010, the labour force in the Republic of Macedonia numbered 954,928 persons, of whom 659,557 or 69.1% were employed and 295,371 or 30.9% were unemployed persons. The activity rate in this period was 57.8% and the employment rate was 39.9%. In the beginning of 2011 (31.01.2011), 322,053 unemployed persons were registered in the Employment Service Agency of the Republic of Macedonia.



Source: State Statistical Office, in the IV quarter of 2010

Figure 5-175 Population, Labour Force and Working Age Population in Macedonia

Economic activity of the working-age population differs by gender, education level, age, ethnic origin and place of residence. According to data from Labour Force Survey in 2005, the activity rate of the female population in the Republic of Macedonia is lower than the activity rate of the male population and amounted 43.2% (male activity rate was 64.9%).

The educational level of the economically active labor force is for the majority (41.3%) a 4-year secondary education followed by 24.6% with finished primary education. 12.4% of the active labor force has completed 3-year secondary education while 11.1% holds a higher education. Activity rates are higher among women who have completed secondary and university education than among men who have identical schooling.

	Total	Rate	Men	Rate	Women	Rate
Labour Force	954,928	57.8	578,896	70.1	376,032	45.5
Employed	659,557	39.9	401,884	48.7	276,673	31.2
Unemployed	295,371	30.9	177,012	30.6	118,359	31.5
Inactive population	697,098	42.2	247,173	35.5	449,925	64.5

Source: State Statistical Office, in the IV quarter of 2010

Table 5-44 Population aged 15 years and over by economic activity and gender

Employment Levels for Young Persons

The employment rate of young persons aged 15-24 showed the very low rate of 12.3% in 2009 mainly due to high level of young unemployment, their engagement in the informal work and attendance at school which also can be seen in their low labour market activity rate. The employment rate of young persons aged 25-27 in 2009 was 35.6%. The employment rate of the age group of persons aged 55-64 is 26.2% while the highest employment rate is among the age group 25-54, i.e. 49.9%.

Different Ethnic Groups Employment Levels

The employment rates among the different ethnic groups varies ranging from 10.2% of Roma, 11.4% Albanians, 15.9% for Turks, 17.2% for Bosniacs, 32.7% Serb, 36.1% Vlachs and 36.4% of Macedonians. Employment rates are in particularly low for women of Albanian (2.9%), Roma (5.5%) and Turkish (5.8%) origin (Population Census, 2002).

Regional Employment Levels

There are also important differences in the employment rates for the various regions in the country. According to the 2002 Population Census data the employment rate the lowest employment rate of 25.0 was recorded in the North-Eastern Region, which also had the highest unemployment rate (58.0). Also, , the employment rate in Polog, North-Eastern and South-Western regions is 1.5 to 2 times lower than the total average employment rate in the country. Only the South-Eastern region has a higher employment rate than the average in the country.

The North-Eastern region participates in the working age population with 8.2% of all in the Republic of Macedonia. The activity rate within the North-Eastern Region is 59.5%. This is 6.8 points below the average activity rate in the Republic of Macedonia. The activity rates for the population in the North-Eastern region compared with the activity in the Republic of Macedonia are presented in the next table.

	Republic of Macedonia	North-Eastern Region	%
Working age population	1 633 341	137 773	8.20
Activity rate	56.3	59.5	-6.80
Employment rate	37.3	25.0	-11.80
Unemployment rate	33.8	58.0	24.20

Source: State Statistical Office

Table 5-45 Activity rates for the population aged 15 years and more, 2008

The urban population of Kumanovo accounts for almost 60% of the North-Eastern Regions total unemployment followed by the urban population of Kriva Palanka (14.8%) and Lipkovo (13.9%). The lowest regional unemployment rates are within the rural areas of Staro Nagorichane (0.4%) and Rankovce (0.5%).

Gender Employment Levels

In the period 2002-2010, the female employment rates were significantly lower than those of men. In 2005 male employment rate was 41.2% while female employment rate only amounted to 26.6%. Like activity rates, male and female employment rates are very unequal. While the male rate reached 41.2% in 2005, only 26.6% of women of working age were employed, and rates were particularly low for older women. The downward trend in employment has been quite evenly spread across the different age groups, with the exception of workers between 55 and 64 years of age, whose employment rate has remained almost unchanged. Data on employment rates according to level of education show that the lowest rates are found among those having primary education or less, while the highest are for people whose education was of university level. There are significant disparities which have been increasing over time (the total for people without education went down from 13.4% in 2001 to 6.7% in 2005, compared to figures for those with higher education of 58.3% in 2001 and 58. 6% in 2005 (LFS)).

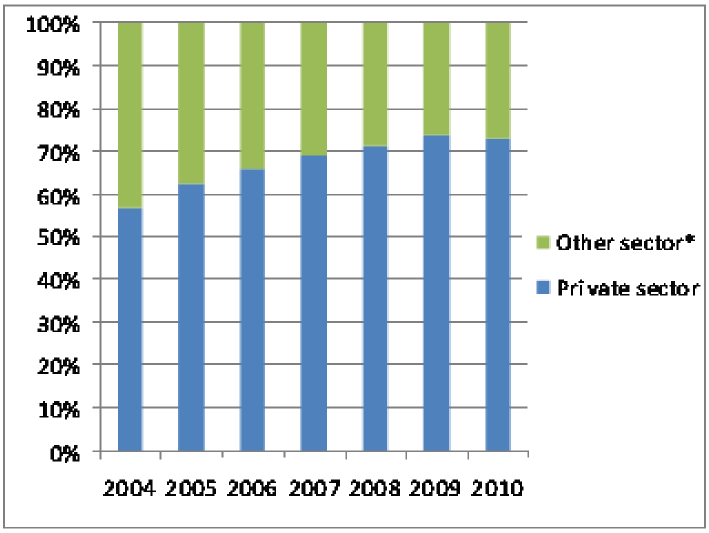
Private Sector Employment Levels

The growing importance of the private sector in Republic of Macedonia is reflected in the number of employed persons, thus 62.4% of the total employment in 2005 was within the private sector - an increase of more than 18.5% compared to 2000. In 2005, 71.8% of the total numbers of employed persons were employees, 5.7% were employers, 12.0% were self-employed. 14.9% of the self-employed were women, and 19.6% of the employers were women. In addition, 10.4 % of the total number of persons in employment were unpaid family workers, mainly in rural farming but not formally registered as being employed or forming part of the active labor force.

Increase of employment in theprivate sector in Macedonia continued even a decade after the start of transition. The numbers employed in state, collective or public companies has decreased over the years 2004-2006 by 30,000 while theprivate sector continued to increase by almost 80,000 employees. Expressed in percents, there is still considerable part of employment in the state sector, for example 33.9% in 2006. The numbers employed in the private sector increased by 21.2% for the period 2004-2006, while employment in the state sector shrunk by 16.9% as shown in the below in *Figure 5-176* and *Table 5-46*.

		2004	2005	2006	2007	2008	2009	2010
Total employment by sector	Private sector	296.709	340.240	376.866	407.154	434.819	463.683	448.976
	Other sector*	226.286	205.013	193.528	183.080	174.197	166.218	166.986

Table 5-46 Employed by Sector in Macedonia



Source: State Statistical Office, Annual Reports

Figure 5-176 Employed by Sector in Macedonia

The development of the private sector showed little effect on the development of self-employment. Employment increases in the private sector is mainly a result of the privatization providing incentives for the development of small and medium-sized enterprises and secondly as a result of establishing new firms. The total share of self-employment out of the total employment figures in the period 2000-2005 has increased by 1.5 %, while the share of employers has increased by 1.4%. In spite of these positive increases, the number of employers and self-employed in the country is still at a low level. One of the reasons is that self-employed people are engaged in the informal sector. The transfer from informal to formal sector would increase the number of self-employed.

Employment in the agriculture sector declined from 22.31% in 2000 to 19.56% in 2005 as a result of the privatization and division of agricultural enterprises, denationalization of the land as well as small number of registered folk. In 2005, 2.9% of the total number of registered enterprises was in the area of agriculture, hunting, forestry and fishery (5,024) - of which 21.4% were based in the rural municipalities (Statistical report 6.1.1.02, State Statistical Office). The industrial sector share of employment decreased by 36,1% in 2000 to 32.3% in 2005, even though the industrial production share measured in GDP in the same period increased by 7 % which is a result of the pressure from the global competition and the need of strengthening the market competitiveness of industrial products. The service sector share of total employment increased from 41.6% in 2000 to 48.2% in 2005, which is mainly due to establishing job positions in the wholesale and retail trade, public administration, education and health.

Sectoral changes in employment were rather modest in comparison to those that occurred in more advanced transition countries. The first period, 1996-2001, was characterised by an increase in agriculture's share of total employment, from 18.6% in 1996 to 24.8% in 2001, while all other sectors declined. Even the services' share fell slightly, from 44.3% to 42.8%, over the same period. The share of services and construction respectively grew to 50.5% by 6.9% in 2004, while the share of agricultural employment declined to 16.8% in 2004. It remains at a high level, well above the EU-15 (3.8%) and the sector may span a very wide range of activities (financial, business, hotels, cleaning, etc); and secondly because it should be noted that the bulk of the informal economy operates in the services sector, probably leading to an underestimate of its share of GDP and employment.

Permanent and Seasonal Migration

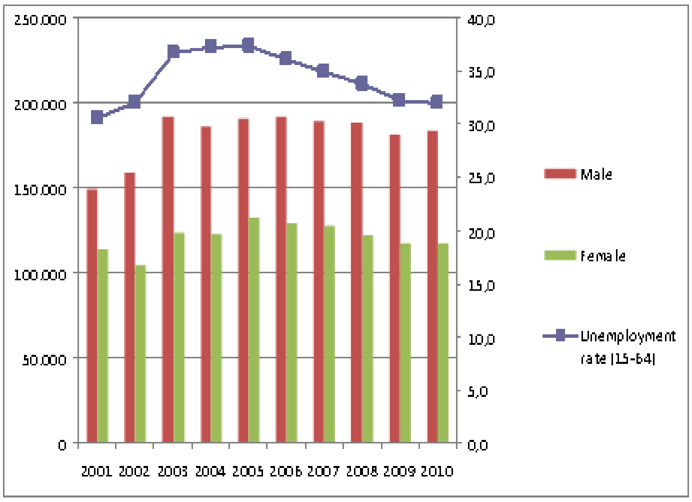
The data on internal migration (movement within the borders of the same region) shows that rural-urban migration is more common than urban-rural migration. The North-Eastern Region had the highest share in rural-urban migration (41.1%), whereas the Polog Region had the smallest share (22.1%).

5.2.9.4 UNEMPLOYMENT

National Unemployment Levels

One of the main weaknesses of the Macedonian economy is the continuously high level of unemployment (ca. 35 %). The unemployment in Macedonia was among the highest in the European Union (EU) and is almost four times higher than the EU average.

Unemployment mainly affects young people, people with low educational qualifications, ethnic minority groups, especially the Roma, and shows a strong regional bias towards urban areas. In 2005 women had on average a slightly higher unemployment rate than men (38.4% opposed to 36.5%). However, unemployment is significant among women belonging to the ethnic minority groups of Roma, Albanians and Turks. Another striking feature of the unemployment problem is the high number of people being unemployed for long periods.



Source: Employment Service Agency of the Republic of Macedonia, January 2011

Figure 5-177 Unemployed persons, unemployed rate in Macedonia

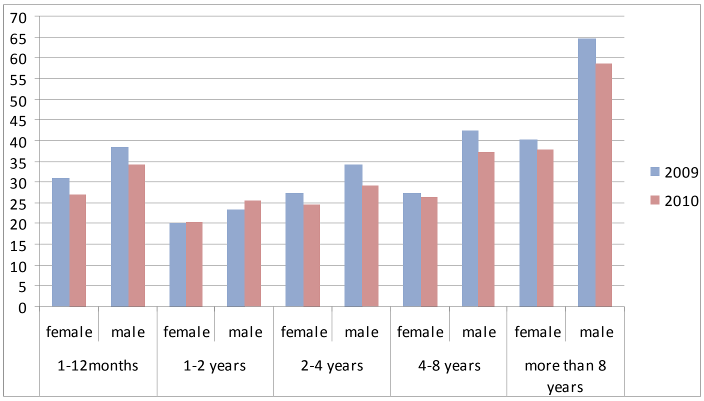
Gender Unemployment Levels

	Unemployed person	Male	Female	Unemployment rate (15-64) %
2001	263.196	149.372	113.824	30.5
2002	263.483	159.144	104.339	31.9
2003	315.868	191.850	124.018	36.7
2004	309.286	186.223	123.063	37.2
2005	323.934	191.096	132.838	37.3
2006	321.274	191.856	129.418	36
2007	316.905	189.306	127.599	34.9
2008	310.409	188.222	122.187	33.8
2009	298.873	181.366	117.508	32.2
2010	300.439	183.426	117.013	32

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-47 Total Unemployed and Unemployed rate in Macedonia

In terms of disparity in gender division of unemployment Macedonia belongs to the group of countries with higher female unemployment. In April 1996, there were 28,8% male unemployment, with 36% female unemployment, calculated as percentage from the total male/female labour force. What is of even greater concern is that female unemployment among ethnic minorities is much higher, reaching 85.2 % among Romas or 68.64 % among the Albanian minority. A factor that may explain this situation could be the influence of specific ethnic, cultural, traditional, and religious values that prevented the female population actively participating in many domains of social life, including education, and the labour market.



Source: Employment Service Agency of the Republic of Macedonia, January 2011

Figure 5-178 Percentage of long term unemployed in Macedonia by gender

The problem is more compounded when the female unemployment rate is reviewed from the perspective of duration of job seeking. Long-term unemployment in Macedonia is another problem. Nearly 82 % of total unemployed persons were unemployed for more than a year. The percentage of unemployed women for more than 8 years as a share of the total unemployed had the biggest fraction of almost 28% and has increased since 2003 when it was 26%. If those women unemployed for more than 4 years are included, it reaches 50%, which means that half of the registered unemployed women were unemployed for more than 4 years.

The seriousness of the problem is also illustrated by the long-term unemployment rate, i.e. the percentage of persons being without work for a year or longer. The long-term unemployment rate during the period: 2000 - 2005 has been more than 80% and in 2005 it was 86.6%. Long-term unemployment among young people is also a striking feature of the unemployment problem. About 66% were unemployed for over one year. One of the reasons for their unfavourable position in the labour market is lack of working experience.

		2003	2004	2005	2006	2007	2008	2009	2010
1-12 months	total	69.208	58.724	50.938	72.636	62.442	61.365	69.215	61.189
	female	29.071	27.012	23.571	31.478	27.833	28.300	30.824	26.916
1-2 years	total	53.357	57.262	45.288	39.341	53.943	43.821	43.627	46.034
	female	23.240	23.575	19.774	17.776	22.982	19.588	20.088	20.467
2-4 years	total	68.234	69.096	71.300	67.774	56.727	60.819	61.475	53.660
	female	30.031	29.450	29.238	28.233	24.453	26.483	27.371	24.487
4-8 years	total	99.184	95.791	82.117	78.289	76.871	71.662	65.550	63.969
	female	40.561	39.161	34.314	32.086	31.170	29.282	27.346	26.585
more than 8 years	total	100.378	110.199	110.346	108.511	107.183	105.696	101.428	96.489
	female	45.034	47.266	44.738	43.037	41.632	41.230	40.310	37.927
Total	total	390.361	391.072	359.989	366.551	357.166	343.363	341.295	321.341
	female	167.937	166.464	151.635	152.610	148.070	144.883	145.939	136.382

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-48 Unemployed persons in Macedonia by gender and duration

Unemployment Levels by Age

As elsewhere, *young workers* (aged 15 to 24) in Macedonia are more likely to be unemployed relative to other age groups. Their unemployment rate is 1.7 times higher than the national average for 2005. The unemployment rates among youth 15-24 years old, and among those on age 25-34, are extremely high. Thus having direct and indirect negative consequences for the socio-economic development of the Republic of Macedonia, since young people are part of the labour force that can significantly contribute towards more dynamic economic development of the country with their knowledge and creative abilities.

year/age	15-24	25-34	35-44	45-54	55-64	over 65
2007	67.558	96.487	70.278	58.667	23.664	253
2008	65.664	93.090	67.547	56.362	27.057	690
2009	62.256	88.469	65.304	55.014	26.883	946
2010	57.112	91.324	68.055	53.667	29.762	519

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-49 Unemployed Persons in Macedonia by Age

Different Ethnic Group Unemployment Levels

In *Table 5-50* unemployment by ethnicity is presented. Compared with the ethnic groups share of the total population, the unemployment rate is slightly lower for Macedonians, Albanians, Vlachs and Serbs while considerably higher for especially the Roma part of the population but also for the Turks and the Bosniaks.

Nationality	Number	%	Share of Population (2002)
Macedonians	203 932	63,3	64.2%
Albanians	78 641	24,4	25.2%
Turks	13 112	4,07	3.9%
Roma	15 457	4,8	2.7%
Serbs	2 501	0,8	1.8%
Villach	321	0,1	0.5%
Bosniaks	513	0,16	0.8%
Others	7 576	2,35	

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-50 Unemployed Persons by Nationality

As can be seen from the 2002 Census Roma are the most affected by unemployment and their unemployment rate is more than twice as high as the national average. Unemployment rates for Albanians and Turks are also high at 61.2 %, and 58.2 % respectively. Roma women have the highest unemployment rate of 84.1 % followed by Albanian women (72.9 %) and Turkish women (69.7 %). High unemployment rates among Roma, Albanians and Turks can be contributed to by the low education levels and other cultural factors (e.g. they are leaving school very early in order to get some kind of job and to support the family).

Unemployment Levels by Educational Level

Level of education	Number of unemployed Total	%
TOTAL	322 053	100
Without qualification	156 835	48,7
Half qualification and lower secondary education	11 147	3,5
3 years secondary education	49 830	15,5
Secondary education	78 220	24,3
Higher education	4 938	1,5
University level education	20 765	6,4
MBA	300	0,09
PhD	18	0,006

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-51 Unemployed Persons in the Republic of Macedonia by Level of Education (January 2011)

A sharp increase of unemployment was registered among persons with university level of education, there is a significant increase of nearly 4,000 persons in just a 3 year period of time, or number of registered unemployed with university level of education rose from 17,920 in 2004 to 21,910 in 2006.

Data based on education level and employment shows that the better educated workers have bigger chance to be employeed (shown in *Table 5-51*). There is a relatively low rate of employment for workers who have not completed primary education. With lower educational level they can accept jobs that require only lower skills levels, mainly in the agricultural sector but in many cases they are less reluctant to accept this kind of jobs.

Overall, unemployment between 2002 and 2010 mainly affected individuals with primary and secondary education and less affected were those with higher education. Almost more than 87% of the total unemployed had no higher or university education in 2010.

Taking into account the global trend towards the knowledge-based economy (although the pace of progress is assumed to be slower in transition economies), an increased need for higher qualifications and a labour force that completed university education can be expected in the medium to long term. Moreover, what is significant in Macedonia is the structural incongruity between the qualitative characteristics of the unemployed and the demands of the labour market.

	Activity rate	Employment rate	Unemployment rate
Without education	14.3	7.1	50.1
Unfinished primary education	24.3	14.6	40.2
Primary education	38.6	20.4	47.1
3 years secondary education	68.6	38.9	43.3
4 years secondary education	65.9	42.3	35.9
Higher education	71.5	59	17.4
University level education	83.9	68.2	18.6
Total	52.2	32.8	37.2

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-52 Educational structure and employment rate

Regional Unemployment Levels

Municipalities in North-Eastern Region:	Population[6]	Unemployment Situation on 31.12.2010[7]
1. Kumanovo	105.484	20.731
2. Kratovo	10.441	2.168
3. Kriva Palanka	20.820	5.116
4. Lipkovo	27.058	4.822
5. Staro Nagorichane	4.840	832
6. Rankovce	16.825	915
Total:	***185.468***	**34.634**

Source: Employment Service Agency of the Republic of Macedonia, January 2011

Table 5-53 The unemployment in the 6 municipalities of the Northern region

The Republic of Macedonia experiences large regional variations in unemployment due to differences in the level of economic development and utilizations of resources. Regional unemployment is particularly high in some rural areas and in areas where employment opportunities have disappeared. Low geographical mobility of the population is another reason for regional unemployment variations as well as the lack of information on job opportunities elsewhere in the country. In 2005 the unemployment rate was 38.7 % in the urban areas and 34.8 % in rural areas.

Although high rates of unemployment exist in the whole country, there are strong regional differences. The lower rates of unemployment are evident in the south and east regions where there are mainly agriculture and tourism activities, while the regions with concentrations of industrial activities have higher rate of unemployment. There is major concern for unemployment rate in the north-western part of the Country.

Region	Unemployment rate
Skopje	27%
Vardar	36%
Northeast	43%
Polog	27%
Pelagonia	35%
East	28%
Southwest	22%
Southeast	42%
Whole country	31%

Source: State Statistical Office, 2010

Table 5-54 Unemployment Rate

[6] Census of Population, Households and Dwellings in the Republic of Macedonia. 2002. Population of settlements to be identified.
[7] Agency for unemployment Announcement

year	Total population (000)	Working age population (15-64)	Total employment	Employed (000)		Employment rate
				male	female	
1996	1.973		537.591			
1997	1.983		512.301			
1998	1.992	1.503.515	539.762			35,9
1999	2.001	1.518.724	545.222			35,9
2000	2.009	1.535.883	549.846			35,8
2001	2.015	1.552.611	599.308			38,6
2002	2.021	1.567.992	561.341			35,8
2003	2.027	1.580.023	545.108			34,5
2004	2.032	1.594.497	522.995	320.640	202.355	32,8
2005	2.037	1.608.416	545.253	332.179	213.074	33,9
2006	2.041	1.620.466	570.404	351.973	218.431	35,2
2007	2.044	1.628.636	590.234	358.835	231.399	36,2
2008	2.047	1.633.341	609.015	373.483	235.532	37,3
2009	2.051	1.638.869	629.901	389.332	240.569	38,4
2010	2.055	1.648.522	659.557	391.923	245.932	40

Source: State Statistical Office, 2010

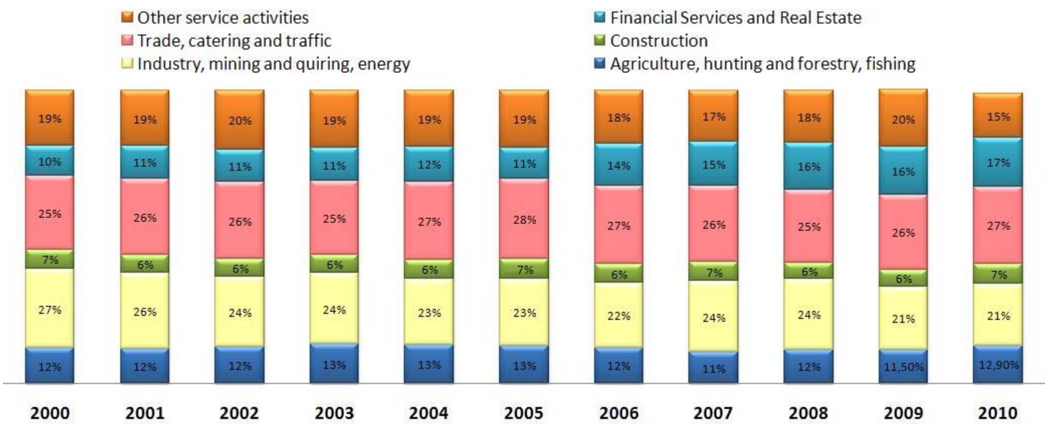
Table 5-55 Population, Labour Force and Working Age Population in Macedonia

5.2.9.5 ECONOMIC ACTIVITIES

Gross Domestic Product (GDP)

The average real GDP growth in 2010 accounted for 0.7 %. Average nominal GDP growth in 2010 accounted for 3.6 %, while GDP deflator was estimated at 2.9 %. According to the data of Q4 2010 nominal GDP growth accounted for 7.4 % compared to the same quarter the previous year, implying that the GDP deflator amounted to 5%. Average nominal GDP growth in 2010 accounted for 3.6 %, while GDP deflator was estimated at 2.9 %.

The analysis of the GDP growth per sectors in the last ten years does not show any dramatic changes in the participation of the sectors in creation of the total country GDP. The agriculture is around 12 %, industry and mining has had a decrease of 6 % in the ten year period, while an increase of 6 % is registered in the financial sector. In general the financial services and real estate business are the highest growing sector in the creation of total country GDP.



Source: State Statistical Office, Skopje

Figure 5-179 GDP in Republic of Macedonia for the Period 2000-2010 (per sector)

The Gross Domestic Product (GDP) is defined as the total production of goods and services indented for end use which are produced on the territory of Macedonia. The data on the Gross Domestic Product in Macedonia is available only on a national level. According to the data of the State Statistical Office, the Skopje Region had the biggest share (45.6%) of the gross domestic product within the Republic Macedonia in 2009, while the Northeast Region had the smallest share (5.2%).

Region	Total (year 2009)
Vardar region	485.561
East region	498.911
Southwest region	506.276
Southeast region	531.984
Pelagonia region	837.431
Polog region	479.236
Northeast region	297.545
Skopje region	3.041.675

Source: State Statistical Office, Skopje

Table 5-56 Gross Domestic Product ,2009, in Euros

Gross Domestic Product per Capita

GDP per capita on a regional level reveals huge discrepancies as regards the level of economic activities between the Skopje region and the rest of the country. Large differences in GDP per capita can be observed across regions too. The Skopje Region has the highest level of GDP per capita, more than three fifths above the average level for the country as a whole. With the exception of Vardar, GDP per capita in all other regions is below the country average. The lowest levels are in Northeast Region (index 49.9) and in Polog (index 46.4) , where levels are around one half of the country average.

Region	Year 2009
Vardar region	3.156
East region	2.772
Southwest region	2.281
Southeast region	3.082
Pelagonia region	3.571
Polog region	1.528
Northeast region	1.704
Skopje region	5.074

Source: State Statistical Office, Skopje

Table 5-57 Gross Domestic Product per capita, in euros

The official data indicating the level of economic development and the welfare of the population, categorize the Northeastern region on the perrifery relative to the other regions, whereas according to the official classification methods, criteria and indicators, this region is classified as the least developed planning region in the Republic of Macedonia.

Gross Fixed Capital (GFC)

Observed by regions, the Skopje Region continuously has the highest share in total gross fixed capital formation, amounting to 54.0% in 2007. The share of the Polog Region has increased in recent years, reaching 11.7% in 2007. The Northeast Region had the lowest share of 2.3% in Gross Fixed Capital Formation (GFCF) in 2007; there is no significant difference between the other regions.

million denars

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
2005	48 867	3 976	1 600	3 863	3039	3 557	5 234	1 752	25 846
2006	56 485	3 647	2 437	3 572	3152	3 373	8 812	1 362	30 129
2007	71557	4404	5374	4788	4295	4010	8379	1647	

Source: State Statistical Office, Skopje

Table 5-58 Gross Fixed Formation by regions

million denars

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
Gross fixed capital formation	71 557	4 404	5 374	4 788	4 295	4 010	8 379	1 647	38 660
Agriculture, hunting, forestry, fishing (A+B)	1 937	631	108	13	308	332	117	47	380
Mining, manufacturing, electricity, gas and water supply (C+D+E)	16 385	1 653	2 439	639	428	2 160	321	373	8 371
Construction (F)	24 543	1 188	1 887	2 828	2 084	819	6 697	421	8 619
Wholesale and retail trade, hotels and restaurants, transport and communications (G+H+I)	18 140	731	754	1 062	1 301	493	759	555	12 487
Financial intermediation, real estate, renting and business activities (J+K)	3 030	47	36	102	14	33	38	21	2 739
Other service activities (L to P)	7 521	155	150	144	160	172	447	229	6 063

Source: State Statistical Office, Skopje

Table 5-59 Fixed capital Formation by regions and sector of activity, 2007

The Northeast Region by sectors of activity, the sector, the wholesale and retail trade had the highest share in total gross fixed capital formation (34.3%), followed by construction, hotels and restaurants, transport and communications with 25.4% and mining, manufacturing, electricity, gas and water supply with 22.9%.

5.2.9.6 AGRICULTURE AREA

At 2.7% the sector Agriculture, hunting, forestry, fishing had the lowest share in GFCF. In all sectors, except Agriculture, the Skopje Region had the highest share.

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
Agricultural area	100	100	100	100	100	100	100	100	100
Cultivated land - total	49	52	70	49	63	43	26	54	59
Pastures	51	48	30	51	37	57	74	46	41

Source: State Statistical Office, Skopje

Table 5-60 Structure of agriculture area, 2008

The statistical data on agricultural area in the Republic of Macedonia, by regions, show that in 2008 the largest part of agricultural area was concentrated in the Pelagonia Region, covering 25.2% of the total area, while the Skopje Region had the least agricultural area, only 6.1%.

The Northeastern region comprises 146.346 hectares agricultural area, with 79.800 hectares thereof being tilled soil. The forests cover 49.295 hectares. The most significant rivers in this region are the Lipkovska Reka and the river Pcinja in the western part, then the Kriva Reka in the northeastern part, i.e. the Osogovo area of the region. The resources available in this region include: minerals such as copper, lead, chromium, arsenic, antimony and zinc, then the bentonite clays, quartzites and opal breccia, in addition to the hydrographic resources that should not be neglected, such as the thermal waters.

	Republic of Macedonia	Vardar Region	East Region	Southwest Region	Southeast Region	Pelagonia Region	Polog Region	Northeast Region	Skopje Region
Agricultural area	1 064 389	108 167	113 625	103 601	90 973	268 500	169 526	145 286	64 711
Cultivated land - total	521 193	56 464	79 771	50 893	57 370	115 314	44 465	78 749	38 167
Arable land and gardens	423 647	44 232	66 689	40 599	48 970	95 879	31 375	64 540	31 363
Orchards	13 916	841	3 187	2 204	977	3 916	1 141	954	696
Vineyards	22 401	9 864	1 723	621	5 241	1 201	41	1 620	2 090
Meadows	61 229	1 527	8 172	7 469	2 182	14 318	11 908	11 635	4 018
Pastures	542 478	51 676	33 826	52 683	33 483	152 705	125 061	66 529	26 515

Source: State Statistical Office, Skopje

Table 5-61 Area by category of use, 2008

Business entities

The number of active business entities in 2010 in the Republic of Macedonia was 75.497. The largest numbers of business entities are within: wholesale and retail trade; repair of motor vehicles and motorcycles with 28,326 entities or 37.5% and manufacturing with 8263 entities or 11.0%. The least represented sectors are electricity, gas, steam and air conditioning supply with 107 entities or 0.1% and mining and quarrying with 164 entities or 0.2%.

The total number of registered businesses in the Northeastern region in 2007 was 6.952 of wich 3.506 (50%) were active. This is relatively equal to the activity rate of registered businesses in the other regions. However, according to the official data obtained from the State Statistical Office, the number of businesses registered in 2007 within the Northeastern region was the least in comparison with the other regions, i.e. 5.92%.

	Total	micro	small	medium	large
Kratovo	242	108	133	1	-
Kriva Palanka	548	280	268	-	-
Kumanovo	3.258	1.883	1.351	20	4
Lipkovo	245	128	116	1	-
Rankovce	50	18	32	-	-
Staro Nagorichane	54	32	22	-	-

Source: State Statistical Office, Skopje

Table 5-62 Active business entities by size, by Municipalities in Northeastern Region, 2010

The economic growth in Northeastern region is based on small enterprises which in 2007 accounted for 70% of the total production. The small enterprises are characterized with high growth rates, thus reaching 72% in the period 2003-2007, creating almost 3,000 new jobs as opposed to the loss of 800 jobs within the medium and large enterprises.

In respect of numbers of employees, the highest share of 78.5% belongs to business entities with 1-9 persons employed, followed by business entities with no persons employed (or the entities did not provide information about persons employed) with 14.2%, and entities with 10-19 persons employed with 3.3%. The share of entities with 20-49 persons employed was 2.1%, those with 50-249 persons employed participated with 1.6%, while entities with 250 or more persons employed had a share of only 0.3%.

According to the official statistical information, the industry and service sectors dominate with 45% each respectively of all businesses. The industrial sector employs 51% of the employed labour force opposed to 38% for the service sector. Regarding investments in capital assets in the Northeastern region during the period 2000-2006 per business fields, it becomes apparent that the civil engineering has been the most exploited field with 32.9%, then comes industry, mining and energetics with 29.6%, followed by other various business areas with 19.1% and trade, catering and communication with 18.4%.

	Kratovo	Kriva Palanka	Kumanovo	Lipkovo	Rankovce	Staro Nagorichane
Total	242	548	3258	245	50	54
Agriculture, forestry and fishing	14	45	110	15	18	22
Mining and quarrying	3	1	4	1	1	-
Manufacturing	29	46	464	29	-	5
Electricity, gas, steam and air conditioning supply	-	-	-	-	-	1
Water supply, sewerage, waste management and remediation activities	2	2	9	1	1	1
Construction	17	18	127	22	4	2
Wholesale and retail trade; repair of motor vehicles and motorcycles	90	237	1375	83	15	9
Transportation and storage	12	34	272	37	-	4
Accommodation and food service activities	27	50	156	16	3	1
Information and communication	-	5	31	1	-	-
Financial and insurance activities	-	1	7	2	-	-
Real estate activities	-	-	9	-	-	-
Professional, scientific and technical activities	6	24	171	3	-	1
Administrative and support service activities	1	4	66	2	-	-
Public administration and defence; compulsory social security	1	2	5	1	1	1
Education	5	10	58	9	1	4
Human health and social work activities	15	28	155	13	2	3
Arts, entertainment and recreation	10	9	52	4	1	-
Other service activities	10	32	187	6	3	-
Activities of households as employers	-	-	-	-	-	-
Activities of extraterritorial organisations and bodies	-	-	-	-	-	-

Source: State Statistical Office, Skopje

Table 5-63 Active business entities by sections of activities

5.2.9.7 VULNERABLE GROUPS

Social Protection & Welfare

According to the State Statistical Office data, in 2009 the percentage of poor people in the Republic of Macedonia was 31.1 %. Analyzed by profiles, most vulnerable groups are multi-member households, bearing in mind the fact that 53.7 % of the poor people live in households with 5 and more members. The poverty rate for the unemployed is 40.5 %, i.e. 42.7 % of all poor people are unemployed. Education of the household head is also an important factor for the risk of being poor, namely 56.7 % of the poor live in households where the head of the household has no, or at most primary education.

Social welfare constitutes 54.7 % of the total social financial assistance. The one-off (occasional) financial assistance is predominant with 32.8 %, or 17.9 % of the total financial social welfare. The table below gives overview of the recipients of social cash benefits.

	Head of household (number of households)		Household members (together with the household head)	
	Total	women	total	women
2008				
Total	**52 974**	**11 096**	**208 797**	**93 816**
Vardar region	3 291	640	10 420	4 825
East region	3 559	1 259	13 361	5 726
Southwest region	4 462	715	18 493	8 473
Southeast region	3 267	531	11 504	5 522
Pelagonia region	7 465	2 029	23 938	9 794
Polog region	11 512	1 533	42 360	19 125
Northeast region	6 579	940	24 849	12 032
Skopje region	12 839	3 449	63 872	28 319
2009				
Total	**49 515**	**10 466**	**193 220**	**86 638**
Vardar region	3 160	673	9 779	4 549
East region	3 159	1 139	12 141	5 286
Southwest region	4 253	511	17 679	7 304
Southeast region	3 180	580	11 278	5 401
Pelagonia region	7 281	1 945	22 323	9 524
Polog region	11 056	1 557	40 888	20 093
Northeast region	6 106	1 005	22 547	9 584
Skopje region	11 320	3 056	56 585	24 897

Source: State Statistical Office, Skopje

Table 5-64 Recipients of social cash benefits

Income Distribution and Poverty

The data on the available *income and expenditure of households* is very important in the identification of the regional differences in the levels of living standard and poverty of the population. On the basis of this data, a large number of indicators could be computed to identify the mentioned differences.

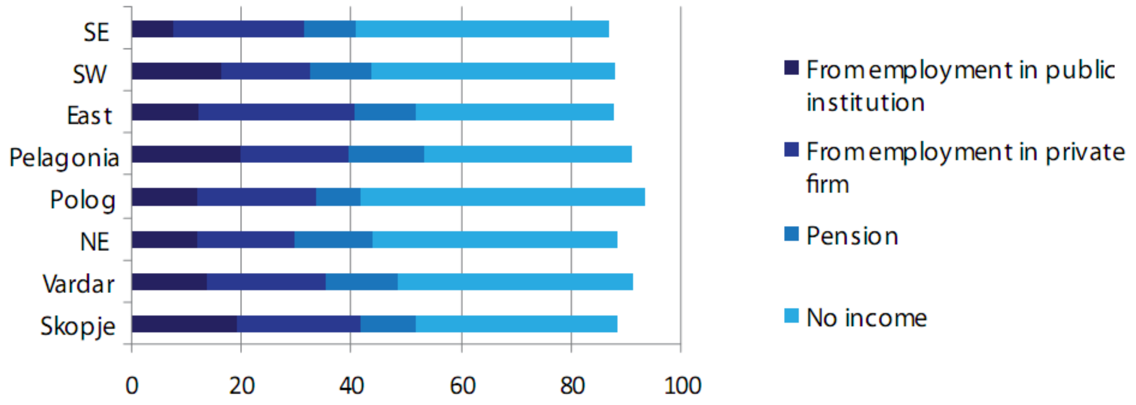
For the needs of mapping the socio-economic development of the municipalities of the targeted Region, the following indicators are particularly relevant for the income: medium income per household; disparity of income among households (percentages of income or expenditures of the poorest 10 and 20 percent and the richest 10 and 20 percent of the households); the subjective opinion of the households on their financial situation; inequality of income expressed by the Gini index, as well as the inequality intensity (relation between the richest 20 percent and the poorest 20 percent of the households). As regards poverty, the key indicators would be the standard ones: the main aggregated index, poverty depth index and poverty severity index. As of recently, the human poverty index (HPI-2) is a poverty indicator of growing importance. Due to the problem of identifying one of the required components (adults at the age of 16-65 with no functional education), we believe that it will be difficult to arrive at HPI-2-relevant indicators at lower levels (regions, groups of municipalities, municipalities) in the near future.

At the moment there are available official data that is necessary for the calculation of the mentioned indicators of inequality and poverty only at a national and regional level. This data are from the Household Budget Survey. The subjective opinion of households on whether their monthly income is sufficient to meet their needs indicates unfavorable changes. Namely, there is a decrease in the percentage of those who believe that their income meets their needs in full (from 3.7 percent in 1998 to 2.1 percent in 2000), meets their needs for the most part (from 26.8 percent to 25.8 percent), and does not meet their needs for the most part (from 42.6 percent to 39.7 percent), whereas there is an increase in the percentage of those according to whom their income completely fails to meet their needs (from 27.0 percent to 32.3 percent).

Regional differences in (median) monthly household equalized income are relatively high, but far less variable than the average (mean) regional GDP per capita. The lowest median monthly equalized income, observed in the Northeastern region is just about 60% of the highest income observed in the Pelagonia region. It is interesting to note while average GDP per capita in Northeastern region is one of the lowest in the country, its mean household equalized income is on a level of the country as a whole. This difference between mean GDP per capita and median household income could reflect either presence of a high level of informal economic activity not captured by the official GDP measure, remittances from abroad, a commuter flow effect, or else simply the difference in distribution of the mean compared to the median as an indicator of the average levels of activity and income.

Furthermore, the scale of household income differences is lower between regions than between ethnic affiliation. The lowest median monthly equalized income is observed among the Roma (81), 50% less than among ethnic Macedonians (163). Since three fifths of the country's Roma population lives in the Skopje region, the income in the Skopje region is reduced directly by the significant presence of low Roma incomes.

Based on PCA (People Centred Analysis) Survey 2008, median equalized household income is lower than the mean equalized household income (within ethnic affiliation and in the country) thus more than a half of the households have income lower than the average income. This is especially true for Roma. Thus, indicating a sharper inequality within ethnic affiliation.



Source: PCA Survey, 2008; Note: total income by regions does not add to 100% as the other categories are not shown

Figure 5-180 Sources of income

The share of income from employment in private firms is lowest in the Southwest and Northeast Regions, where the share of income originating from the private sector is around one fifth and highest in the Southeast, Vardar and Polog, where around one quarter of all incomes originates from the private sector. The highest share of income from employment in the public sector is in Pelagonia and the Skopje region, where about one fifth of incomes originate from this source, while the lowest is in the Southeast and Polog. The share of income originating from pensions is highest in Pelagonia and Vardar (13%). Overall, around 40% of respondents to the survey answered that they have no income at all (ranging from 52% in Polog and 36% in the East).

Remittances are an important source of income, especially in Polog, Southwest and Northeast Regions where more than one tenth of households receive remittances from abroad. In the last decade the amount of payment orders from abroad from the persons who are temporarily engaged abroad (Afghanistan and Iraq mainly) has increased. This refers especially for the Municipality of Kumanovo and wider region.

The "at-risk-of-poverty rate" is defined as a share of people with an equivalent disposable income below 60% of the national equivalent median income, shows a high degree of regional variability in the at-risk-of-poverty rate. In the Northeast Region over one third of households are at risk of poverty, while in Pelagonia and Vardar less than one fifth of households are at risk of poverty on the income based measure. The reason why income-based poverty measure is higher than the expenditure-based measure in almost all regions except Polog may be due to the fact that part of household incomes comes from the informal sector and is underreported, or that part of expenditure derives from a draw-down of savings.

It is discouraging to note that, except for the Southwest and Vardar (on the income based measure), the proportion of children under age of 15 at risk of poverty is even higher than the overall proportion of households at risk of poverty. The Northeast has an extremely high proportion of children at risk of poverty, reaching over three fifths when measured in relation to household income

The most vulnerable ethnic group remains the Roma, with 64% of Roma households below the income-based poverty line. On the income based measure the ethnic Albanian population has a similar poverty headcount to the national average. On an expenditure basis, the poverty headcount is above the national average. Correspondingly, the ethnic Macedonian population has a poverty headcount below the national average on the expenditure basis.

The "relative median poverty risk gap" is used for measure the depth of poverty. It is defined as difference between the median equalized income of those below the at-risk-of poverty threshold and the threshold itself, expressed as a percentage of the threshold. Using this way to measure the gap which separates the poor from the poverty threshold we can monitor whether the poor are just below the poverty threshold or are deeply below it .The poverty gap is highest in Northeast and lowest in the Pelagonia.

Region	Income based (Poverty line=5778)		Expenditure based (Poverty line=6571)	
	Poverty Headcount	Poverty Gap	Poverty Headcount	Poverty Gap
Pelagonia	18%	7%	13%	3%
Vardar	19%	7%	18%	8%
East	23%	7%	18%	6%
Polog	26%	9%	36%	18%
Southwest	27%	10%	21%	6%
Whole country	28%	10%	19%	8%
Southeast	29%	13%	4%	1%
Skopje	32%	10%	13%	6%
Northeast	38%	16%	34%	15%
Ethnicity	**Income based (Poverty line=5778)**		**Expenditure based (Poverty line=6571)**	
	Poverty Headcount	**Poverty Gap**	**Poverty Headcount**	**Poverty Gap**
Macedonians	27%	9%	14%	6%
Albanians	29%	11%	30%	14%
Roma	63%	32%	44%	20%
Other	16%	4%	12%	9%

Source: PCA Survey July/August 2008

Table 5-65 Poverty Gap

Chapter 6 Potential Environmental & Social Impacts

Describes the potential environmental and social impacts resulting from the railway project activities, including cumulative, synergy and transboundary impacts.

6 POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

6.1 INTRODUCTION

Chapter 6 addresses potential impacts (adverse and positive) of all planned project activities during the Construction and Operational Phases which were initially identified by means of the Scoping Matrixes (see *Chapter 4).* The Scoping Matrix where the interactions between relevant project activities and the natural/physical environmental aspects and the social aspects were considered to determine whether the interaction may create a potential impact.

The main findings and description of the potential environmental impacts and Significance of Effect (without mitigation) are presented in *Chapter 6.2* where these are discussed for the following affected receptors: a) land use, b) surface and ground waters, c) air quality, d) soils, e) landscape and visual aspects, f) acoustic quality (noise and vibrations), g) generation of waste and appropriate waste management needed, h) biodiversity, including habitats, flora, and fauna, i) natural, cultural and archaeological heritage.

The main findings and description of the positive and negative social impacts and significance of effect (with mitigation) are presented in *Chapter 6.3*, where the following issues are addressed: a) land and property, b) Community health and safety, c) Community tensions d) Access and severance effects, e) disruption of utilities, f) economic impacts, g) employment impacts, h) Education and training, i) Vulnerable groups, j) workforce related impacts and issues, k) Local Communities and their “Quality of life”.

6.2 POTENTIAL ENVIRONMENTAL IMPACTS

The following Section presents the assessment of the impacts on each environmental resource/receptor identified with the Leopold matrix that is presented in *Chapter 4*. For each resource/receptor, impacts have been identified and assessed distinguishing between those that occur during the construction phase and those that occur during the operational phase of the railway project. In some cases, where the impact is first created during construction, but it persists along the operational phase (e.g. landscape), the assessment is presented for both phases together.

The assessment in this Section is made without considering the application of preventive and corrective measures that could attenuate the magnitude of the impact. Mitigation measures for each impact assessed are presented in *Chapter 7*, where the effectiveness to attenuate the impact evaluated before reassessing the impact with the mitigation measures.

In this chapter, the information on the assessment of the impacts is organized in subchapters for each environmental resource/receptor impacted. In each subchapter, the value or sensitivity of the resources present in the railway project area are first evaluated with regards to their value or sensitivity and then the potential impacts and their likely significance is determined, following the methodology explained in *Chapter 4*.

The resources/receptor for which impacts have been identified and are assessed in this chapter are soil, surface water, groundwater, air, noise and vibrations, landscape, habitats, flora, fauna, protected and designated sites and cultural heritage. Impacts on resources such as geomorphology have not been assessed because no relevant features of these resources are expected to be impacted by the project.

6.2.1 POTENTIAL IMPACTS ON SOIL

6.2.1.1 ASSESSMENT OF SOIL RESOURCES

For the assessment of soil resources, the emphasis has been placed on the ecological functions that natural or semi-natural soil types have in natural and human environments, including their capacity to: produce biomass, ensuring food, fodder, and raw materials; influence in the water cycle at the earth surface; accumulate water as well as filtering and cleaning of percolated waters; buffer contaminant effects; carry out gas exchange between terrestrial and atmospheric systems and be a central link in the biotransformation of organic carbon. They are also a living space for a specialized biocenosis of a large variety of small animals and micro-organisms.

Therefore, if the sensitivity of soils is evaluated from the stand view of the potential loss of their ecological functions, soil types occurring in the railway corridor are evaluated as follows:

Type of soil	Sensitivity
Natural and semi-natural soils occurring in steep areas, prone to erosion	Very high
Natural and semi-natural soils occurring in flat areas	High
Anthropogenic influenced soils that still have natural soil functions (e.g. soils used for agriculture)	Medium
Contaminated natural and semi-natural soils	Low
Totally converted and destroyed soils like infill soils	Negligible

The soils encountered along the railway corridor are as follows and have the following sensitivities.

Location	Predominant type of soil in railway corridor	Sensitivity
Section 1		
K.P. 0.4 to K.P 28	Agricultural	Medium
K.P. 28 to K.P 30.5	Natural soil on flat or gently hilly areas	High
Section 2		
K.P. 30.5 to K.P 54	Natural soil on flat or gently hilly areas	High
K.P. 54 to K.P 60	Agricultural	Medium
K.P. 60 to K.P 65	Natural and semi natural soils on flat or gently hilly areas	High
Section 3		
K.P. 65 to K.P. 71	Natural and semi natural soils on gently hilly areas	High
K.P. 71 to K.P. 74	Urban area of Kriva Palanka	Negligible
K.P. 74 to K.P. 78	Natural and semi natural soils on gently hilly areas	High
K.P. 78 to K.P. 88	Natural and semi-natural soils occurring in steep areas	Very high

Table 6-1 The soils sensitivities along the railway corridor

6.2.1.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

Soils have important ecological functions in nature and represent an important resource for agricultural utilization and for forestry. Soil is a non-renewable resource, once destroyed natural soils cannot be restored quickly taking decades or longer to develop.

Soils may be affected in several ways during the construction and the operational phases.

Soils may become contaminated during construction works due to leaks and accidental spills of hydrocarbons from construction vehicles and machinery, as well as of other hazardous substances handled during the construction activities, such as lubricants, paints, solvents, resins, or acids. These leaks and spills could occur either at the construction site or at the storage sites for products and waste. Also, contamination of soils may occur if already contaminated soils are encountered during construction works (e.g. soils that could have been contaminated by spills of hazardous substances in the previous construction period 1994-2004). In this case, the inadvertent mobilization of pollutants from the contaminated area could contaminate clean areas of soil.

During railway operation, soils may also be subject to contamination from diffuse release of inorganic and organic substances due to leaks of lubricants and greases from the passing wagons and locomotive, emissions of metals from abrasion processes in brakes, rails, wheels and contact lines, lubricants and other hazardous substances used for railway maintenance, or herbicides used in railway vegetation management.

The clearance operations, the removal of topsoil and earthworks can result in the loss of soil through erosion by water or wind, particularly on the steeper sections of cuttings and embankments. Erosion risks will remain through the operational life of the railway if the soil is left unprotected and/or devoid of vegetation. The risk of landslides in steep areas has also been considered. However, this impact is not likely to occur because the engineering design of the railway already takes into account this risk in the design of berms and benches, bridges and tunnels, foreseeing their stability. Therefore, this potential impact is not evaluated.

The impacts on soils that are evaluated in this Section are:

Construction phase

- Impairment of soil quality (soil contamination) due to the introduction of pollutants;
- Soil erosion due to clearance of vegetation and earth movements;
- Destruction of fertile top soil.

Operation phase

- Impairment of soil quality (soil contamination) due to the introduction of pollutants from trains;
- Soil erosion in earth banks devoid of vegetation.

CONSTRUCTION PHASE

For the construction phase, the impacts will be evaluated only for Section 3, since Section 1 is already constructed and the clearance operations required in Section 2 were done in the previous construction period 1994-2004 (although minor some further earthworks are expected here they are anticipated to be minor).

Impairment of soil quality (soil contamination) due to the introduction of pollutants

The construction works required in Section 3 will have a high intensity with a heavy traffic of vehicles and machinery that could release realtively insignificant amounts of contaminants to the soil, mainly through leaks of oil and lubricants. Potential spills from this equipment and in hazardous materials storage areas could cause a more serious effect, but these events are more unlikely given adequate storage.

Estimation of the magnitude

Because the time at a given construction area is limited and the potential leaks from vehicles, machinery and from other activities using hazardous substances are expected to be small, it is considered that a distinguishable low level of soil contamination could occur at certain areas, but not severe enough to alter the key characteristics of the soil. The magnitude of the impact is low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows.

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct/Cumulative	Soil contamination occurs from materials and emissions generated by construction equipment/activities.
Reversibility	Reversible	Soil contamination can be remediated by natural means if contaminants are biodegradable and are in low concentrations. For severe contamination episodes, an active remediation would be needed.
Geographic Extent	Local	Limited to the footprint of the project
Time when the impact occurs	Immediate	Soil contamination occurs as the pollutants are released
Duration	Medium-term	As long as soil contamination is not severe, the soil self-depuration will eliminate contaminants in relatively short periods of time (weeks to years).
Likelihood of appearance	Probable	The impact has a medium likelihood of occurring
Magnitude	Low	See above

Table 6-2 Assesment of impact

Considering that the soil resource in Section 3 have an overall high sensitivity, using the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures is slight.

Soil erosion due to clearance of vegetation and earth movements

Most of the construction works in Section 3 will take place on hilly or steep terrain. Therefore, it is anticipated that there is a significant risk of erosion, particularly during rainy or windy days.

Estimation of the magnitude

Erosion processes are anticipated to be important in all Section 3, but more severe from K.P. 74 to K.P. 88, where the railway alignment enters a more mountainous area. Erosion will mainly occur in the areas where the permanent way will run on the side of the hills, which is where the cuttings will expose large surfaces of soil. Some exposed soil will also occur at the areas of the abutments and pillars of bridges and viaducts, as well as at the entrance/exit approach cuttings for the tunnels. Because of the steep morphology of the terrain, a relatively short length of the corridor will be exposed to erosion taking into account that there will be approximately 5 km of bridges and 9 km of tunnels. It should also be noted that the alignment in Section 3 runs over geological materials resistant to erosion (epidote-chlorite-schist, amphibiolites and albite-quartz-muscovite-chlorite schist).

Soil erosion during the construction of Section 3 will be clearly visible, but will be limited to realtively small areas and the over all magnitude of the impact on the soil resources in this Section is considered medium.

The other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Erosion occurs because of exposure of soil by earth movements of the construction works.
Reversibility	Irreversible	Eroded soil cannot be replaced.
Geographic Extent	Local	Limited to the footprint of the project
Time when the impact occurs	Immediate	Soil erosion will occur as soil is exposed to the surface
Duration	Short-term	During construction works
Likelihood of appearance	Probable	The impact has a medium likelihood of occurring
Magnitude	Medium	See above

Table 6-3 Assesment of impact

Considering that the soil resource in Section 3 has an overall high sensitivity, using the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

Destruction of top soil

In Section 3, the planned railway line will mostly go through open land covered with rich natural and semi natural soils with well-preserved ecological functions.

This impact is relevant for two main reasons, because soil is rendered useless and it is unavoidable, althought corrective measures are available. It generally implies a large amount of rich top soil removed that cannot be given another use (there is no market or use for excess top soil in this area of Macedonia.

Estimation of the magnitude

In Section 3, approximately 424,379 m^2 of land will be subject to land take for the construction of the railway and associated infrastructures, including train stations; this means that the top soil in this surface will be removed and lost forever (assuming no other loction can be found to use it).

Of these 424,379 m^2, about 82% corresponds to high and very high sensitivity natural and semi natural soils, 10 % corresponds to medium sensitivity agricultural soils, and the rest to urban soils with negligible sensitivity.

The destruction of top soil will be distinguishable and measurable, will affect most of Section3, but be restricted to a narrow strip of land, it will not affect the integrity of the resource in the area. Therefore the magnitude of the impact is considered medium.

The other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Type of Impact	Direct	Loss of top soil occurs because of land take needed to construct the railway line.
Reversibility	Irreversible	Rich top soil is removed to construct the permanent way and the right of way and cannot be replaced.
Geographic Extent	Local	Limited to the footprint of the project
Time when the impact occurs	Immediate	Top soil is lost when clearance and earth works start
Duration	Long-term	Top soil underneath the railway alignment will be lost for ever
Likelihood of appearance	Certain	Top soil needs to be removed to construct the railway
Magnitude	Medium	See above

Table 6-4 Assesment of impact

Considering that the soil resource in Section3 have an overall high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

OPERATIONAL PHASE

Impairment of soil quality (soil contamination) due to the introduction of pollutants

During railway operations, various contaminants are released in the railway permanent way and right of way, which cause soil contamination. This contamination, however, would be expected to be limited in extension because of the construction characteristics of the substructure of the railway. The ballast is placed on a protective sub-ballast layer of compacted fill soil, which in turn lies on the natural subsoil, which is also compacted (unless it is rock). The compacted soil increases load-bearing capacity, prevents soil settlement and frost damage, provides stability, reduces water seepage, swelling and contraction, and reduces settling of soil. In addition, for proper drain off, the sub-ballast layers, including the underneath subsoil should have an inclination of 2.5 % to the outside.

Thus, during operations the greater concern from ballast contamination is the contamination of surface water from railway runoff percolated through the ballast. The main soil contamination would be from the application of herbicides in the outer space of the right of way.

Estimation of the magnitude

The magnitude of the impact will depend on the biodegradability of the herbicides used, the doses applied, and the frequency of application. If toxic non/low biodegradable herbicides are used at high doses and frequently, the impact on soil contamination may be relevant; it could be distinguishable and measurable, would affect any soil along the railway, but it would be confined to a narrow band at both sides of the railway tracks. The magnitude of the impact is considered to be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct/Cumulative	Soil contamination occurs from products used in railway maintenance activities.

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Reversibility	Reversible	Soil contamination can be remediated by natural means if contaminants are biodegradable and are in low concentrations. For severe contamination episodes, an active remediation would be needed.
Geographic Extent	Local	Limited to the footprint of the project
Time when the impact occurs	Delayed	Distinguishable soil contamination would take a time until sufficient pollutants accumulate.
Duration	Long-term	Soil contamination will be concomitant to railway operation.
Likelihood of appearance	Probable	The impact has a medium likelihood of occurring
Magnitude	Medium	See above

Table 6-5 Assesment of impact

Considering that the soil resource in Section3 have an overall high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

Soil erosion in earth banks devoid of vegetation

Soil erosion processes during the operational phase will be mainly considered for Section3, since in Section1 and 2, this process has already been offset by the growth of vegetation in exposed cuttings and banks. In Section1, only in the abutments of the bridge over the Pcinja river some post-construction erosion process in the form of gullies could be expected. The same goes for the abutments and pillars of the bridges and viaducts that remain to be constructed in Section2, where, on the other hand, the geological substrate is resistant to erosion (being mainly andesitic tuffs, andesite, and epidote-chlorite-schists).

Estimation of the magnitude

Post-construction erosion processes in Section3 would be mainly expected in the areas where the permanent way will run on the side of the hills, which is where the cuttings have exposed large surfaces of nude soil. Also, earth banks formed to adapt the railway path to the slope may be subject to erosion processes in the form of gullies.

Because of the steep morphology of the terrain, most of the exposed surfaces will be covered with retaining walls (868 meters of walls, according to the feasibility project), thus stopping any erosion process. In addition the geological materials of the substrate are resistant to erosion (epidote-chlorite-schist, amphibiolites and albite-quartz-muscovite-chlorite schist).

Thus, it is considered that there may be some measurable changes in the soil resource during the operational phase of the railway project, but the losses will be minor and limited to key areas. The magnitude of the impact is considered to be low.

The other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Erosion occurs because of exposure soil left devoid of vegetation or retaining material after the construction works.

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Reversibility	Irreversible	Eroded soil cannot be replaced.
Geographic Extent	Local	Limited to the footprint of the project
Time when the impact occurs	Delayed	Soil erosion processes in cuttings and banks start to be noticeable after some time upon exposure of the soil
Duration	Medium-term	The growth of vegetation should help to stop the erosion processes.
Likelihood of appearance	Probable	The impact has a medium likelihood of occurring
Magnitude	Low	See above

Table 6-6 Assesment of impact

Considering that the soil resource in Section 3 has an overall high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Slight.

6.2.2 POTENTIAL IMPACTS ON SURFACE WATER

6.2.2.1 ASSESSMENT OF SURFACE WATER RESOURCES

The sensitivity or importance value of the surface water resources along the railway corridor has been assigned according to the following criteria (*Table 6-7*), and taking into account that generally, except in the areas near urban settlements, the quality of the surface water is considered to be good, ranked in classes I or II).

Sensitivity value	Assessment criteria
Very high	Natural rivers with unlimited retention capacity and constant water flow
High	Natural streams with unlimited retention capacity and constant natural flow
Medium	Natural rivers and streams with unlimited retention capacity and periodic water flow Limited natural rivers and streams with and without retention and constant water flow. These are water courses that have partially lost their naturalness (e.g. in urban areas)
Low	Natural rivulets with unlimited retention capacity and periodic water flow.
Negligible	Unnatural water channels without retention capacity

Table 6-7 Identification of importance of the water courses

The assigned sensitivity values to the surface water courses existing along the railway corridor are as follows:

Name of the water course	Type of the surface water course	K.P. at which water course is crossed	Sensitivity value assigned
Section1			
unnamed	seasonal small stream	0.355 – 1.866 (5 times)	Negligible
Kavardzik	small stream	2.771	Medium
Lipkovska river	small river	3.125 and parallel to alignment	Medium
unnamed	seasonal stream	3.452 - 5.095 (2 times)	Negligible
Konjarska river	small river	7.412 and parallel to alignment	Medium
Kumanovska river	small river	Parallel to alignment	High
unnamed	seasonal small stream or drain	8.161 – 16.538 (20 times)	Negligible
BabinDol	small stream	17.379	Medium
unnamed	seasonal small stream	18.119 – 18.816 (2 times)	Low
Bara	small stream	19.550 – 20.310 (3 times)	Medium
unnamed	seasonal small stream	21.524 – 24.325 (6 times)	Low
Pcinja	river	24.500 and parallel to alignment	Very high
unnamed	small seasonal stream or drain	24.784 – 26.725 (5 times)	Negligible
Zivusa	small stream	27.466	Medium
unnamed	small seasonal stream or drain	27.739 – 29.309 (7 times)	Negligible
Kriva river	river	Parallel to alignment	Very High
Section 2			
unnamed	seasonal small stream	29.900 – 33.300 (8 times)	Low
Drzava	small stream	33.830	Medium
unnamed	seasonal small streams or drain	34.900 – 37.870 (9 times)	Low
Korija	small stream	38.690	Medium
unnamed	small seasonal streams or drain	38.950 – 40.700 (5 times)	Low
Kriva river	river	41.350, 51.090 and parallel to the alignment in all Section2	Very high
unnamed	seasonal small streams	42.00 - 45.870 (11 times)	Low
Kratovska river	small river	46.050	High
unnamed	seasonal small streams	46.700 – 51.730 (10 times)	Low

Name of the water course	Type of the surface water course	K.P. at which water course is crossed	Sensitivity value assigned
Vetunicka river	small stream	51.110	Medium
unnamed	small seasonal stream	51.730 – 53.290 (4 times)	Low
Rankovska river	small river	53.700	High
unnamed	small seasonal streams	54.300 – 56.260 (5 times)	Low
Ginovski Dol	small stream	56.968	Medium
Zavartce	seasonal stream	57.230	Low
Buina Bare	seasonal stream	57.970	Low
Cvetin Vir	seasonal stream	59.310	Low
unnamed	small seasonal streams	59.700 – 59.990 (2 times)	Low
Golem Dol	seasonal stream	60.470	Low
unnamed	small seasonal streams	60.720 – 62.320 (6 times)	Low
Raska Reka	seasonal river	62.630	Medium
unnamed	small seasonal streams	63.060 – 63.970 (3 times}	Low
SewiDol	seasonal stream	64.490	Low
unnamed	small seasonal streams	64.880 – 65.160 (2 times)	Low
Gabarska Reka	seasonal river	66.010	Medium
Section 3			
Gradecka Reka	seasonal river	66.460	Medium
Randel	seasonal small river	67.510 and 71.450	Medium
unnamed	small seasonal streams	67.940 – 71.130 (11 times)	Low
unnamed	seasonal small streams	71.950 – 72.630 (3 times)	Low
Domacki Dol	seasonal small river	73.930	Medium
unnamed	small seasonal streams	73.430 – 74.640 (5 times)	Low
Kriva river	river	74.910, 82.290 and parallel to the alignment in all Section 3	Very high
Kiselicki	small river	76+768	High
unnamed	seasonal small streams	75.360 – 78.620 (7 times)	Low
Krkljanska river	small river	79.280	High
unnamed	small seasonal stream	79.710 – 80.180 (3 times)	Low
Uti Reka	seasonal stream	80.700	Medium
unnamed	seasonal stream	83.640	Low

Table 6-8 The surface water courses sensitivity values along the railway corridor

6.2.2.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

All surface water bodies are vulnerable to pollution that reduces water quality and to changes in the flow characteristics (level and volume) from the project activities, both during the construction and the operational phases.

Construction activities have a potential to introduce pollutants into surface waters including sediment, fuel and lubricants. These compounds directly impact the physical and chemical quality status of the water and indirectly influence the living organisms in water.

During the construction phase, the most likely effect is the contamination of streams and rivers close to the railway alignment where construction activities are taking place by the arrival of suspended solids swept by storm water runoff from the construction site devoid of vegetation. Suspended solids may also originate in products such as concrete, bentonite or grout used in the construction of tunnels, bridges, viaducts, containing walls, etc., which are either accidentally released or dumped during cleaning of the equipment that has held these products. The washout from concrete mixing plants or ready-mix concrete lorries is particularly damaging due to the highly alkaline nature of uncured concrete. The release of significant volumes of sediments to the water bodies by storm water runoff or direct disposal, can lead to changes in the flow patterns of the water course (biota will be affected as well, but this effect is addressed with the impacts on fauna).

Another source of surface water pollution during construction is leaks and accidental spills of hydrocarbons from construction vehicles and machinery, as well as of other hazardous substances handled during the construction activities, such as lubricants, paints, solvents, resins, acids, or uncured concrete. These leaks and spills could occur either at the construction site or at the storage sites for products and waste. The contamination of the water body may occur either directly (e.g. if the construction site is taking place very close to or on the river or stream) or indirectly, though soil and groundwater transport to the surface water body.

Wooden sleepers are impregnated with creosote, a substance made up of a mix of several hydrocarbons (phenol, xylenol, cresol) and represent a potential water pollution source. Sleepers to be used in this railway project are made of concrete for sections 2 and 3, and the wooden sleepers along the railway alignment in Section1 will be replaced with concrete ones. The removed wooden sleepers could be a water pollution source if they are stored (on a temporary basis) near a watercourse. The rain runoff would leach the creosote into the surface water or soil and further into groundwater, although it is recognized that as these have been in situ for some time the levels of potential pollutants will have diminished.

Changes to the existing drainage network may also occur due to the interception and redirection of the natural watercourses in order to construct drainage structures or the substructure of bridges. The effects of these activities are likely to last throughout the operational phase.

Finally, another effect that could take place (more unlikely) during construction is an increased surface water flow due to the discharge of large volumes of groundwater if dewatering was needed in the course of the construction of tunnels or a cuttings because of the potential interception of the groundwater table.

The main construction activities associated to the railway project that may affect surface water bodies are summarized in *Table 6-9.*

Activities that provide a pollution source	Uncontrolled sediment erosion and contaminated silt runoff caused by removal of vegetation and destruction of soil and gravel rocks into small fractions, which could cause water turbidity, sediment deposition on stream beds and banks, and accumulation on the slopes of rivers and ravine gorges. Mainly caused by blasting, excavation and earthworks.
	Leaks and accidental spills from the use of concrete, bentonite and grout during the construction of tunnels, bridges and viaducts. Cleaning of equipment holding these products.
	Leaks and accidental spills of fuel, lubricants and other hazardous substances at product and waste storage areas

	Leaks and accidental spills of fuel and lubricants from construction machinery and vehicles at construction site
	Leaks and accidental spills from use at construction site of hazardous products (solvents, paints, acids, resins, etc.) during the construction of railway tunnels, bridges, viaducts, permanent way, signals, overhead contact system)
	Discharge of potentially contaminated groundwater from dewatering of potentially contaminated sites (if contaminated sites were detected and dewatering would be necessary)
Activities that cause variations in natural flow	Accumulations of excessive amounts of sediments in watersheds from increased runoff from cleared areas or cleaning of equipment (e.g. concrete mixing plant)
	Changes to the existing drainage network, including interception and redirection of watercourses
	Discharge of groundwater to surface water, if the groundwater table is intercepted.
Activities that provide a pollution pathway	Blasting, tunnelling cuttings, excavation, earthwork
	Vegetation clearing
	Cleaning of equipment
	Artificial water recharge activities

Table 6-9 Type of construction activities that may affect surface water along the railway alignment

With regards to the operational phase, there is increasing concern about water pollution by diffuse emissions of various environmental hazards emitted by transportation activities. Regular railway operation is associated with the diffuse release of inorganic and organic substances into the environment. Some of these substances are listed as hazardous substances – priority substances in the Water Framework Directive (List I and II substances) and national legislation. They may pollute the groundwater or the surface water entering through the railway ballast and from there leach into the underneath soil or drained through the railway drainage system running along the sides of the tracks as shown in *Figure 6-1*. Some of these contaminants are: copper, zinc, chromium and polycyclic aromatic hydrocarbons (PAH), lubricants and herbicide substances.

The main sink of all released substances seems to be the railway embankment (hydrocarbons have been found to occur in the embankment to the bottom of the track profile in 1 m depth) and a smaller proportion deposit in soil nearby the track (metal contents in soil are mainly within 5-10 m distance from the track).

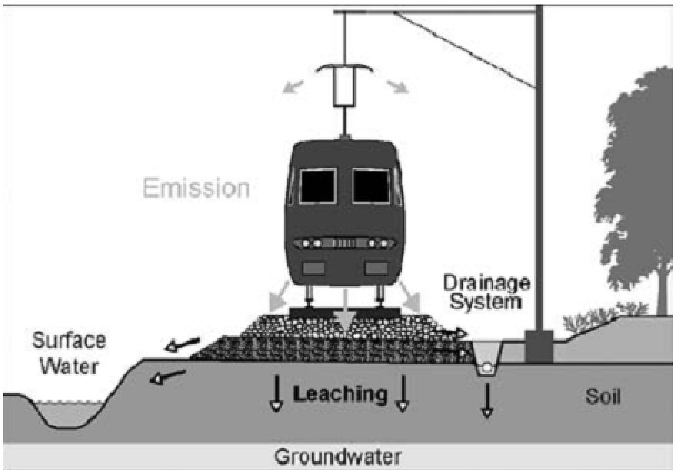


Figure 6-1 Spatial distribution of substances emitted by everyday railway operation and their pathways to waters

The abrasion processes are the main cause of metals emissions and the main source of abrasion are: brakes, rails, wheels and contact lines. The substances usually found into the ballast as a result of abrasion process are: iron, manganese, chromium, copper, tin, antimony, lead, molybdenum, nickel and vanadium in particulate matter form. The release of lubricants (grease and oil) is coming from track-switches which are lubricated. The periodical cleaning of track switches with hot water steam, sometimes combined with surfactants, may foster the emissions.

During operation, the plants and weeds that grow along the railway tracks are usually eliminated for security and track stability reasons. The aim is to avoid fouling of communication and signal lines, to maintain visibility around signs, signals, switches and at crossings, and to keep trains and cargo freight from hitting overhanging vegetation and to prevent fire. This is usually done with the application of mechanical methods and chemical method using various herbicides. The most popular is the chemical treatment as it is an efficient one (more area can be treated in a shorter time), but it is also a potential source of water pollution to both surface and groundwater.

Maintenance operations of the elements of the railway line (e.g. lubrication of the track switches) involve the use of lubricants and other hazardous substances (e.g. acids and coating resins for the treatment of corroded parts), which may also reach nearby surface water bodies through the railway drainage system or through the soil and then carried out by groundwater.

The various types of freight that will be transported could also be a source of soil and water contamination due to potential leaks or accidental spills of hazardous substances (e.g. liquid fuels, solvents, acids, bases, etc.).

Wastewater generated by train passengers, workers and visitors at the train stations and halts, and railway office and administration buildings would also be a potential source of adverse impacts for surface waters. Likewise, wastewater generated in the process of cleaning wagons using hot water steam and/or chemicals. This wastewater may contain concentrations of oil and greases, detergents, chemicals, metals and solid materials that could pass into the drainage system and from there to the nearest stream. These washing activities, however, are currently performed at facilities located in Trubarevo (near Kumanovo) and there are no plans to build washing facilities at the other stations along the railway alignment.

The physical presence of the constructed railway may cause modifications in the local flow patterns during flooding periods due a barrier effect. If the railway is constructed in the flood plain of the river, it will occupy a space that is no longer available for the water to expand during flooding periods. The water will be then retained by the railway bed and impounded upstream. Thus, areas which were not flooded before the construction of the railway could become flooded after the railway is constructed.

Water impoundment effects because of the railway presence may also occur at the points where it crosses water courses if insufficient drainage is provided (e.g. the drainage pipes are too small for the stream flow in rainy periods). Where bridges are constructed, if piers are placed the steam bed, they obstruct the flow and the effect will be aggravated because of the accumulation of sediments behind the piers and the flood debris being caught on the piers. This, in addition to increase flooding upstream, may threaten the stability of the bridge.

The main operational activities associated to the railway project that may affect surface water bodies are summarized in *Table 6-10.*

Activities that provide a pollution source	Operation of the railway/passing of passenger and freight trains. Diffuse release of organic and inorganic contaminants
	Usage of herbicides for vegetation control near the railway track
	Usage of lubricants and other hazardous compounds for maintenance of the railway elements (switches, rails)
	Potential leaks from transported hazardous substances
	Accidental spills of transported hazardous substances
	Sewage from railway stations and administration buildings
Activities that cause variations in natural flow	Occupation of the flood plain by the railway
	Drainage pipes and bridges at the intersections of the railway with water courses

Table 6-10 Type of operation activities that may affect surface waters along the railway alignment

The following potential impacts on surface water have been identified and are subject to assessment for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Impairment of water quality due to the introduction of pollutants

Operation phase

- Impairment of water quality due to the introduction of pollutants
- Alteration of flow patterns and sediment deposition during flooding periods

CONSTRUCTION PHASE

Impairment of water quality due to the introduction of pollutants

The reconstruction/rehabilitation and construction works of the railway project are expected to have an impact on the surrounding water courses along the railway line, since the alignment runs all the time parallel and close to the main rivers in the region and crosses them at several points. These main rivers are:

- Section 1: Lipkovska river, Konjarska river, Kumanovska river, Pcinja
- Sections 2 and 3: Kriva river

Figure 6-2 River Pcinja (Section 1) and River Kriva Reka (Section 2)

Moreover, as the alignment is parallel to these rivers, it crosses several tributaries to these rivers:

- Section 1: Kavardzik river, BabinDol, Bara, Zivusa, and several seasonal small streams without name;
- Section 2: Drzava, Korija, Kratovska river, Krvareka, Vetunicka river, Rankovska river, Ginovski Dol, Zavartce, Buina Bare, CvetinVir, Golem Dol, Raska, Sewi Dol, Gabarska river, and several seasonal small streams without name;
- Section 3: Gradecka river, Randel, Domacki Dol, Kiselicki, Krkljanska river, Uti river, and several seasonal small streams without name.

Estimation of magnitude

The impact assessment was made based on the following considerations:

- The Intensity of the project activities that are expected to be performed in the surroundings of the water courses.

  In this regards, it is considered that the works to be performed in Section 3 will have a high intensity and will have greater possibilities of releasing contaminants to the soil and surface water than construction works for sections 2 and 1. Thus, for Section 2, where most of the earth works have been completed, the emission of suspended particles that causes water turbidity is expected to be minimal, and a moderate intensity has been considered for the construction works in this section. For Section 1, where rehabilitation works will be done, including the construction of the bridge over the Pcinja river, construction works are considered to have a low intensity, with less probabilities of creating impacts to surface water quality.

- The sensitivity of the water courses to the pollution in the area of the construction works, according to the sensitivity assessment presented in Chapter 6.2.3.1.
- The number and types of water courses crossed and the times the same water course is crossed (only for very high, high and medium sensitivity water courses. Water courses with low and negligible sensitivity that are crossed several times have been considered to be crossed only once).
- The distance of the water course to the railway alignment when they run parallel. Those stretches of water course flowing at a distance less than 200 meters were computed.

In the tables shown below, the inputs to determine the magnitude of the potential impact on water quality are provided for each section. First, the length of the stretches of water courses flowing at less than 200 meters from the alignment are presented, divided according to the sensibility of the water course. The lengths are given in kilometers and as a percentage of the total length of the section. This percentage has then been multiplied by a weighing factor as follows:

Sensibility of the water course	Weighing factor
Very high	4
High	3
Medium	2
Low	1
Negligible	0

Table 6-11 Weighing factors

Secondly, the number of water courses crossed has been introduced, also divided according to the sensitivity of the water course and the same weighing factor applied.

The sum of the products obtained has then been summed to obtain a total score. For each section, this score has been multiplied by a factor of 1, 1.2 and 1.5 to take into account the intensity of the construction works in each Section 1, 2, and 3, respectively.

The final score has been assigned a magnitude value, according to the following rating scale:

Magnitude	Final score
Low	0 - 350
Medium	351 - 550
High	>550

Table 6-12 Magnitude values

Section 1		Weight	Score
Section length (km)	30.8		
Km of construction works at less than 200 meters of water course of very high sensitivity (Pcinja and Kriva rivers)	6.0		
Percentage	19	4	76
Construction works at less than 200 meters of water course of high sensitivity (Kumanovska)	4.5		
Percentage	15	3	45
Construction works at less than 200 meters of water course of medium sensitivity	1.0		

Section 1		Weight	Score
Percentage	3	2	6
Construction works at less than 200 meters of water course of low sensitivity	0		
Percentage	0	1	0
Construction works at less than 200 meters of water course of negligible sensitivity	0		
Percentage		0	0
Number of crossings	16		
Number of crossings of very high sensitivity water courses	1		
Percentage	6	4	24
Number of crossings of high sensitivity water courses	0		
Percentage	0	3	0
Number of crossings of medium sensitivity water courses	7		
Percentage	44	2	88
Number of crossings of water courses with low sensitivy	2		
Percentage	13	1	13
Number of crossings of water courses with negligible sensitivy	5		
Percentage	30	0	0
Total score			**252**
Final score taking into account intensity of construction works (Total score x 1)			**252**
Magnitude of the impact	**Low**		

Table 6-13 Estimation of the impact on surface water quality during construction in Section 1

Section 2		Weight	Score
Section length (km)	33.9		
Km of construction works at less than 200 meters of water course of very high sensitivity (Kriva river)	11.6		
Percentage	34	4	136
Construction works at less than 200 meters of water course of high sensitivity	0		
Percentage	0	3	0
Construction works at less than 200 meters of water course of medium sensitivity	0	2	0
Percentage			
Construction works at less than 200 meters of water course of low sensitivity	0		
Percentage	0	1	0
Construction works at less than 200 meters of water course of negligible sensitivity	0		
Percentage		0	0
Number of crossings	26		
Number of crossings of very high sensitivity water courses	2		
Percentage	8	4	32

Section 2		Weight	Score
Number of crossings of high sensitivity water courses	2		
Percentage	8	3	24
Number of crossings of medium sensitivity water courses	6		
Percentage	23	2	46
Number of crossings of water courses with low sensitivy	16		
Percentage	61	1	61
Number of crossings of water courses with negligible sensitivy	0		
Percentage	0	0	0
Total score			299
Final score taking into account intensity of construction works (Total score x 1,2)			**359**
Magnitude of the impact	**Medium**		

Table 6-14 Estimation of the impact on surface water quality during construction in Section 2

Section 3		Weight	Score
Section length (km)	23.4		
Km of construction works at less than 200 meters of water course of very high sensitivity (Kriva river)	19		
Percentage	80	4	320
Construction works at less than 200 meters of water course of high sensitivity	0		
Percentage	0	3	0
Construction works at less than 200 meters of water course of medium sensitivity	0	2	0
Percentage			
Construction works at less than 200 meters of water course of low sensitivity	0		
Percentage	0	1	0
Construction works at less than 200 meters of water course of negligible sensitivity	0		
Percentage		0	0
Number of water courses crossed	14		
Number of crossings of very high sensitivity water courses	2		
Percentage	14	4	56
Number of crossings of high sensitivity water courses	2		
Percentage	14	3	42
Number of crossings of medium sensitivity water courses	4		
Percentage	29	2	58
Number of crossings of water courses with low sensitivity	6		
Percentage	43	1	43
Number of crossings of water courses with negligible sensitivy	0		
Percentage	0	0	0

Section 3		Weight	Score
Total score			519
Final score taking into account intensity of construction works (Total score x 1.5)			**778**
Magnitude of the impact	**High**		

Table 6-15 Estimation of the impact on surface water quality during construction in Section 3

The overall magnitude of the impact is considered to be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct/ Cumulative	Water pollution generates due to emissions and contaminated effluents generated by the construction activities.
Reversibility	Reversible	Water bodies have a self-purification capacity that allows the return to natural conditions
Geographic Extent	Local	The alteration of water quality is limited to the footprint of the project
Time when the impact occurs	Immediate	The alteration of the water quality occurs as the railway construction takes place and contaminated effluents reach surface water bodies.
Duration	Short-term	At each location it will last the time the construction activity takes place.
Likelihood of appearance	Probable	The execution of the construction works generate effluents and emissions to soil that may reach water bodies if care is not taken
Magnitude	Medium	See above

Table 6-16 Assesment of impact

Considering that the resources have a during construction will be those in Section 3, and that they have an overall medium sensitivity, using the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

OPERATIONAL PHASE

Impairment of water quality due to the introduction of pollutants

In order to assess the impact of railway operations on surface water quality, the same methodology that was used to assess the same impact during construction has been applied. However, in this case, as the railway traffic and other maintenance operations along the railway alignment will be similar in all three sections, the magnitude of the impact has been obtained by applying the rating scale values to the total scores obtained in tables above.

The fact that the stations and the administrative buildings along the railway are part of the operation of the railway has been taken into account in considering that raw domestic wastewater generated in these facilities could eventually end up in the nearby water courses. In this regard, the most vulnerable Section would be Section 1, where the stations of Supli Kamen and Beljakovce would be located near Pcinja and Kriva Reka rivers, respectively. However, it is very unlikely that this event would ever occur.

Also, the fact that during stage 1, Section 1 will operate with diesel locomotives has been considered. It is likely that the diesel locomotive will release more hydrocarbons into the ballast than the electrical locomotives. However, this will be a temporary situation that will last less than 4 years and the larger effect in surface water quality may be difficult to distinguish.

It should also be pointed out that part of the rehabilitation works to be performed in Section 1 consist of the replacement of the exisiting wooden sleepers with concrete ones. Therefore, removing these as a potential source of difuse pollution will further minimize the impact on surface water quality.

Estimation of magnitude

Thus, the impact assessment for the impairment of surface water quality during the operational phase results as follows:

Railway section	Total score	Magnitude
Section 1	252	Low
Section 2	299	Low
Section 3	519	Medium

Table 6-17 The overall magnitude of the impact

The overall magnitude of the impact is considered to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct/ Cumulative	Water pollution would occur from the arrival of contaminants generated from mobile and fixed elements of the railway system during traffic of trains and during track and right of way maintenance activities.
Reversibility	Reversible	Water bodies have a self-purification capacity that allows the return to natural conditions if the contaminant load is not high
Geographic Extent	Local	The alteration of water quality is limited to the footprint of the project
Time when the impact occurs	Delayed	The alteration of the water quality would take a time once the railway starts to operate.
Duration	Long-term	The impact will last as long as the railway operates.
Likelihood of appearance	Probable	The impact has a medium likelihood of occuring
Magnitude	Low	See above

Table 6-18 Assesment of impact

Considering that the resources have an overall medium sensitivity, using the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures is Slight.

Alteration of flow patterns and sediment deposition during flooding periods

The impact on water flow patterns and sediment deposition has been assessed to account for the potential water impoundment effects caused by the railway in the points where it crosses streams and rivers. In this regard, the railway alignment crosses a quite large number of rivulets, streams and rivers, some of them several times. The assessment presented herein also covers the construction period, since this effect may start happening during construction, but may remain throughout the operational life of the railway project.

The modifications in the local flow patterns during flooding periods due a barrier effect have been considered. However, the magnitude of the impact has not been estimated since it is determined that such impact would already be occurring in Section 1. Between km 17 and 31, some stretches of the railway line were constructed on the flood plain of the Pcinja river where, in a short length, the Kumanovska river, the Kriva river and the Pcinja river meet together, and which is a critical flooding area. The existing railway structure would have contributed to extend the flooding area upstream, but it is possible that it could also be preventing water during flooding periods from reaching the areas beyond the line, which otherwise would have been flooded. In any case, the completion of Section 2 and the construction of Section 3 will not create any additional barrier effect since in both sections the railway alignment runs on the side of the valley hills, well above the river flood plain.

Estimation of magnitude

The potential retention of rain run-off by the railway linear structure in the water courses intercepted by the alignment has been assessed for sections 2 and 3 since, it is in these sections where the drainage works have to be completed or constructed. In Section 1, the pipes and bridges to facilitate water drainage already exist and part of the rehabilitation works consist of cleaning and reprofiling the existing drainage and renewing bridge insulation and drainage. Only the bridge over the Pcinja river will be newly constructed and is included in the assessment.

In order to assess the magnitude of the potential water retention it has been considered that this effect would more likely occur in the drainage pipes through which the water flowing in the smaller water courses passes underneath the railway track. If the diameter of the pipe is not wide enough for a given flow generated during a rainy period and/or the pipe becomes obstructed with sediments and large objects swept by the rain runoff (e.g. broken branches, plastics), water may become impounded in one side of the railway track. Therefore, the magnitude of the impact has been estimated taking into account the number of bridges and drainage pipes in each section. The data obtained from the project description are shown in the following table.

Section 1	
Section length (km)	30.8
Number of crossings	
Number of crossings of very high sensitivity water courses	1
Number of bridges	1
Section 2	
Section length (km)	33.9
Number of crossings of water courses	82
Number of crossings of very high sensitivity water courses	2
Number of crossings of high sensitivity water courses	2
Number of crossings of medium sensitivity water courses	6
Number of crossings of water courses with low sensitivity	72
Total number of bridges	34
Number of bridges with substructure to be completed or constructed	11
Number of drainage pipes to be constructed	48
Section 3	
Section length (km)	23.4
Number of crossings of water courses	38
Number of crossings of very high sensitivity water courses	2

Number of crossings of high sensitivity water courses	2
Number of crossings of medium sensitivity water courses	4
Number of crossings of water courses with low sensitivity	30
Number of bridges	47
Number of drainage pipes to be constructed	9

Table 6-19 Number of water course crossings and drainage structures in the railway project

From the data shown in Table 1, the most vulnerable Section to impoundment of surface water upstream the railway track is Section 2, where there are 82 crossings; i.e. an average of a crossing every 400 m. Of these, 34 are bridge crossing with limited potential to retain flood water, but still more than half (48, average of one crossing every 700 m) are crossed by means of drainage pipes, where water impoundment during peak rainfall events could in theory occur.

Compared to Section 2, Section 3 has much fewer crossings of water courses, 38 or an average of one every 600 m, the majority of these are bridge crossings, with only 9 (one every 2.6 km) uilising drainage pipes. Overall the risk of flood water impoundment in Section 3 is lower than in Section 2.

Taking into account that potential impoundments created by the railway line would occur always in minor seasonal streams (i.e. those where drainage pipes are used), the magnitude of of any impact is estimated as low.

For the bridges, some water retention could occur if the piers are constructed within the stream bed. An indirect effect would be the accumulation of sediments and larger objects upstream behind the piers, thus causing changes in the stream flow and sedimentation patterns. The magnitude of the effect would depend on the number and size of the piers inside the water bed (the more and wider the piers the greater water retention potential). Taking into account that piers of modern bridges are narrow, usually they are not built in the stream bed, and that the effects are limited to a small area behind the pier, the impact of bridges on the alteration of the water flow is estimated to be low.

The magnitude of the impact on alteration of flow patterns is therefore estimated to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	**Assessment Thresholds**	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Flow modifications occur because of the presence of railway structures that may hinder the normal water flow in water courses.
Reversibility	Reversible	Water flows would return to natural conditions if obstacles were removed.
Geographic Extent	Local	Flow modification is limited to the footprint of the project
Time when the impact occurs	Immediate	Flow modification starts with the construction of the railway in crossings with water courses (usually drainage pipes or bridges will be constructed at these points)
Duration	Long-term	The impact will last as long as the railway operates.
Likelihood of appearance	Probable	The impact has a medium likelihood of occuring
Magnitude	Low	See above

Table 6-20 Assesment of impact

Considering that the resources have an overall medium sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Slight.

6.2.3 POTENTIAL IMPACTS ON GROUNDWATER

6.2.3.1 ASSESSMENT OF GROUNDWATER RESOURCES

The sensitivity of the groundwater resources along the railway corridor has been assigned according to the different types of geological formations over which the alignment runs, taking into account their capacity to store and yield water. The following rating scale has been utilized:

Hydrogeological Unit	Sensitivity rate
Quaternary formations: alluvium	Very high
Quaternary formations: river terraces	High
Pliocene series (mostly) and proluvium	Medium
Epidote-chlorite and albite-quartz-muscovite-chlorite schist	Low
Andesitic tuffs and andesite Epidote-chlorite-schist and amphibiolites	Negligible

Table 6-21 Rating scale

For each Section of the railway alignment, only those areas where there will be activities that may potentially affect groundwater have been assigned a sensitivity value. Thus, in Section 1, only the area around the Pcinja river has been considered. In Section 2 and 3, those areas where cuts, tunnels, embankments and bridges are to be completed (Section 2) or constructed (Section 3) have been considered.

The following values have then been assigned to the geological formations along the railway in order to evaluate their sensitivity as groundwater resources in table below.

	K.P. Interval	Geomorphology	Sensitivity-+
Section 1	0.400-8.000	alluvium	very high
	8.000-24.300	down river terraces	high
	24.300-24.600	alluvium	very high
	24.600-31.500	down river terraces	high
Section 2	31.500-41.500	down river terraces	high
	41.500-46.000	andesitic tuffs and andesite	negligible
	46.000-51.000	andesitic tuffs and andesite	negligible
	51.000-54.000	epidote-chlorite-schist	low
	54.000-60.500	Pliocene series (mostly) and proluvium	medium
	60. 500-65.000	epidote-chlorite-schist	low
Section 3	65.000-71.700	epidote-chlorite-schist	low
	71.700-73.000	epidote-chlorite-schist	low
	73.000-76.000	epidote-chlorite-schist and amphibiolites	negligible
	76.600-82.000	epidote- chlorite and albite-quartz-muscovite-chlorite schist	low
	82.000-88.200	epidote- chlorite and albite-quartz-muscovite-chlorite schist	low

Table 6-22 Sensitivity of groundwater resources

6.2.3.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The railway construction is expected to have short-term impacts to groundwater resources primarily related to construction activities that may cause potential groundwater contamination or dewatering.

Potential pollution of groundwater could occur as a consequence of leaks or accidental spills at the construction site of hydrocarbons from construction vehicles and machinery, as well as of other hazardous chemicals handled for various purposes in executing the construction works (e.g. lubricants, solvents, acids, paints, resins). Accidental leaks and spills of hazardous materials may also occur at product storage areas and hazardous waste storage areas. Leaked or spilled hazardous contaminants most often will reach groundwater indirectly leaching through the soil or, for some construction activities, directly when the groundwater table is exposed to the atmosphere.

When groundwater levels are higher than the base level of the tunnel, the cutting or the excavation needed to lay the railway substructure, a dewatering system is required to lower the water table outside the excavation. This action, in addition to cause the disruptance of the groundwater table, it may also cause other indirect effects like drying of existing springs/wells, and potential movement of contaminated plumes if present. There are no marked springs otherwise they would be marked on habitat map.

The main construction activities of the railway project that may affect groundwater are summarized in the table below.

<table>
<tr><td rowspan="4">Activities that provide a pollution source</td><td>Leaks and accidental spills of fuel, lubricants and other hazardous substances at product and waste storage areas</td></tr>
<tr><td>Leaks and accidental spills of fuel and lubricants from construction machinery and vehicles at construction site</td></tr>
<tr><td>Leaks and accidental spills from use at construction site of hazardous products (solvents, paints, acids, resins, etc.) during the construction of railway tunnels, bridges, viaducts, permanent way, signals, overhead contact system)</td></tr>
<tr><td>Works in contaminated sites (if present)</td></tr>
<tr><td rowspan="4">Activities that provide a pollution pathway</td><td>Tunneling</td></tr>
<tr><td>Piling</td></tr>
<tr><td>Boreholes</td></tr>
<tr><td>Excavations</td></tr>
<tr><td>Activities that may cause variations in groundwater levels</td><td>Dewatering activities during excavations, earthworks, and tunnelling</td></tr>
</table>

Table 6-23 Type of railway construction activities that may affect groundwater along the alignment

With regards to the potential impacts on groundwater during operation, the same operational activities discussed for surface water in Chapter 6.2.3. may also create an impact on groundwater, as the substances released by these activities end up in the soil, from where the contaminants are transported downwards, through percolation of rain water though the vadose zone, until reaching the groundwater table.

As discussed for the construction phase, dewatering may occur when groundwater levels higher than the base level of the tunnels or cuttings have been intercepted. The existence of a high groundwater table or water percolating down from above would require that tunnels and cuttings be waterproof in order to ensure the durability of the structure, reduce maintenance, and reduce hazards related to ice formations during winter. However, this is not always the case, and the impact that started during construction may last throughout the operational life of the railway.

Thus, the main operational activities associated to the railway project that may affect groundwater are summarized in tabel below.

Activities that provide a pollution source	Operation of the railway/passing of passenger and freight trains. Diffuse release of organic and inorganic contaminants
	Usage of herbicides for vegetation control near the railway track
	Usage of lubricants and other hazardous compounds for maintenance of the railway elements (switches, rails)
	Potential leaks from transported hazardous substances
	Accidental spills of transported hazardous substances
	Sewage from railway stations and administration buildings
Activities that cause variations in natural flow	Dewatering through unsealed tunnels and cuttings

Table 6-24 Type of operation activities that may affect groundwater along the railway alignment

The following potential impacts on groundwater have been identified for assessment for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

Impairment of groundwater quality due to the introduction of pollutants:

- Alteration of groundwater flow patterns during tunnelling and cutting operations

Operation phase

- Impairment of groundwater quality due to the introduction of pollutants:

CONSTRUCTION PHASE

Impairment of water quality due to the introduction of pollutants:

The susceptibility of an aquifer to surface pollutants is based on the degree of protection provided by geological materials overlying it. This is dependent on the vertical travel time required for a waterborne contaminant release at or near the land surface to enter the groundwater. Vertical travel time is primarily controlled by the permeability of the sediments and their thickness.

In the railway corridor there are no aquifers, except for the free water level alluvial aquifers of the Pcinja river (Kumanovo- Katlanovo) and the Kriva river (Kriva Palanka valley).

The railway project could only affect the Pcinja river aquifer, since the only areas along the railway corridor that lie within zones of high and very high sensitivity are located in sections 1 and 2, where in some stretches the alignment runs on the alluvial terraces or the alluvial plain. In all Section 3 and long stretches of sections 1 and 2, the alignment is located on low permeability epidote-chlorite-schists or low-medium permeability Pliocene series and runs well above the Kriva river (Kriva Palanka valley) aquifer.

Estimation of magnitude

The stretches of the railway line in sections 1 and 2 over high and very high permeability soils roughly correspond to km 2 to 8 in Kumanovo city area, km 17 to 25 in Supli Kamen area and km 28 to 38.

In Section 1, one of the major construction activities that may impact groundwater will be the construction of a new bridge over the Pcinja river to replace the destroyed railway bridge located downstream. As explained above, groundwater in these sensitive alluvial areas may become contaminated from contaminated soils from leaks and spills of hazardous materials, or even directly through the construction of the pile foundations for the bridge, for instance.

Another major activity in Section 1 will be the renewal of the track, which will be re-ballasted, realigned and the wooden sleepers replaced with concrete sleepers. If wooden sleepers were temporarily stored over these alluvial areas, the underlying ground water could also become contaminated, however, the removal of these sleepers will result in the removal of this potential source of pollutants and be a positive impact.

In Section 2, the main construction activities were already done to an important degree of completion in the 1994-2004 period. In the most sensitive area along km 30.5 to 38, the substructure of the bridges is complete or near completion. Therefore, the intensity of the construction works will be moderate, with a lesser probability of releasing contaminants to soil or groundwater.

Given that the groundwater pollution vulnerable areas along the railway alignment are circumscribed to some stretches of sections 1 and 2, where construction activities will have a relatively low intensity, and the release of contaminants, if it happened to occur, would affect specific, but sensitive zones (there are active water wells in the alluvial formations of the Pcinja and Kriva rivers), it is considered that the magnitude of the impact on groundwater quality is medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Indirect / Cumulative	Groundwater contamination in most of the cases would occur through soil contamination
Reversibility	Reversible	As long as groundwater contamination is slight. Should a large spill occur, the return to original conditions would need of a remediation project
Geographic Extent	Local	Groundwater pollution would be limited to the area downstream the source
Time when the impact occurs	Delayed	Groundwater contamination would show up sometime after soil becomes contaminated
Duration	Medium term	Once contaminants reach groundwater, depuration may take several years if the source is removed. If the source is important and is not removed the duration may be considered on the long term
Likelihood of appearance	Unlikely	The probability of occurrence depends on important enough leaks or spills of hazardous substances into soil so that the contaminants can reach the groundwater level
Magnitude	Medium	See above

Table 6-25 Assesment of impact

Considering that the most affected groundwater resources during construction would be those laying in sections 1 and 2 , and that they have a high or very high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

Alteration of flow patterns during tunnelling and cutting operations

This impact will be analysed for sections 2 and 3 since, Section 1 is already constructed.

Estimation of magnitude

In Section 2 all the cuttings have already been done and there are no tunnels to be drilled through those geological formations that could bear water in significant amounts. All the tunnels that remain to be open in Section 2 are located in very low permeability geological formation. All Section 3 of the railway will be constructed in very low permeability materials, where no groundwater formations are expected to be intersected. Therefore, the magnitude of the impact on groundwater flow patterns is considered to be non-existent or negligible.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Groundwater levels would be intercepted because of tunneling or cutting operations.
Reversibility	Reversible	When the interception action stops (e.g. sealing of the interception zone)
Geographic Extent	Local	Dewatering would occur locally, limited to the radius of influence of the interception area
Time when the impact occurs	Immediate	Dewatering starts to occur as the level is intercepted
Duration	Short tem	If the interception stops during the construction period. Long term if interception zone is not sealed
Likelihood of appearance	Unlikely	Most of the alignment where new cuttings and tunnels are going to be constructed runs over impermeable materials. However, it is not discarded that some isolated bearing water formations could be crossed.
Magnitude	Negligible	See above

Table 6-26 Assesment of impact

Considering that the sensitivity of the formations in which cuttings and tunnels will be performed have a low sensitivity and that the magnitude of the impact will be negligible, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Neutral.

OPERATIONAL PHASE

Impairment of groundwater quality due to the introduction of pollutants

As for the construction phase, the railway activities during the operational phase could only affect the Pcinja river aquifer, since the only areas along the railway corridor that lie within zones of high and very high sensitivity are located in sections 1 and 2, where in some stretches the alignment runs on the alluvial terraces or the alluvial plain. In all Section 3 and long stretches of sections 1 and 2, the alignment is located on low permeability epidote-chlorite-schists or low-medium permeability Pliocene series and runs well above the Kriva river (Kriva Palanka valley) aquifer.

Estimation of magnitude

The stretches of the railway line in sections 1 and 2 over high and very high permeability soils roughly correspond to km 2 to 8 in Kumanovo city area, km 17 to 25 in Supli Kamen area and km 28 to 38.

Railway operations that release contaminants to the soil include the traffic of passenger and freight trains releasing small amounts of organic and inorganic amounts, but on a constant basis, spreading of herbicides for vegetation control near the railway track, usage of lubricants and other hazardous compounds for maintenance of the railway elements (switches, rails), potential leaks from transported hazardous substances. Also, an accident cannot be discarded to occur with the eventual spill of transported hazardous substances. In the most sensitive areas, these are the alluvial areas, the input of these contaminants into soil will likely affect the quality of the underneath groundwater as the rain water percolates through the soil dragging the contaminants present along the soil profile.

Also, sewage from railway stations and administration buildings such as those of Supli Kamen and Beljakovce and intermediate halts, like Lopate, in the unlikely case they were not properly managed, could be a source of groundwater pollution.

The groundwater pollution vulnerable areas along the railway alignment are circumscribed to some stretches of sections 1 and 2. There may be distinguishable and measurable changes in the quality of groundwater, especially in those areas closest to the railway track, which could affect individual local users who rely on well water (as reported in the baseline study, the settlements in the Municipality of Kumanovo are supplied with drinking water from the two reservoir lakes located North of the Municipality of Kumanovo). The magnitude of the impact on groundwater quality is considered as medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Indirect / cumulative	Groundwater contamination occurs through soil contamination
Reversibility	Reversible	If contamination is slight, return to natural conditions through self-purification may be possible.
Geographic Extent	Local	Groundwater pollution would be limited to the area closest to the railway
Time when the impact occurs	Delayed	Groundwater contamination would show up sometime after soil becomes contaminated
Duration	Long term	As long as the railway operates, contaminants will be released to soil and potential for an impairment of groundwater quality will remain
Likelihood of appearance	Probable	If contaminants are released on a constant basis to the soil and groundwater is shallow, they will likely reach the groundwater level.
Magnitude	Medium	See above

Table 6-27 Assesment of impact

Considering that the most affected groundwater resources during construction would be those laying in sections 1 and 2 , and that they have a high or very high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

6.2.4 POTENTIAL IMPACTS ON CLIMATE AND AIR QUALITY

6.2.4.1 ASSESSMENT OF AIR QUALITY RECEPTORS

The air quality receptors will be the people using the areas adjacent to both sides of the railway alignment, namely the residents of the urban settlements in the cities of Kumanovo and Kriva Palanka and the several small villages along the railway alignment.

The criteria used for the assignment of sensitivity values to air quality receptors are as follows:

- Health facilities, nurseries, schools, retirement homes and special institutions for handicapped children or adult are always assigned a very high sensitivity value;
- Residential, recreational and commercial areas are assigned a low to high sensibility value. The sensibility increases with the degree of pollution to which the inhabitants are subject, and the density of population;

- Industrial areas are assigned a negligible to low sensibility value. The sensibility increases with the degree of pollution and the degree of industrialization.

In order to evaluate the degree of pollution for this ESIA, either the official air quality data for the exceeding of the limit values in 2010 for the city of Kumanovo are used or the estimated quantity of sources of air pollution in terms of stationary and mobile sources. In the city of Kumanovo, limit values for PM were exceeded 150 days in 2010 and those of ozone 46 days.

With regards to the sources of air pollution in terms of stationary and mobile sources, the city of Kumanovo has the larger number of industries in the region and the number of mobile sources is also the biggest. The mobile sources are the main source of air emissions in Kriva Palanka together with emissions from wood-powered heating systems in households. There are no large stationary sources in Kriva Palanka, only several SMEs. In the villages along the railway route there are no industrial capacities, except for a few small ones in Ketenovo and Kritalica, and the number of mobile sources is relatively low.

The density of populated areas is linked with the distribution of the air pollutants taking into account the wind direction, the configuration of the terrain, the climate, the type and height of houses and buildings, and the class of land within the spatial and urban planning documents.

A list of these settlements along the railway route and their assigned sensitive values following the above criteria is presented in the table below.

Sensitive settlements to the reduced air quality	Position on alignment	Density of residential area	Sensitivity	Construction activities on site/Operational activities	Source of air pollution
Section 1					
City of Kumanovo and particularly settlements near the railway alignment: Chereskoselo/Lopate/Rezanovce/ Sredorek/PeroCico/Proevce/ Kumanovo spa	0.00-17.00 km	High/ medium density populated residential area	High	Reconstruction and rehabilitation of the existing track, vegetation clean up, transportation of construction materials and workers Construction of station and halt / Diesel operated during stage 1 (2015-2018)	Diesel powered transportation and construction machinery Dust/PM_{10}/Fuel combustion gases/GHGs
Kumanovo spa	17.00 km	Health facility	Very high	Reconstruction and rehabilitation of the existing track, vegetation clean up, transportation of construction materials and workers / Diesel operated during stage 1 (2015-2018)	Diesel powered transportation and construction machinery Dust/PM 10/Fuel combustion gases/GHGs
ShupliKamen	18.5-19.5 km	Medium population density residential area	High	Reconstruction and rehabilitation of the existing track, vegetation clean up, transportation of construction materials and workers Construction of station and halt Construction of the bridge on River Pcinja Diesel operated during stage 1 (2015-2018)	Diesel powered transportation and construction machinery Dust/PM 10/Fuel combustion gases/GHGs
Dovezance	28.00 km	Low density populated area, village			
Section 2					
Ketenovo	46.5.00 km	Poorly / less populated area (mixed industrial + houses)	Medium	Earth excavation, construction of concrete pipe culvert, and bridge No.12	Diesel powered transportation and construction machinery, earth excavation , construction of substructure Dust particles/PM_{10}/Fuel combustion gases/GHGs
Krilatica	49.00 km	Poorly / less populated area (mixed industrial + houses	Medium	Earth excavation, construction of concrete pipe culvert, and bridge No.14	
Odreno	52.00 km	Medium density populated area	Low	Earth excavation, construction of concrete pipe culvert, and bridge No.16	
Petralica	59.00 km	Low density populated area (village)	Low	Earth excavation, construction of concrete pipe culvert, and R.C. box culvert	
T'liminci	67.00 km	low density populated area, village	Low	Earth excavation, construction of concrete pipe culvert, and bridge No.30, 31	
Section 3					
K. Palanka	71.50-74.50 km	High density populated area, town	Medium	Earth excavation, construction of 14 bridges, tunnels No. 18, 19, 20 and concrete pipe culvert, construction of station	Diesel powered transportation and construction machinery, earth excavation dust particles Dust particles/PM_{10}/Fuel combustion gases/GHGs
Zidilovo	81.00 km	Medium density populated area, village	Medium (near the motor way Kriva Palanka – Bulgaria)	Construction of retaining wall, tunnel No. 27, 28 and bridge No. 45, construction of station	

Table 6-28 Sensitive receptors to air pollution and reduction of air quality

6.2.4.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

For this ESIA, the air emissions and their effects on air quality will be due to the construction of the railway line, generated by the outdoor machinery, equipment and transportation vehicles, and to the operation with diesel machines during stage 1 of the operational phase, this is during the period 2015 to 2018, in Section 1.

During stage 2 of the operational phase, the entire railway (sections 1, 2 and 3) will be run with electric locomotives, and therefore, the main sources of air emissions will come from the increase of movements of vehicles bringing and taking passengers to and from the stations and the heating systems of the station buildings.

The following potential impacts on air quality have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Impairment of air quality due to emission of construction-borne air pollutants

Operation phase

- Impairment of air quality due to emission of air pollutants from:
    - Combustion gases of diesel locomotives
    - Combustion gases of boilers used for heating in train stations

CONSTRUCTION PHASE

Impairment of air quality due to emission of construction-borne air pollutants

The construction activities will generate dust and combustion gases from fuel powered machinery and vehicles (PM_{10}, $PM_{2,5}$, CO_2, NO_x, PAH, SO_2).

Dust will mainly be generated from earth movements (tunnelling, blasting, excavation, levelling, dumping), wheels of trucks and machinery moving /travelling along unpaved surfaces, handling and transport of soil, wind erosion from exposed surfaces, and crushing plants.

In addition, both the reconstruction works to be conducted in Section 1 and the construction works to be conducted in Section 1 and 2 will most likely be the cause of traffic congestion, particularly in the larger urban settlements of Kumanovo and Kriva Palanka, but also in the villages of Rankovce, SupliKamen, Krilatica, Ketenovo, and Zidilovo. Traffic jams that may occur when streets and local roads are fully or partially closed during construction will increase combustion air emissions from cars.

The construction camps, which will host a work force, could be another additional source of air emissions, particularly in winter, if heating systems are fuel powered or workers make camp fires for heating with wood collected around the camp.

An initial step in the construction phase will be the demolition of objects (buildings, houses, fences, etc.) located on the path of the railway route. In the case of buildings and houses, their demolition implies the risk of finding asbestos containing materials that might have been used for their construction. If this happened a highly dangerous asbestos air contamination could occur. Because this is a very sensitive issue, the risk or air-borne asbestos fibres and the dust control and mitigation measures to be implemented during the demolition works to minimize this risk as well as that of other harmful substances is addressed in detail in further below.

At the construction site, the possible impacts are expected across the axis of the railway (at a distance of ± 100 m). The dispersion area of exhaust and dust (up to standard levels of air quality) depends on the concentration of machinery and equipment at the site and the capacity of their engines.

Estimation of magnitude

The estimation of the magnitude for dust emissions depends on the number of mechanization vehicles on the construction site at the same time, number of working hours, meteorological conditions (mainly wind direction, speed, air moisture), and distribution of urban settlements with regards to the source.

An estimation of dust emissions has been done using the emission factors presented in the Emission Estimation Technique Manual for Mining version 2.3 (NPI, 2001) shown in the table below.

Construction Activity	Unit	TSP	PM_{10}	Controls to be adopted (% reduction)
Drilling	kg/hole	0.59	0.31	water sprays (70%)
Blasting	kg/blast	11.7	6.09	hoardings around site (30%)
Excavation	kg/tone	0.025	0.012	hoarding and water sprays (65%)
Bulldozers on spoil	kg/hour	1.63	0.33	hoardings around site (30%)
Loading trucks	kg/tone	0.0003	0.0001	hoardings around site (30%)
Wheel generated dust	kg/vkt	3.88	0.96	water sprays (75%)
Trucks dumping spoil	kg/tonne	0.012	0.0043	-
Wind erosion	kg/ha/hour	0.4	0.2	-

Table 6-29 Emission factors for dust emission from construction activities

The estimation has been done for Section 3, which is the one that will involve the largest amount of earth movements since Section 1 is already constructed and most of the earth works have been done in Section 2.

In Section 3 a total amount of excavated earth of 3,600,000 m^3 has been estimated in the feasibility study, of which 454.200 m^3 correspond to spoil from tunnelling where dust emissions would be minimised. Construction works will last 3 years.

A number of assumptions have been made in estimating the emissions of dust as Total Suspended Particles and PM10 particles:

- Surface excavation activities will take place 12 hours per day, 6 days a week.
- The construction works will advance at a rate of 20 meters per day. Then, the soil excavated in 20 m (or per day) is 2,689 m^3. Using a soil density of 1,605 kg/m^3, this corresponds to 4,315 tonnes per day.
- Using 30 m^3 capacity loading trucks, 90 loads/day would be necessary to evacuate the spoil from the site. Assuming a hauling time per truck of 2 hours=6 trips/day, 15 loading trucks are needed.
- Haul distance on unsealed roads for spoil movements and materials delivery is 1,000 m.
- Construction surface at a site is 20m x (10 m width of railway + 10 m working sides), which gives a construction surface area of 400 m^2.
- Blasting occurs 4 times per day with blast size of 100 m^2 .
- Drill pattern for blasting is assumed to require 1 drill hole for each 1.5 m2 blast area, which gives 600 blasts

Using these data, the following dust emission results are obtained, reported in several units as TSP and PM10:

TSP	PM10
10,066 kg/day	4,431 kg/day
503,307 kg/km	221,556 kg/km
6.27 m^3/day	2,76 m^3/day

Table 6-30 Dust emission results

These are fairly high amounts of dust emitted to the air to which all the residents along the railway will be exposed. Exposure to ambient air pollution has been linked to a number of health impacts mainly related to the respiratory tract and pulmonary functions. However, particles generated through construction works are larger than $PM_{2.5}$.(particles smaller than 2.5 micrometres are the particles which are of most concern in terms of health impacts) and deposit very rapidly.

For the combustion emissions that are generated during construction operations from vehicles, equipment and machinery, the emission factors shown in the table below have been used. These emission factors are given for the construction of one kilometre of railway based on the machinery activity (excluding the foundation work).

Construction phase	CO	NO_x	VOC	PM10	N_2O	CH_4	NH_3	CO_2	SO_2
	Emission (kg/km)								
Superstructure and track laying	4	2	16	1	0	0	0	177	0
Signal and telecommunication lining	0	0	1	0	0	0	0	13	0
Electrical lining	1	0	2	0	0	0	0	50	0
Total	**5**	**2**	**19**	**1**	**0**	**0**	**0**	**240**	**0**

Table 6-31 Average emission for construction machinery for every 1 km, according to the EMEP/EEA, 2007

The alignment length that is to be constructed is 58.97 km (Section 2 – 35.55 km and Section 3 – 23.42 km) consisting of several tunnels, bridges, viaducts, over/underpasses and access roads and buildings associated the railway track. The estimation of the total emissions of pollutants into the atmosphere due to the railway construction work is presented in the table below.

Section	CO	NO_X	VOC	PM10	N_2O	CH_4	NH_3	CO_2	SO_2
	Emission (kg)								
Section II	177.75	71.10	675.45	35.55	0	0	0	8 532	0
Section III	117.10	46.84	444.98	23.42	0	0	0	5 620	0
Total	**294.85**	**118.00**	**1 120.00**	**58.96**	**0**	**0**	**0**	**14 152.00**	**0**

Table 6-32 Estimation of total emissions during construction work

These emissions will be generated during the period of construction works, and their distribution will depend of the wind direction, weather conditions, moisture of the air and other conditions.

These values have been compared with the officially reported values for total yearly emissions of various air pollutants from stationary and domestic sources in the northeastern region.

Emission sources	Air Emissions Inventory Report (year)	Pollutants (t/year)			
		SO_2	CO	NO_x	PM_{10}
Domestic firewood combustion	2005	3.477	11.168	114	323
Industrial production facilities (SMEs in the region – number of facilities identified 86)		138	91	51	13
Industrial production facilities (large production plants with IPPC license)	2009	752	113	313	47

Table 6-33 Emission of air pollutants from stationary sources and domestic firewood in the Northeastern region

Given that the railway stretches along all the Northeastern region of the Republic of Macedonia and the most important urban and industrial areas are included in the corridor, it is pertinent observing, that during the whole construction period, air emissions from construction activities will be almost negligible compared with those for one year from stationary sources in the northeastern region: CO emissions from the railway construction (0,294 tonnes) would represent less than 2 per thousand of the CO emissions from the stationary sources (215 tonnes/year); NOx emissions from the railway construction (0,118 tonnes) would represent less than 0,5 per thousand of the NOx emissions from the stationary sources (478 tonnes/year); PM10 emissions from the railway construction (0,059 tonnes) would represent less than 0,02 per thousand of the PM10 emissions from the stationary sources (383 tonnes/year).

They are also low compared to the yearly air emissions for mobile sources reported at the national level (see *Table 5.14* in *Chapter 5.1.4.6)*

From what it has been discussed above, the magnitude of the impact of construction activities on air quality is considered to be medium since the most severe emissions of dust will be distinguishable and measurable, will affect all the receptors along the railway corridor (to a much lesser degree to those in Section 1 and 2 and to a considerable degree to those in Section 3), and there will be a temporary loss of resource, but not affecting its integrity since dust should not have major effects on human health.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct/ Cumulative	Dust and combustion gases are generated by the construction activities.
Reversibility	Reversible	Air contamination stops when construction works are interrupted.
Geographic Extent	Local	The alteration of air quality is limited to the footprint of the project
Time when the impact occurs	Immediate	The alteration of the air quality occurs as the railway structures are constructed
Duration	Short-term	At each location it will last the time the construction activity takes place.
Likelihood of appearance	Certain	The execution of the construction works generate dust and combustion gases.
Magnitude	Medium	See above

Table 6-34 Assesment of impact

Considering that the most affected receptors during construction will be those living along Section 3, and that they have a medium sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

OPERATIONAL PHASE

Impairment of air quality due to emission of air pollutants

For the assessment of the impacts on air quality during the operation of the railway, the two stages of the project implementation shall be taken into account since while in stage one Section 1 will be operated with diesel fuelled locomotives, in stage 2 the three sections will be operated with electrical locomotives. Consequently, during stage 1 there will be a major source of air pollutants from combustion gases whilst in stage 3 major sources of air pollution shall be attributed to the railway operation. The only air emissions would be those of the train stations, if the heating systems were run on fossil fuels.

An operation of the railway with electric trains is an environmental friendly means of transportation (both for passengers and cargo transport of goods) compared with other transportation modes: road transport, ship transport, and aviation.

The lower CO_2 emissions have been already recorded in favour of railway transport in comparison with other modes of transport of goods and people, as can be seen in the two charts below (*Figure 6-3 and Figure 6-4*). The chart in Figure 3 compares the total CO_2 emissions from transporting 1 passenger between Berlin and Frankfurt city centres in Germany. For passenger transport, travelling by rail is in average 4 times more efficient than taking the car and more than 3 times better than taking the plane.

Figure 6-4 compares the total CO_2 emissions from transporting 100 tons of average goods from Basel, Switzerland, to the port of Rotterdam, Netherlands, with different transportation modes. CO_2 emissions from rail are almost 8 times lower than those of lorries and 4 times lower than inland waterways.

This trend is expected to continue in this direction.

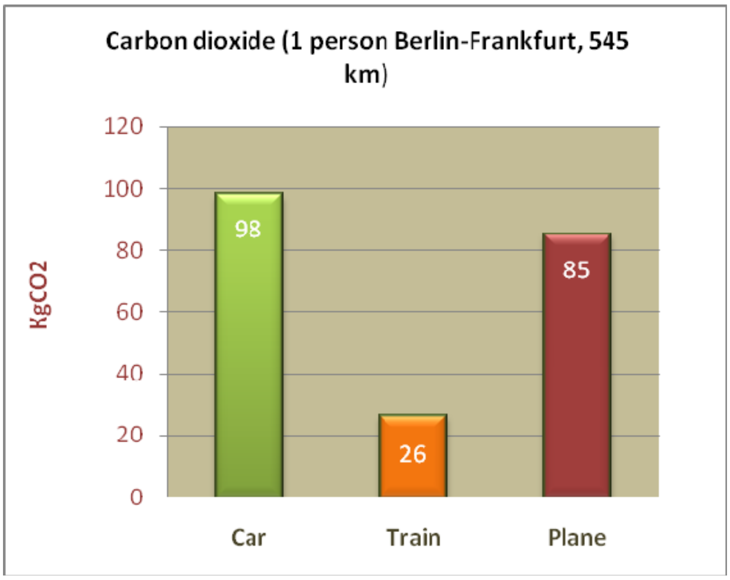


Figure 6-3 Transportation of passenger by different transport modes and CO2 emissions

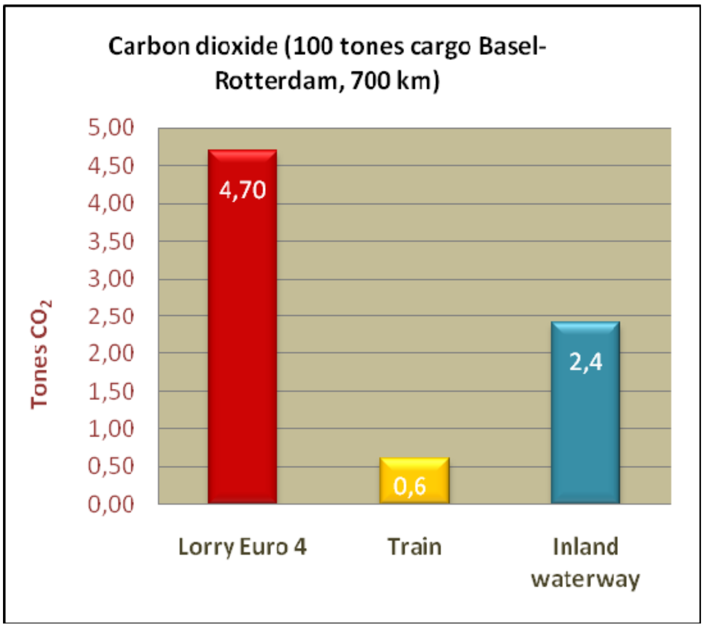


Figure 6-4 Emissions of CO 2 during the cargo transportation of goods

Travelling by rail is on average 3-10 times less CO_2 intensive compared to road or air transport and with 7 to 10% of the market share, rail contributes with less than 2% of the EU transport sector's CO_2 emissions.

The electrical rail transport is free of direct local air pollution. Therefore, the impact is positive for the area where it is located, but this effect should be considered in the context of the region`s share among renewable and fossil sources of energy to produce electricity.

Estimation of magnitude

For estimating the magnitude of the impact on air pollution during stage 1, the emissions from railway on diesel traction have been calculated.

Diesel locomotives either use only diesel engines for propulsion or in combination with an on-board alternator or generator to produce electricity which powers their traction motors (diesel – electric). These locomotives fall in three categories:

- Shunting locomotives;
- Rail – cars;
- Line – haul locomotives.

The pollutants for which rail transport can be important are SO_2, NO_x, CO_2 and PM, and of lesser, but still significant importance are emissions of CO, NMVOCs (non – methane volatile organic compounds) and some metals.

Exhaust emissions from railways arise from the combustion of liquid fuels in diesel engines, and solid or liquid fuels in steam engines to provide propulsion, as shown in the flow diagram in figure below.

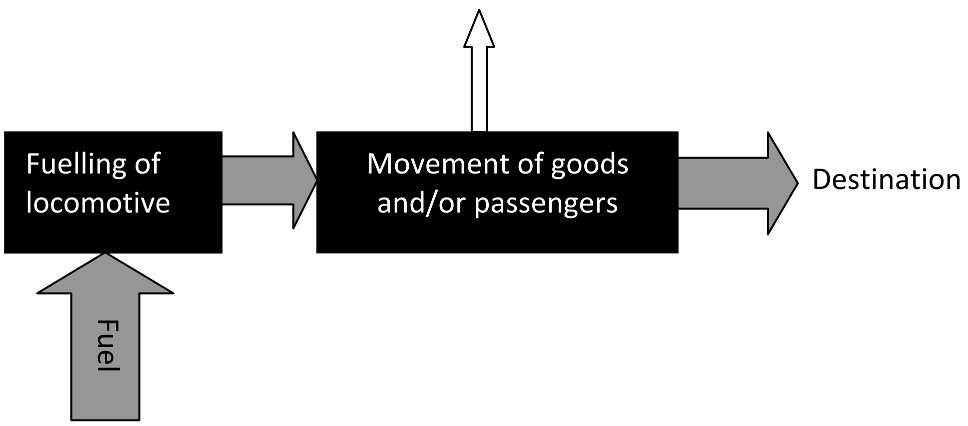


Figure 6-5 Flow diagram for the contribution from railways to mobile sources combustion emissions

In the period from middle of 2015 until the end of 2018, the railway track from Kumanovo to Beljakovce will be operative and national and regional passenger diesel traction service will take place. No freight service is envisaged in that period. So, the combustion of diesel fuel will be a main source of air pollutants.

The main characteristics of trains and locomotives that will be operational in that period on diesel fuel are presented in table below, based on the traffic forecast.

Technical data on railway traffic specification	**Section I (Kumanovo – Beljakovce)**	
Length of the railway station	30,8 km	
Design speed	100 (km/h)	
Number of trains per day	up to 12 - 16 daily passenger trains per direction	
International passenger service	Locomotive-hauled wagon train with 5 wagons (approx. length 180 m, 300 seats and 300 t)	
Regional passenger service	TALENT 166 t, length 67m, 200 seats	
Max. weight of trains (/double	Single traction – 800 tones	Double traction – 1500 tones

locomotive)		
Maximum payload per train (net tones)	600 tones	
Number of stations	3	
Number of halts	6	
Distance between stations	Minimum 6,6 km	Maximum 13,4 km

Table 6-35 Operation phase of Section I (period mid. 2015-2018) – Only passenger transportation, no freight transport in this period

The Feasibility Study for Railway Corridor VIII – Eastern Section (Economic and Financial Evaluation Study) provides the transport demand forecast, the train operational programme, and the distances of train operations in order to calculate the annual volume of train-km. The conversion of daily trains into annual trains was done based on several assumptions shown in table below.

Passenger services (domestic):	**100% services on 260 working days p.a. (mostly commuter traffic); 75% passenger services on 105 Saturdays/Sundays (lower demand for commuter traffic, higher demand for private and touristic trips)**
Passenger services (international):	100% services on 365 days p.a.

Table 6-36 Assumption for conversion of daily trains into annual trains

Based on the transport demand forecast, the annual volume of train-km was calculated and taken into consideration in the calculations for air emissions (presented in table below).

Category of service	**Train-km p.a between Kumanovo - Beljakovce (in '000 train-km p.a)**			
Diesel traction	2015	2016	2017	2018
Freight service	no freight service	no freight service	no freight service	no freight service
Passenger service	77,7	155,5	155,5	155,5

Table 6-37 Annual train-km for passenger and freight service between Kumanovo and Beljakovce

Other important parameters for the calculation of the railway diesel traction emissions to the air is the diesel consumption quantity per train-km and the total annual consumption of fuel, shown in the table below.

	2015	**2016**	**2017**	**2018**
Total passenger train-km p.a	77700	155500	155500	155500
Consumption of diesel (kg diesel)*	**94949,4**	**190021**	**190021**	**190021**

1,222 kg diesel/train-km; 1 kg diesel = 0,854 g/m^3

Table 6-38 Consumption of diesel fuel p.a.

These data are the starting point for air emissions calculations.

The emissions produced by railways arise from combusting the fuel in an internal combustion engine. Consequently, the principal pollutants are those from diesel engines (i.e similar to those used in road transport). These are principally CO_2, PM and NO_x, plus to a lesser extent CO and hydrocarbons, together with SO_x and heavy metals originating from the content of fuel in sulphur and metals, respectively.

Several methods to calculate air emissions from diesel operated railways can be foreseen depending of the information and data available for this project, namely: a) total fuel/energy consumption, b) total fuel/electrical consumption and c) passenger train occupancy and passenger train weight, freight trains and locomotive weight.

The first method uses energy of fuel specific emissions factors in combination with known energy and/or fuel consumption. The second uses empirical correlations of weight specific energy consumption for a variety of train types as a function of speed and distance between stops. The third method is based on train rolling and aerodynamic resistance integrated over a given route.

The first method is the most accurate if consumption data are available, and is the one used for this assessment. Specifically, the *SNAP Methodology on air emissions inventory (Tier 1) and the EMEP/EEA emission inventory guidebook, 2009 (SNAP Code 80200 Railways)* were used. In using this methodology it was very important the fact that this methodology has been used by EU member countries for reporting air emissions and also by the Republic of Macedonia in the preparation of the two cadastres of air polluters and air emission inventories using the SNAP nomenclature and emission factors.

The tier 1 approach for railways is a fuel based methodology and uses the general equation:

$$E_i = \sum_m FC_m \times EF_{i,m}$$

Where: E_i = emissions of pollutant *i* for the period concerned in the inventory (kg or g),

FC_m = fuel consumption of fuel type *m* for the period and area considered (tonnes),

EF_i = emission factor of pollutant *i* for each unit of fuel type *m* used (kg/tonnes),

m = fuel type (diesel, gas oil).

Tier 1 emission factor (EF_i) assume an average technology for the railway locomotive fleet. For the emissions of CO_2, SO_2 and heavy metals, the emission factors are calculated presuming that the carbon in the fuel is fully oxidized to CO_2 and that the sulphur and heavy metals in the fuel are quantitatively emitted into the atmosphere.

The tier 1 calculations for each pollutant are explained next:

<u>CO_2 emissions</u> are estimated on the basis of fuel consumption only, assuming that the carbon content of the fuel is fully oxidized to CO2 .The following formula is applied:

mass of CO_2 = 44.011(mass of fuel/(12.011+1.008 · $r_{H/C}$), with

with $r_{H/C}$ = the ratio of hydrogen to carbon atoms in the field 1.8 for gasoline and 2.0 for diesel.

Taking into account the total fuel consumption that is expected for the trains demand forecast, the total CO_2 emissions in tonnes on an annual basis for the period of 2015-2018 were estimated using the above mentioned formula.

The quantities per anum for the whole period are presented in the table below.

	2015	2016	2017	2018
CO_2 emissions (tones CO_2 p.a)	**298**	**596**	**596**	**596**

Table 6-39 CO2 emissions in the period 2015-2018 (Tonnes p.a.)

<u>Emissions of SO_2</u> may be calculated by means of the following equation:

$$E_{SO2} = 2 \times \sum_m k_{S,m} \times FC_m$$

Where:

E_{SO2} = emissions of sulphur dioxide for the period concerned in the inventory (kg),

$k_{S,m}$ = the sulphur content in the fuel (0% by mass).

The sulphur content in diesel fuel is 10 ppm (10 mg/kg) on the fuel market in Macedonia. The PERI – Transport purchases the ordinary diesel fuel that could be found on the national market with quality according the national fuel quality standards.

The total annual emissions of SO_2 are presented in table below.

	2015	2016	2017	2018
SO_2 emissions (kg SO_2 p.a)	**1,9**	**3,8**	**3,8**	**3,8**

Table 6-40 SO2 emissions in the period 2015-2018 (kg p.a.)

The fuel based methodology has been taken into consideration for the calculations of other pollutants such as CH_4, NO_x, NM-VOC, CH_4, CO, NH_3, N_2O, PM, $PM_{2,5}$ in the air.

The Emission factors for "SNAP 80200 Railways" group of diesel engines from the guidebook (EMEP/EEA emission inventory guidebook, 2009) are presented in **Error! Reference source not found.**. Using the railway emission factors and the total quantity of fuel consumed, the emissions of pollutants per year in the operative period for the Section Kumanovo – Beljakovce up to year 2018 were calculated.

Emission factors for "Other Mobile Sources and Machinery - Railways" part 1: diesel engines							
NOx	NM-VOC	CH_4	CO	NH_3	N_2O	PM	$PM_{2,5}$
39,6	4,65	0,18	10,7	0,007	1,24	5,14	4,83

Table 6-41 Emissions from diesel fuel combustion by pollutants - kg p.a. (2015-2018)

The total air emissions on an annual basis for non-metal pollutants from the diesel traction during passenger service in Section 1 for the projected period 2015-2018 are presented in the tabel below.

Emissions (kg p.a)	2015	2016	2017	2018
NO_x	3760	7525	7525	7525
NM-VOC	442	884	884	884
CH_4	17	34	34	34
CO	1016	2033	2033	2033
NH_3	0,7	1,3	1,3	1,3
N_2O	118	236	236	236
PM	488	977	977	977
$PM_{2,5}$	459	918	918	918
CO_2	297849	596081	596081	596081
SO_2	1,899	3,800	3,800	3,800

Table 6-42 Pollutant emissions by the railroad contributing to air pollution

In order to calculate the emissions of heavy metals into the air, the SNAP emissions factors "Other Mobile sources and machinery" group of diesel engines were used. These emission factors are presented in **Error! Reference source not found.** table below.

Heavy metals emission factors for "Other Mobile Sources and Machinery" part 1: diesel engines						
	Cadmium	Copper	Chromium	Nickel	Selenium	Zinc
(µg/kg fuel)	0,01	1,7	0,05	0,07	0,01	1

Table 6-43 Emission factors for "Other Mobile Sources and Machinery" part 1: diesel engines

Total heavy metals emissions for the period 2015 – 2018 were calculated and are presented in the table below

TOTAL EMISSIONS (g p.a.)	Cadmium	Copper	Chromium	Nickel	Selenium	Zinc
Emissions 2015	0,9	161,4	4,7	6,6	0,9	94,9
Emissions 2016	1,9	323,0	9,5	13,3	1,9	190,0
Emissions 2017	1,9	323,0	9,5	13,3	1,9	190,0
Emissions 2018	1,9	323,0	9,5	13,3	1,9	190,0

Table 6-44 Emission of heavy metals (g p.a. for 2015-2018)

In order to determine the magnitude of the impact it has been considered how and to what extend these emissions from the railway diesel traction could contribute to the whole emissions from railway activity in Macedonia.

The Annual Report from 2009 on Air Emissions Inventory prepared by the Ministry of the Environment using the EMEP/EEA SNAP Methodology summarizes the annual air emissions from all SNAP groups: industry, transport, energy combustion, agriculture and other mobile sources and equipment. These “other mobile source” include the railway locomotives under code 80200.

Table 6-45 presents the total emissions in 2008 for all mobile sources under code 80200 – railway. If these data are compared with the calculated values for emission of pollutants during stage 1 from the diesel traction operation on the route Kumanovo-Beljakovce (Section 1), it can be concluded that the relative increase of air emissions will be low (approximately 2%). Moreover, this modest increase will only last 3.5 years and will be partially or potentially wholy offset by the fact that many citizens will reduce the road travelling by using the railway service.

Emissions according the Air emissions inventory for 2008 (Macedonia) GROUP 8 - Other mobile sources and machinery		Percentage of increased emission of pollutants by the railway transport system
80200 - Railways	tones	percent
NO_x	173,82	2,12%
NM-VOC	20,38	2,12%
CH_4	0,47	3,49%
CO	46,99	2,12%
NH_3	0,03	2,28%
N_2O	5,47	2,11%
PM	20,1	4,29%
CO_2	13970	2,08%
SO_2	24,33	0,006%

Table 6-45 Pollutant emissions from other mobile sources and machinery and the percentage share of pollutants that are emitted by the railway

From 2018 on, upon completion of construction works in Section 2 and 3, Section 1 of the railway (Kumanovo-Beljakovce) will be electrified and also used by the freight trains. No major air emissions are expected into these operational phase.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Air emissions are generated by diesel combustion engines
Reversibility	Reversible	Air contamination will stop when Section 1 is electrified.
Geographic Extent	Local	The alteration of air quality is limited to the footprint of Section 1 of the railway project
Time when the impact occurs	Immediate	The alteration of the air quality occurs as the diesel locomotives operate
Duration	Medium-term	The operation on diesel locomotives will last 3.5 years.
Likelihood of appearance	Certain	Contaminant gases are generated in combustion engines powered with fossil fuels.
Magnitude	Low	See above

Table 6-46 Assesment of impact

Considering that the most affected receptors during stage 1 will be those living along Section 1, and that they have a high sensitivity, using the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

6.2.5 POTENTIAL LANDSCAPE AND VISUAL IMPACTS

6.2.5.1 ASSESSMENT OF LANDSCAPE SENSITIVITY

The value or sensitivity of the landscape resources present along the railway corridor has been determined through the evaluation of the quality of the landscape scenery units identified and described in *Chapter 5.1.1.7.*

The quality of each of the defined landscape scenery units has been evaluated based on its visual quality and its fragility. Visual Quality is understood in the aesthetic sense, but also with regards to the size of the visual field, i.e., the amplitude of the areas from which a component is visible. Thus, for equal aesthetic features, those components with very broad and clearly defined landscapes will have a higher visual quality.

With regards to aesthetic features, the lowest value judgments are attributed to the presence of areas subject to industrial and urban expansion or areas where the elements have grown in a disordered manner, with spontaneous vegetation inconsistent with the potential natural vegetation of the area and presence of anthropogenic detractors such as abandoned quarries, waste dumps, high voltage power lines, etc. Higher value judgements are assigned to areas with elements perfectly organized and with tendency to naturalness, both with regards to their historical and cultural values (understood as an association of physical and non-physical elements ordered according to morphological and functional rules developed over time) and natural values (those in which human activity has little changed or not changed the original identity of the landscape).

Fragility is defined as the susceptibility of a landscape to change when a different use is implemented. In other words, it is the expression of the degree of deterioration that the landscape experiences following the incidence of certain actions. Another measure is the visual absorption capacity, which is the ability of a landscape to absorb the modifications or alterations without compromising its visual quality. A greater visual fragility accounts for less visual absorption capacity and vice versa.

The visual assessment of the fragility depends directly on the scenic or landscape qualities, as attractive landscapes are more vulnerable, since they retain a greater number of aesthetic values. However, in assigning values of fragility, there are other many intervening factors, so that, for instance, a landscape of high quality can be little affected visually, simply by the fact it has a dense vegetative cover capable of attenuating the perception of the alteration.

In developing the score to be assigned to each landscape scenery unit, visual quality and visual fragility have been evaluated separately using in both cases the following scoring scale:

- Negligible (1)
- Low (2)
- Medium (3)
- High (4)
- Very high (5)

The landscape quality score has been obtained using the following algorithm:

Landscape quality = ((2 x visual quality score) + (fragility score))/3

A weighting factor has been applied to the visual quality parameter to account for the importance of the aesthetic values and avoid that these are overridden by the fragility aspects.

The quality scores obtained for each of the landscape scenery units defined for the railway corridor are presented in the following table. An overall landscape sensitivity value was obtained for each Section by multiplying the length of each landscape unit by its quality score, summing the resulting values, and averaging over the total length of the section.

Landscape scenery unit	Visual quality	Visual fragility	Landscape quality score
Section 1			
K.P. 0.4 to K.P. 7 Relatively flat area, highly populated area, but with a large rural component dominated by agricultural land fields, orchards and abandoned arable land lots.	Negligible	Negligible	Negligible
K.P. 7.0 to K.P. 10 Predominantly urban area on a broad valley, with some sparse parks, agricultural land lots, and abandoned lots in the immediate vicinity of the alignment.	Negligible	Negligible	Negligible
K.P. 10.0 to K.P. 17.5 Rural area with gentle slopes towards the Kumanovska river dominated by agricultural land.	Low	Low	Low
K.P. 17.5 to K.P.28.5 Gently sloping agricultural land in the broad flood plains formed by the Pcinja river and the Kriva river, with some patches of pastures, vineyards and scattered rural settlements. Riparian vegetation in the river banks lies next to the alignment at some	Low	Low	Low

Landscape scenery unit	Visual quality	Visual fragility	Landscape quality score
points.			
28.5 to K.P. 31.0 The valley of the Kriva river has significantly narrowed. The landscape is dominated by pastures uphill, and agricultural land and relatively large areas covered with riparian vegetation towards the river.	Medium	Low	Medium
Overall sensitivity for Section 1			*Low*
Section 2			
K.P. 31.0 to K.P.36.0 Same as for K.P. 28.5 to K.P. 31.0.	Medium	Low	Medium
K.P. 36.0 to K.P. 41.0 The rail alignment runs through upper elevations of the hilly terrain surrounding the Kriva river. The landscape is completely dominated by hill pastures with a few scattered agricultural land lots.	High	Very high	High
K.P. 36.0 to K.P.37.0 Rocky and stony area with chasmophytic vegetation. Earth movements for the construction of the railway at this point were already performed 15 years ago.	Very high	Very high	Very high
K.P. 39.0 to K.P.40.0 Rocky and stony area with chasmophytic vegetation. The pillars of the viaduct are already constructed.	Very high	Very high	Very high
K.P. 41.0 to K.P. 45.0 The Kriva river flows boxed in by the surrounding mountains and so does the railway. The landscape is characterized by alternations of degraded xerothermophilous oak forest and hill pastures.	Medium	Medium	Medium
K.P. 45.0 to K.P. 50.0 Same as for K.P. 31.0 to K.P.36.0.	Medium	Low	Medium
K.P. 50.0 to K.P. 53.0 Same as for K.P. 41.0 to K.P. 45.0.	Medium	Medium	Medium
K.P. 53.0 to K.P. 61.0 The river valley widens significantly. The alignment runs away from the river course on gentle slopes dominated by agricultural land and several larger settlements.	Low	Low	Low
K.P. 61.0 to K.P. 65.0 Same as forK.P.41.0 to K.P. 45.0.	Medium	Medium	Medium
Overall sensitivity for Section 2			*Medium*
Section 3			
K.P. 65.0 to K.P. 71.0 The valley becomes broader on the side opposite to the railway alignment. The rail alignment runs across the more rugged northern side through a landscape dominated with hill pastures and several forested areas (conifer plantations and xerothermophilous oak forests)	Medium	Medium	Medium
K.P. 71.0 to K.P. 74.0	Negligible	Negligible	Negligible

Landscape scenery unit	Visual quality	Visual fragility	Landscape quality score
The railway alignment runs North of the town of Kriva Palanka through an urban area.			
K.P. 74.0 to K.P. 78.0 As the river valley narrows, the landscape consists of an alternation of forested areas and pastures, where forests are dominant.	High	Low	Medium
K.P. 78.0 to K.P. 88.0 The river flows boxed in by the mountains and so does the railway. The landscape is dominated by the presence of forests of different types with scattered small patches of pasture, grasslands and meadows. Well preserved and highly valued forests are present in this area, such as mesophilous oak forests, thermophilous oak forests, and submontane beech forests.	Very high	Negligible	High
Overall sensitivity for Section 3			*Medium*

Table 6-47 Landscape sensitivity values

6.2.5.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

Anticipated impacts on the landscape will arise from the presence of new elements that will change the landscape, either temporarily or permanently. Temporary changes will generally be associated to the physical presence of workers and construction machinery and materials during the construction phase, whereas permanent impacts will be associated to the built structural elements of the railway, thus the effects on the landscape start in the construction phase, but they continue through the operational phase.

In this section, the impacts during the construction phase will refer to those that have a temporary character and will be only briefly discussed because of their low significance compared to the long term impacts caused by the built structures, whose impact on the landscape will be analysed as part of the operational phase.

The following potential impacts on landscape have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

<u>Construction phase</u>

- Alteration of landscape scenery by the presence of construction works, construction camps and other auxiliary facilities

<u>Operation phase</u>

- Alteration of landscape scenery by the presence of the railway objects (tunnel openings, cuttings, bridges, stations)

CONSTRUCTION PHASE

Alteration of landscape scenery by the presence of construction works, construction camps and other auxiliary facilities

The main activities of the construction phase that are anticipated to have short term effects on the landscape include:

- The construction site itself, where the presence of the workers, the heavy machinery, the earth movements, the deposits of construction material, the piles of waste, the nude soil, etc. will impair the local landscape, especially for nearby residents. This landscape impairment will disappear as the construction front advances to other areas.
- The construction camps for workers, where the site huts for offices, toilets and accommodation will occupy a previously bare space. This type of camps will also be perceived as an impairment of the landscape at a local scale.
- Ancillary areas for vehicle and machinery maintenance and the installation of other temporary structures such as the concrete plant or the crushing plant, etc., which may have a high visual impact due to their size and height.

Estimation of magnitude

The magnitude of the impact on the landscape is anticipated to be low during stage 1 (Section 1) since the above mentioned activities are not expected to be observed by a large number of people, they will occupy limited extensions of land, will have relatively small dimensions, and will be located next or close to the alignment where the railway is already built.

For stage 2 (sections 2 and 3), in Section 2, where the main construction works were completed before 2004, but some earth movements are still to be executed and the railway structures need to be installed, and in Section 3, where works should start from the beginning, the dimensions of the construction site (land occupied by construction front, camps, material storage and ancillary areas, installation of concrete and crushing plants, number of workers, number and size of vehicles and machinery) will create a greater alteration of the local landscape, which, on the other hand, has relatively few observers as the corridor runs along low populated areas. Upon completion of construction, these temporary construction sites shall be dismantled and the land scheduled for reclamation. As these elements disappear from the landscape, the impact will cease. The magnitude of the impact on landscape during construction in stage 2 will be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The alteration of the landscape occurs because of the presence of construction activities
Reversibility	Reversible	The alteration of the landscape because of the presence of construction activities will disappear when construction is complete and construction elements removed.
Geographic Extent	Local	The alteration of the landscape is limited to the footprint of the project
Time when the impact occurs	Immediate	The alteration of the landscape occurs as the construction elements are installed
Duration	Short-term	It will last during the construction period
Likelihood of appearance	Certain	The presence of the construction elements will be seen by nearby residents, road users, etc.
Magnitude	Low	See above

Table 6-48 Assesment of impact

Considering an overall medium sensitivity for the landscape receptor, according to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is Slight.

OPERATIONAL PHASE

Alteration of landscape scenery by the presence of the railway objects (tunnel openings, cuttings, bridges, stations)

With the implementation of a railway project, the landscape impacts that arise are due to the appearance of linear and geometric forms, which also introduce color changes due to the removal of the vegetative cover, the use of construction materials (concrete, ballast, metal, etc.) with textures and colors different from those of the nearby natural elements, and the creation of cuttings (the newly open substrate has a clearer and brighter coloration than the naturally altered substrate) and embankments.

The landscape changes should be viewed in two ways: one is the disturbance on the intrinsic quality of the landscape, and the other is the ease with which these changes are captured by the observers. Thus, the affections of the railway project implementation have been analyzed with regards to their visibility, and for this, the areas along the alignment with high visual vulnerability (those open areas which concentrate a large number of potential observers, such as towns, tourist sites, roads, etc.) have been identified. Another factor that has been taken into account in addressing the condition of visibility is the distance at which the alignment is located from the potential observers, since, as distance increases, the perception of details is lost, the color shades fade, and the intensity of the lines and contrasts diminish. For the assessment of landscape impacts, the immediate surroundings and the midway distance (800 to 1000 meters) have been considered.

The magnitude of the landscape changes will also depend on the number and types of project actions capable of introducing significant alterations in the observed space. In this regard the analysis of the intensity of the impact causing activities has been based on the types, number and concentration over a stretch of railway track of such activities. The landscape impact causing activities considered for this analysis include:

- The railway track, including the rails, the sleepers, the fasteners, the ballast, the subgrade, and particularly the earth movements needed for its laydown, since large cuttings and embankments in rugged terrain will potentially create a greater impact due to their visibility.
- The bridges and viaducts, because they are constructed over the span of valleys, therefore occupying a highly visible space.
- The tunnels and more specifically their entrances/exits, because cuttings may be needed around the mouths for construction purposes.
- The new landfills for the disposal of surplus material from excavation works in Section 3 of the railway corridor. These disposal sites are intended to be located in small valleys, thus changing the morphology of the site.
- The stations and their platforms.

<u>Estimation of magnitude</u>

The magnitude of the impact of the project actions has been evaluated based on the quality of the affected landscape units (see *Chapter 6.2.6.2*), the intensity of the project actions and the number of potential landscape observers in the area where the project action takes place.

A quantitative method has been used to assess the visibility and intensity of impact causing activities in each landscape scenery unit, consisting of applying a score to both parameters. The following scoring scale has been used: Negligible (1), Low (2), Medium (3), High (4), and Very high (5).

The results of this assessment are shown below, with a short description for the rational of the analyses in each landscape unit.

Once the visibility and the intensity of impacting actions for each scenery unit have been rated, the magnitude impact in each unit has been estimated as the average of the three parameters: Landscape quality, Visibility, and Intensity of impacting actions. The same scoring scale is applied to the magnitude results, which are shown in *Table 6-49*.

Visibility / Impact causing intensity in Section 1. Kumanovo to Beljakovce

K.P. 0.4 to K.P. 7.0

Visibility / number of observers: High (the alignment passes beside the towns of Chereskoselo, Lopate and Rezanovce. The railway crosses the roads that go from Kumanovo to these towns as well as highway E-75, there is a road that runs parallel to the railway. See *Figure 6-6*Figure 6-6 Topographical map of first part of Section 1.

Intensity of impact causing activities: Low (replacement of the old wooden sleepers and rehabilitation of the substructure from K.P. 0.000 to K.P. 2.667, reconstruction of bridges at km 2.780 and 3.133, construction of overpasses at km 2.876 and 3.507, reconstruction of box culvert at km 3.432, fencing of the railway at km 3.507 and 6.600, cleaning of the terrain and replacement of missing rail fittings from K.P. 2.667 to the end of the strech).

K.P. 7.0 to K.P. 10

Visibility / number of observers: Very high (the city of kumanovo, of 71.000 people, lies along both sides of the railway). See *Figure 6-6*.

Density of impact causing activities: Low (rehabilitation of crossing slopes from K.P. 7.600 to K.P. 8.900, rehabilitation of underpasses at km 7.206, 8.001 and 9.026, reconstruction of concrete arch bridge at km 7.316, fencing of the railway at km 9.026, cleaning of the terrain and replacement of missing rail fittings in all the stretch).

K.P. 10.0 to K.P. 17.5

Visibility / number of observers: High (the relatively large settlements of Proevce, about 1.300 people, and Dobrosame, of about 1.600 people, are in this stretch. Rows of houses extent all along the road Kumanovo-SuppliKamen, approximately 500 meters of the railway. See *Figure 6-6*.

Density of impact causing activities: Low (cleaning of the terrain and replacement of missing rail fittings in all the stretch, construction of a security and noise protective fence in K.P. 12.600).

K.P. 17.5 to K.P.28.5

Visibility / number of observers: Low (the main settlement is SuppliKamen with approximately 100 people. A few houses are scattered along the railway. There is a road running parallel to the rail alignment and other local roads. See *Figure 6-7*.

Density of impact causing activities: Medium (cleaning of the terrain and replacement of missing rail fittings from K.P. 17.5 to K.P. 23.600, new bridge over Pcinja river at K.P. 24+768).

K.P. 28.5 to K.P. 31.0

Visibility / number of observers: Low (there are several small settlements along the existing railway. Klechevtce is the more important one, with about 500 people. There is a road running parallel to the rail alignment and other local roads). See *Figure 6-7*.

Density of impact causing activities: Low (finishing of cuts and embankments between km 25.600 and km 30.836).

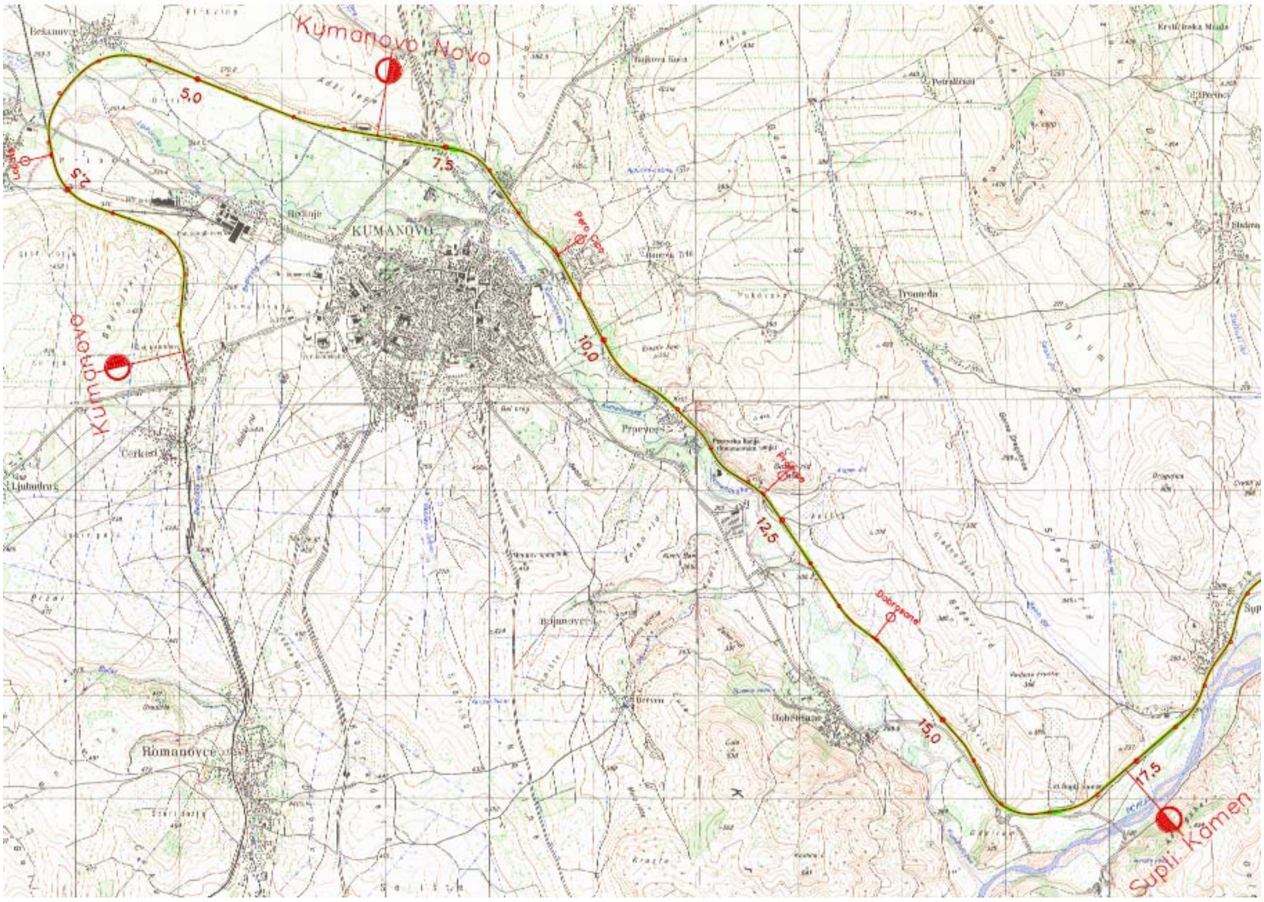


Figure 6-6 Topographical map of first part of Section 1

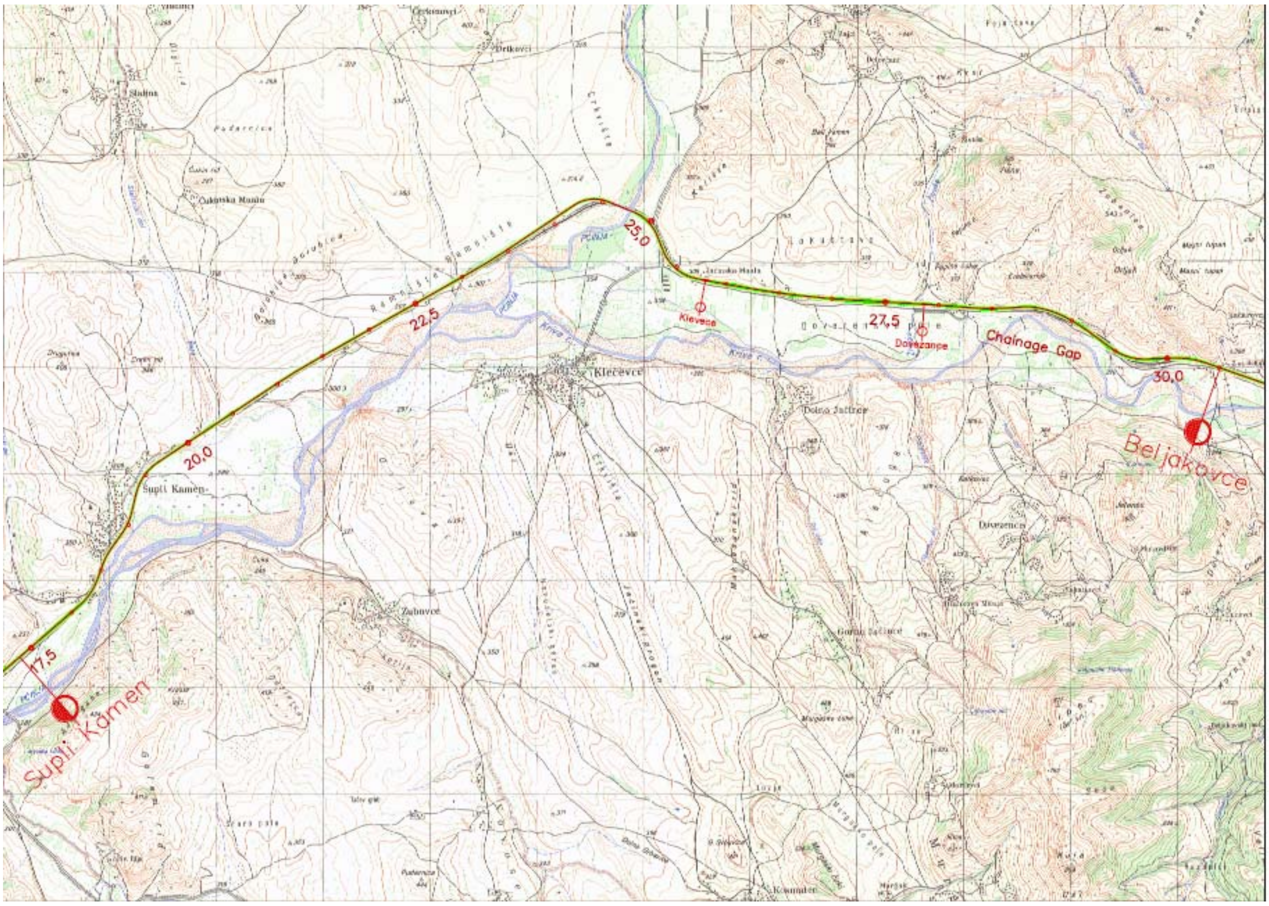


Figure 6-7 Topographical map of second part of Section 1

Visibility / Impact causing intensity in Section 2. Beljakovce to Kriva Palanka

K.P. 31.0 to K.P.36.0

Visibility / number of observers: Low (low density of population in the area, in the proximity of the alignment, the main settlements are Kacarovci, Vardarci, Bantevci, and Kurlevci, with a few hundreds inhabitants. There are roads which give access to the proximity of the alignment, but they are all local roads. See *Figure 6-8*.

Density of impact causing structures: Low (1 bridge, no tunnels and platform built on relatively gentle slopes).

K.P. 36.0 to K.P. 41.0

Visibility / number of observers: Low (low density of population in the area, in the proximity of the alignment, the main settlements are Culak, Ruinci, and ShopskoRudare, with a few hundreds inhabitants. There are roads which give access to the proximity of the alignment, but they are all local roads). See Figure 6-8.

Density of impact causing structures: Very high (7 bridges, 1 tunnel and platform built on rugged terrain).

K.P. 41.0 to K.P. 45.0

Visibility / number of observers: Low (low density of population in the area, the main settlement is Ketenovo, with about 200 inhabitants, which lies less than 100 meters from the rail alignment. Roads are all secondary). See *Figure 6-8* and *Figure 6-9*.

Density of impact causing structures: Very high (3 bridges, 4 tunnels and platform built on rugged terrain).

K.P. 45.0 to K.P. 50.0

Visibility / number of observers: Medium (the small settlement of Lazinci lies approximately 200 meters from the alignment. Road 206 connecting Kratovo with road E-871 to Deve Bair and Bulgaria runs parallel to the alignment at distances generally between 500 and 750 metresrailway at distances, but at closer distances at some points, e.g. where both alignments cross each other. There are several industrial premises along this road). See *Figure 6-9*.

Density of impact causing structures: Low (4 bridges, 1 tunnel and platform built on a terrain of gentle slopes, Kratovo station).

K.P. 50.0 to K.P. 53.0

Visibility / number of observers: Negligible (very low density of population with only some isolated houses and a secondary road). See *Figure 6-9*.

Density of impact causing structures: High (2 bridges, 3 tunnels and platform built on rugged terrain).

K.P. 53.0 to K.P. 61.0

Visibility / number of observers: Medium (low density of population in the area, <1.000 residents, the main settlement is Ginovtsi, with about 300 inhabitants, which lies between the rail alignment and road E-871 to Deve Bair and Bulgaria, which runs parallel to the railway at distances varying between 300 and 800 meters. Road E-871 crosses the railway at the beginning of this stretch, close to the settlement of Krilatitsa, of approximately 150 inhabitants. See *Figure 6-9* and *Figure 6-10*.

Density of impact causing structures: Low (3 bridges, no tunnels and platform built on a terrain of gentle slopes, Ginovci station).

K.P. 61.0 to K.P. 65.0

Visibility / number of observers: Medium (low density of population in the area, <1.000 residents, the main settlement is Psacha, with about 500 inhabitants, and about 500 meters from the alignment, on the mountain slope opposite to that of the alignment. Road E-871 to Deve Bair and Bulgaria runs along the same corridor than the railway, slightly above the river level, less than 300 meters away). See *Figure 6-10*.

Density of impact causing structures: Very high (9 bridges, 5 tunnels and platform built on the slope of the mountain).

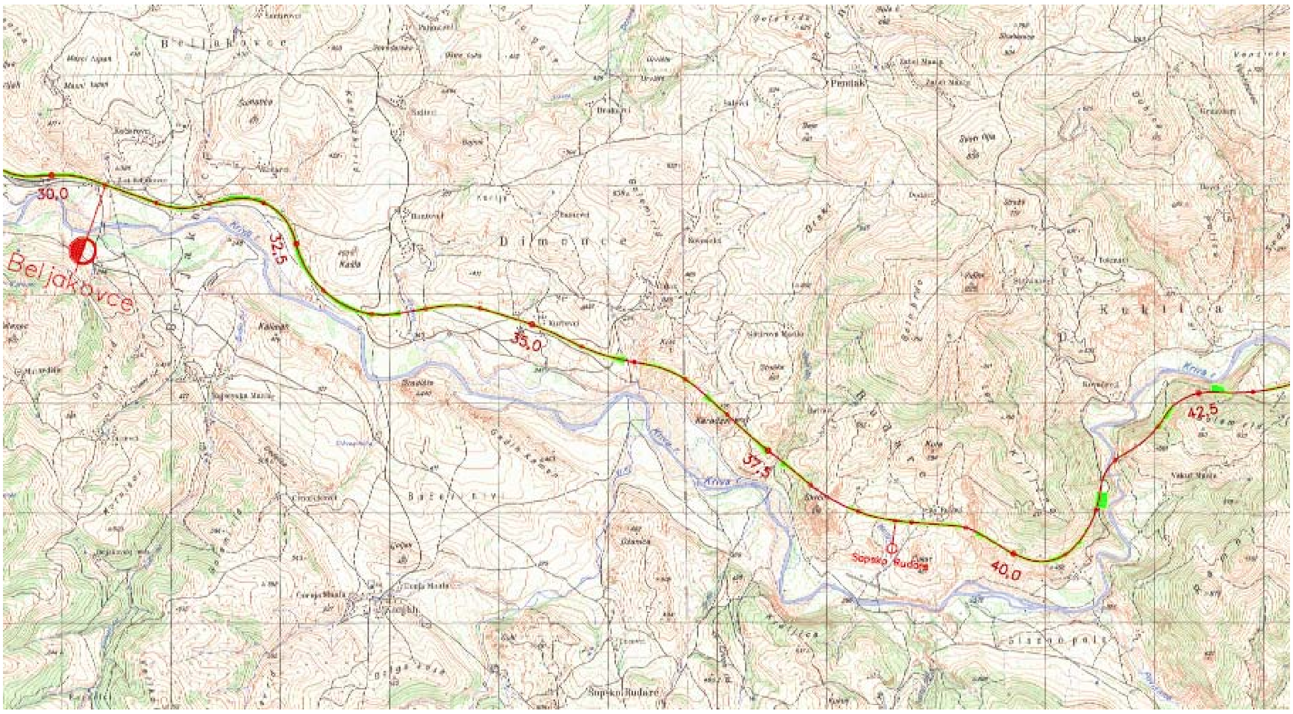


Figure 6-8 Topographical map of first part of Section 2

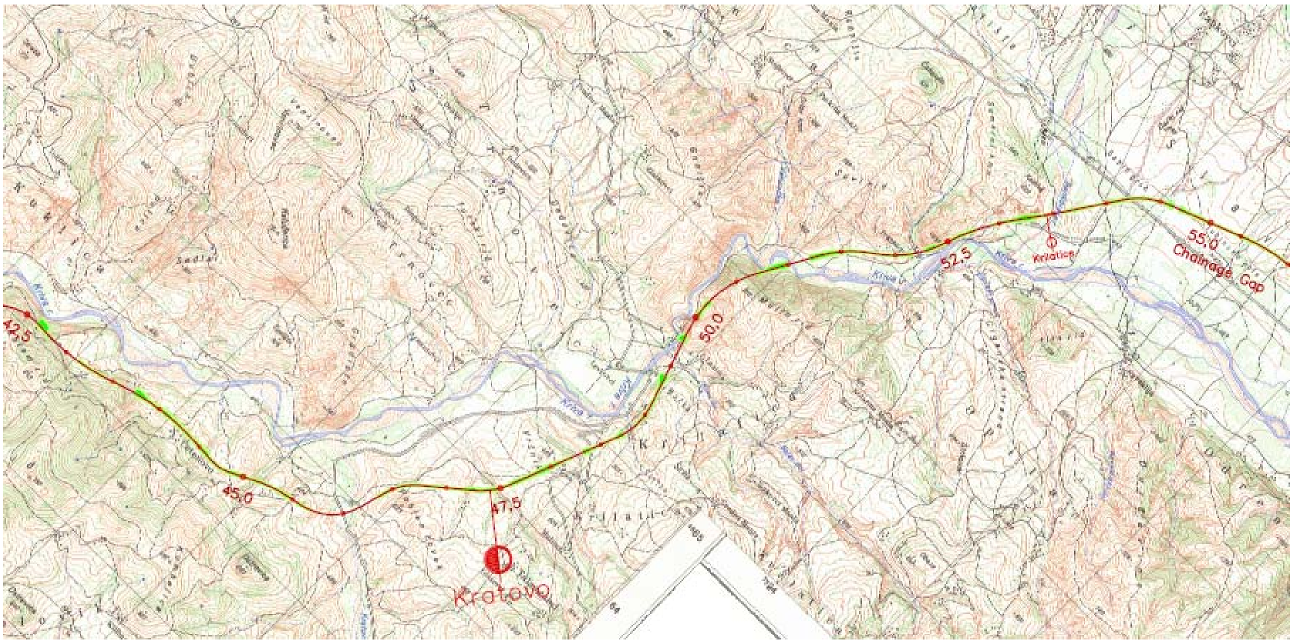


Figure 6-9 Topographical map of second part of Section 2

Visibility / Impact causing intensity in Section 3. Kriva Palanka to Bulgarian Border (Deve Bair)

<u>K.P. 65.0 to K.P. 71.0</u>

Visibility / number of observers: High (there are several settlements along the rail alignment, especially in the areas nearer to Kriva Palanka. The concentration of settlements is greater towards the southern side of the Kriva river, where the land shape is flatter, especially at both sides of Road E-871 to Deve Bair and

Bulgaria, which runs parallel to the rail alignment at distances of about 300 to 750 meters). See *Figure 6-10* and *Figure 6-11*.

Density of impact causing structures: Very high (17 bridges, 6 tunnels, platform built on the slope of the mountain, 9 landfills).

K.P. 71.0 to K.P. 74.0

Visibility / number of observers: Very high (the town of KrivaPalanka, with about 14.500 inhabitants, lies along side the alignment on both sides of the Kriva river, but the majority are on the mountain slope on the opposite side of the valley to the alignment, at about the same height, less than 750 meters away. The by-pass of road E-871 to Deve Bair and Bulgaria, runs parallel to the rail alignment). See *Figure 6-11.*

Density of impact causing structures: Very high (9 bridges, 2 tunnels and platform built on the slope of the mountain, 4 landfills, Kriva Palanka station).

K.P. 74.0 to K.P. 78.0

Visibility / number of observers: Medium (low density of population in the area, <500 residents, but the road E-871 to Deve Bair and Bulgaria runs along the same corridor as the railway, in the mountain slope opposite to that of the rail alignment, less than 300 meters away). See *Figure 6-11*.

Density of impact causing structures: Very high (5 bridges,5 tunnels and platform built on the slope of the mountain, 8 landfills).

K.P. 78.0 to K.P. 88.0

Visibility / number of observers: Medium (low density of population in the area, <1.000 residents, but the road E-871 to Deve Bair and Bulgaria runs along the same corridor than the railway, along the mountain slope opposite to that of the alignment, less than 200 meters away). See *Figure 6-11*.

Density of impact causing structures: Very high (14 bridges, 8 tunnels and platform built on the slope of the mountain, 14 landfills, Zidilovo station).

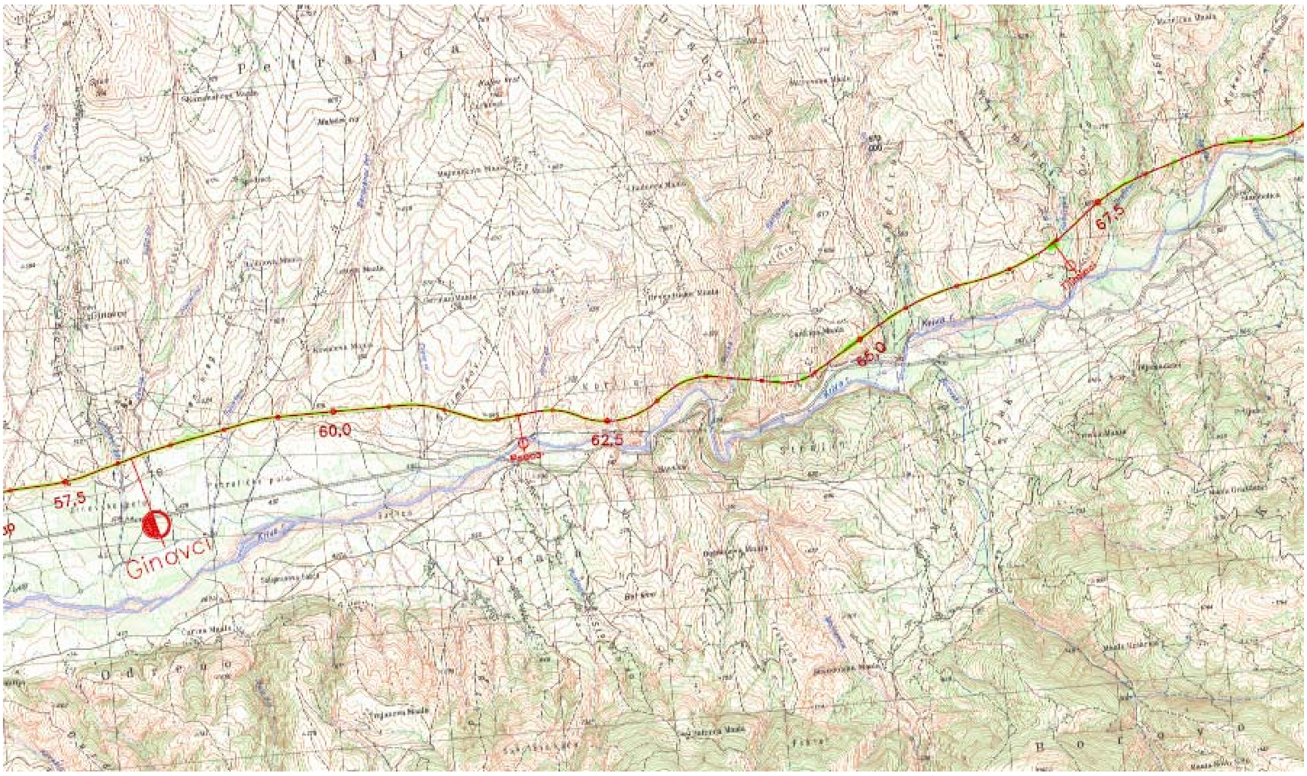


Figure 6-10 Topographical map of end of Section 2/first part of Section 3

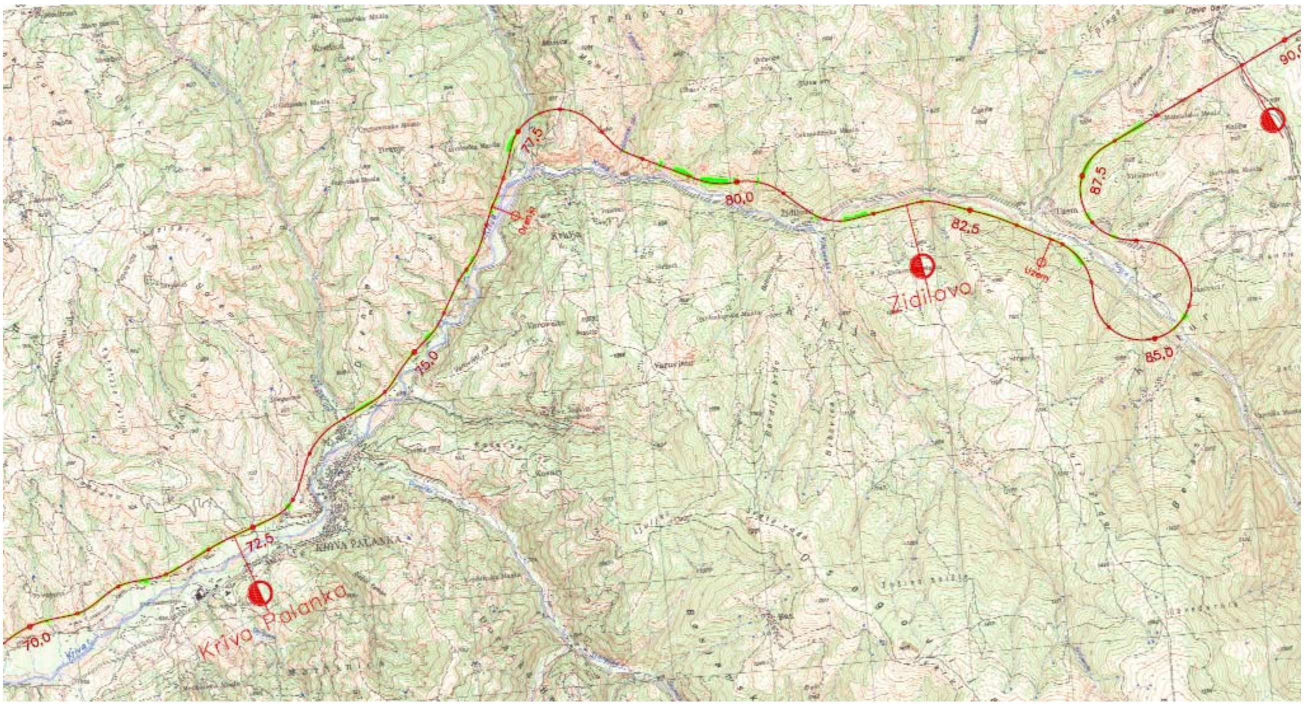


Figure 6-11 Topographical map of second part of Section 3

The magnitudes of the impact on the landscape scenery units, obtained as the average score for Landscape quality, Visibility, and Intensity of impacting actions are shown in table below. An average magnitude score has also been estimated for each section.

	Landscape quality	Visibility	Intensity of impacting actions	Magnitude of the impact
Section 1				
K.P. 0.4 to K.P. 7. Relatively flat area, highly populated area, but with a large rural component dominated by agricultural land fields, orchards and abandoned arable land lots.	Negligible	High	Low	Medium
K.P. 7.0 to K.P. 10. Predominantly urban area on a broad valley, with some sparse parks, agricultural land lots, and abandoned lots in the immediate vicinity of the alignment.	Negligible	Very High	Low	Medium
K.P. 10.0 to K.P. 17.5. Rural area with gentle slopes towards the Kumanovska river dominated by agricultural land.	Low	High	Low	Medium
K.P. 17.5 to K.P.28.5 Gently sloping agricultural land in the broad flood plains formed by the Pcinja river and the Kriva river, with some patches of pastures, vineyards and scattered rural settlements. Riparian vegetation in the river banks lies next to the alignment at some points.	Low	Low	Medium	Low
28.5 to K.P. 31.0 The valley of the Kriva river has significantly narrowed. The landscape is dominated by pastures uphill, and agricultural land and relatively large areas covered with riparian vegetation towards the river.	Medium	Low	Low	Low
Overall mangnitude for Section 1				*Medium*
Section 2				

	Landscape quality	Visibility	Intensity of impacting actions	Magnitude of the impact
K.P. 31.0 to K.P.36.0 Same as for K.P. 28.5 to K.P. 31.0.	Medium	Low	Low	Low
K.P. 36.0 to K.P. 41.0 The rail alignment runs through upper elevations of the hilly terrain surrounding the Kriva river. The landscape is completely dominated by hill pastures with a few scattered agricultural land lots.	High	Low	Very high	High
K.P. 36.0 to K.P.37.0 Rocky and stony area with chasmophytic vegetation. Earth movements for the construction of the railway at this point were already performed 15 years ago.	Very high	Low	Very high	High
K.P. 39.0 to K.P.40.0 Rocky and stony area with chasmophytic vegetation. The pillars of the viaduct are already constructed.	Very high	Low	Very high	High
K.P. 41.0 to K.P. 45.0 The Kriva river flows boxed in by the surrounding mountains and so does the railway. The landscape is characterized by alternations of degraded xerothermophilous oak forest and hill pastures.	Medium	Low	Very high	High
K.P. 45.0 to K.P. 50.0 Same as for K.P. 32.0 to K.P.36.0.	Medium	Medium	Low	Medium
K.P. 50.0 to K.P. 53.5 Same as for K.P. 41.0 to K.P. 45.0.	Medium	Negligible	High	Medium
K.P. 53.5 to K.P. 61.0 The river valley widens significantly. The alignment runs away from the river course on gentle slopes dominated by agricultural land and several larger settlements.	Low	Medium	Low	Low
K.P. 61.0 to K.P. 65.0 Same as for K.P. 41.0 to K.P. 45.0.	Medium	Medium	Very high	High
Overall magnitude for Section 2				*Medium*
Section 3				
K.P. 65.0 to K.P. 71.0 The valley becomes broader on the side opposite to the railway alignment. The rail alignment runs across the more rugged northern side through a landscape dominated with hill pastures and several forested areas (conifer plantations and xerothermophilous oak forests)	Medium	High	Very high	High
K.P. 71.0 to K.P. 74.0 The railway alignment runs North of the town of KrivaPalanka through an urban area.	Negligible	Very high	Very high	High
K.P. 74.0 to K.P. 78.0 As the river valley narrows, the landscape consists of an alternation of forested areas and pastures, where forests are dominant.	Medium	Medium	Very high	High
K.P. 78.0 to K.P. 88.0 The river flows boxed in by the mountains and so does the railway. The landscape is dominated by the presence of forests of different types with scattered small	High	Medium	Very high	High

	Landscape quality	Visibility	Intensity of impacting actions	Magnitude of the impact
patches of pasture, grasslands and medows. Well preserved and highly valued forests are present in this area, such as mesophillous oak forests, thermophilous oak forests, and submontane beech forests.				
Overall magnitude for Section 3				*High*

Table 6-49 Magnitude of the impact on landscape

With regards to the magnitude, the impact is generally medium for Section 1 of the railway corridor. The railway is already constructed, and only the rehabilitated structures, and mainly the new bridge over the Pcinja river, will create an appreciable alteration on the landscape. The area, however, is relatively densely populated.

For Section 2, the magnitude is generally medium. It combines a generally high value from the landscape quality point of view and a generally high intensity of the impact causing actions, but the visibility is generally low.

For Section 3 the magnitude of the impact is high due to combinations of one or more of the following factors considered in the assessment: high intensity of impacting activities, high aesthetic values, and high number of potential observers.

The overall magnitude for the impact on the landscape during the operational phase is medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	**Assessment Thresholds**	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The alteration of the landscape occurs because of the presence of the railway structures
Reversibility	Irreversible	The size of many of the railway structures is too large to be hidden by the surrounding vegetation.
Geographic Extent	Local	The alteration of the landscape is limited to the footprint of the project
Time when the impact occurs	Immediate	The alteration of the landscape occurs as the railway structures are constructed
Duration	Long-term	It will last during the operational life of the railway
Likelihood of appearance	Certain	The presence of the railway structures will be observable at several locations
Magnitude	Medium	See above

Table 6-50 Assesment of impact

Considering an overall medium sensitivity for the landscape receptor, according to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate.

6.2.6 POTENTIAL IMPACTS OF NOISE AND VIBRATION

6.2.6.1 ASSESSMENT OF NOISE AND VIBRATION SENSITIVITY

The railway alignment will be passing through or near several settlements, including the cities of Kumanovo and Kriva Palanka and several villages, which, following what is established in Macedonian noise regulations may correspond to areas with degree I (health care), II (residential), III (mixed residential and commercial uses) or IV (industrial uses) of noise protection (see table below).

Area defined according to the degree on noise protection	Noise threshold (dB)		
	L_d	L_e	L_n
Area with degree of noise protection I (hospitals, national parks, schools)	50	50	40
Area with degree of noise protection II (residential)	55	55	45
Area with degree of noise protection III (mixed-residential and commercial area)	60	60	55
Area with degree of noise protection IV (industrial area)	70	70	60

Table 6-51 Noise standards for noise protected areas

Noise and vibration effects during the railway construction and operational phases will be important in high sensitive areas (residential areas and areas with health institutions, school, national parks). This will be particularly so during the operational phase, when long-term noise and vibration disturbances during the day (7 am – 7 pm), evening (7 pm – 11 pm) and night (11 pm – 7 am) may occur.

In order to prepare this assessment the noise and vibration receptors that might be affected by noise and vibrations from the railway activities (construction and operation) have been identified and assigned to a sensitive category. The identification was made for the nearest settlements along the railway corridor, in all three sections, on the left and right sides of the alignment.

The minimum and maximum distances of the first row of buildings/houses in each settlement, as well as the number of rows affected, were defined using the topographic maps. The minimum distance of the first row of objects (building/house) was found to vary from 8 to70 m on the right side and 10 to 300 m on the left side. A very important value is the length of the row of objects affected by noise and vibration in order to later prescribe the mitigation measures, if needed.

The next step was the assignment of the baseline noise levels to each receptor settlement. The two main sources of information used were:

- The Annual Environmental Noise Report of the MoEPP of Macedonia (2010) for the city of Kumanovo (presented in the Baseline Conditions chapter 5.1.). Based on the reported data, a baseline noise value of 65 dBA (L dn) was used for all the settlements identified in the area of Kumanovo (Chereskoselo, Lopate, Proevce, Sredorek and PeroCico).
- The noise measurements performed at several points along the route (including, settlements near by the railway line) in July 2011 by the Consultant. These measurements were used to assign baseline noise levels to all the settlements where measurements were made.

For some villages (Odreno, Dovezance and T'lminci) where no measurements were performed, the baseline noise levels were assigned taking into account the similarity of these villages in term of density of population, density of houses, land configuration, proximity of other noise sources, etc. with the villages where the noise measurements were performed.

Table 6-52 below, shows the identified receptors, their location in the railway alignment chainage, the distance to the alignment, affect length, and some important information about the density of the population.

Table 6-53 the noise baseline levels for each selected settlement.

As it can be seen in *Table 6-52*, 18 potential noise and vibration receptors have been identified along the railway corridor, of which one corresponds to a health related facility (Kumanovo spa) and the others to residential areas. According to the degree of noise protection that Macedonian noise legislation assigns to the areas depending on their uses for human activities, the following sensitivity rates will be assigned to these receptors:

- Area with degree of noise protection I — Very high sensitivity
- Area with degree of noise protection II — High sensitivity
- Area with degree of noise protection III — Medium sensitivity
- Area with degree of noise protection IV — Low sensitivity
- Other areas — Negligible

Figure 6-21, Figure 6-22 and *Figure 6-23* at the end of this subchapter show the location of these types of areas along the railway alignment.

Thus, there is one receptor, Kumanova spa, with very high sensitivity. The rest are all residential areas and will be considered to have a high sensitivity, including those in which there may be mixed uses, like, for instance, in Krilatica/Ketenovo. In these cases it has been considered that, unless the area is clearly commercial, the residential use should prevail over the commercial or industrial use and therefore the assigned sensitivity has been high.

The overall sensitivity of the noise and vibration receptors is high.

Noise receptor/ settlement	Right side of the railway track						Left side of the railway track					Comment
	Position on alignment (km)	Min. distance from first row of buildings (m)	Max. distance of first row of buildings (m)	Total length of affected first row of buildings (m)	Number of first row buildings	Number of building rows	Min. distance from first row of buildings (m)	Max. distance from first row of buildings (m)	Total length from track by first row of buildings (m)	Number of first row buildings	Number of building rows	
Section 1												
Chereskoselo	0.00-0.70	railway station					35	299	600	50	3	Medium population density residential area
Lopate	03.00-03.30	no houses on the right side					20	75	250	8	4	Medium population density residential area
Rezanovce	03.80-05.00	no houses on the right side					10	130	450	19	3	Medium population density residential area
Sredorek	08.00-09.00	20	52	420	27	4	no houses on the left side					High population density residential area
PeroCico	08.50-10.00	no houses on the right side					10	45	770	30	5	High population density residential area
Proevce 1	10.00-10.50	13	57	130	7	2	no houses on the left side					Low population density residential area
Proevce 2	10.50-11.50	8	40	500	20	2	no houses on the left side					Low population density residential area
Kumanovo spa	17.00	32	32	50	1	1	no houses on the left side					Medium population density residential area
ShupliKamen	18.50-19.5	no houses on the right side					10	79	450	12	3	Medium population density residential area
Dovezance	28.00	25	43	273	10	1	no houses on the left side					Houses are located behind the local road
Section 2												
Krilatica/ Ketenovo	48.00	39	103	250	6	2	no houses on the left side					Poorly / less populated area (mixed industrial + houses
Odreno	52.00	25	60	72	3	1	no houses on the left side					Medium density populated area, closes up next to 3 houses only
Petralica	59.00	36.5	107	110	7	3	17	49	140	5	2	Low density populated area (last houses of the village)
T'liminci	67.00	70	110	85	4	2	no houses on the left side					There is a local road between the houses and the railway track
Section 3												
K. Palanka 1	71.50	31	65	130	5	6	no houses on the left side					The location is at the beginning of the town before the planned railway station in K. Palanka
K. Palanka 2	71.50-72.87	15	55	270	11	3	10	60	200	8	6	The location is from the railway station till the second bridge on 72+874.62 km
K. Palanka 3	72.87-73.00	10	65	280	20	3	10	108	14	330	4	The location is from the second bridge to the tunnel entrance
Zidilovo	81.00	10	60	190	7	3	10	60	190	7	3	Around the planned bridge, before entering in the tunnel-gallery

Table 6-52 Noise and vibration receptors along the railway corridor

Receptor	Position along the alignment (km)	Baseline noise level dB(A)	Min distance/ Max distance (m)	Length (m)/# buildings first row
Section 1				
Chereskoselo	0.00	65 dB	35/299	600/50
Lopate	03.00	65 dB	20/75	250/8
Rezanovce	04.50	65 dB	10/130	450/19
Sredorek	08.50	65 dB	20/52	420/27
PeroCico	09.30	65 dB	10/45	770/30
Proevce 1	10.20	65 dB	13/57	130/7
Proevce 2	11.50	65 dB	8/40	500/20
Kumanovo spa	17.00	48 dB	32/32	50/1
ShupliKamen	19.00	40 dB	10/79	450/12
Dovezance	28.00	40 dB	25/43	273/10
Section 2				
Krilatica/Ketenovo	48.00	50 dB	39/103	250/6
Odreno	52.00	35 dB	25/60	72/3
Petralica	59.00	45 dB	37/107	110/7
T'liminci	67.00	40 dB	70/110	85/4
Section 3				
K. Palanka 1	71.00	49 dB	31/65	130/50
K. Palanka 2	72.00	60 dB	15/55	270/11
K. Palanka 3	73.00	65 dB	10/65	280/20
Zidilovo	81.00	70 dB	10/60	190/7

Table 6-53 Baseline noise levels for receptors along the railway corridor

Noise

Noise is defined as unwanted sound and is perceived as a pollutant and an environmental stressor. Sound is what we hear when our ears are exposed to small pressure fluctuations in the air. Noise can be described in terms of three variables: a) amplitude (loud or soft), b) frequency (pitch), c) time pattern (variability).

Noise is generally considered as an annoyance, defined by the World Health Organisation (WHO) as “a feeling of displeasure evoked by noise“. However, noise is more than just a nuisance: in Europe, around 40% of the population is estimated to be exposed to noise levels that are potentially dangerous to health. At least 170 million Europeans (EU-15 figures) are seriously affected by noise in their residential areas.

Noise affects nervous and hormonal systems, which can increase the risk of cardiovascular disease and damage to cognitive function. Health effects of noise pollution may include:

- Sleep disturbance, including loss of sleep quality, and awakening. Disturbed sleep and tiredness can lead to loss of concentration, more accidents and injuries.
- Disrupted learning, understanding and memory (especially in children).
- Annoyance, leading to stress and reduced quality of life.
- Tinnitus (perception of sound within the human ear in the absence of corresponding external sound).
- Heart disease, including heart attacks, and other problems as a result of raised blood pressure.

Figure 6-12 illustrates the increasing severity of health effects of noise pollution and its distribution among populations (number of people affected vs severity).

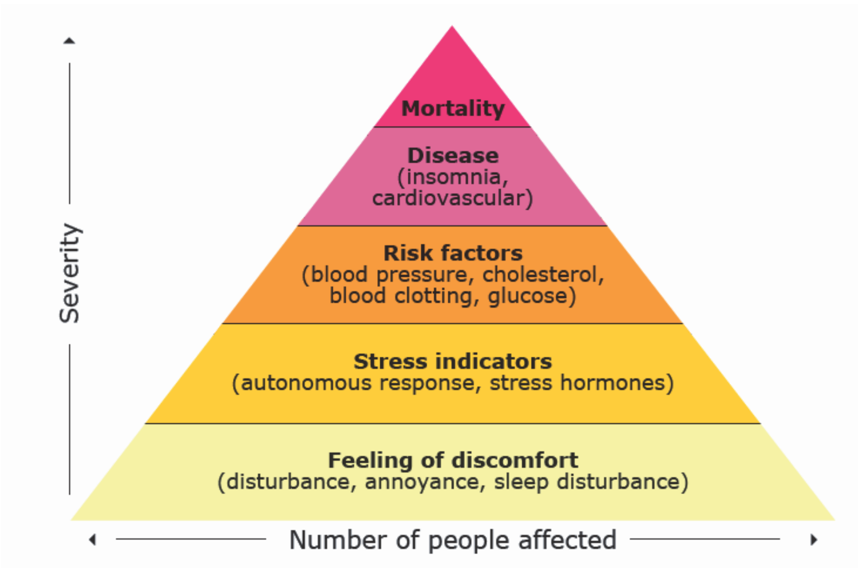


Figure 6-12 Pyramid of effects (WHO 1972 —modified); Source:EEAGoodpracticeguide(2010)

In contrast to many other environmental problems, noise pollution continues to increase. Traffic noise from roads, airports and railways is the most widespread source and increasingly recognized as a key environmental cause of physical and mental health impacts.

In the EU, around 210 million people are exposed to road traffic noise at levels exceeding 55 decibels. This number represents the annual average noise level during the day and night. At night, around one in five of the urban population in the European Union is exposed to levels exceeding 55 decibels over an 8 hour period.

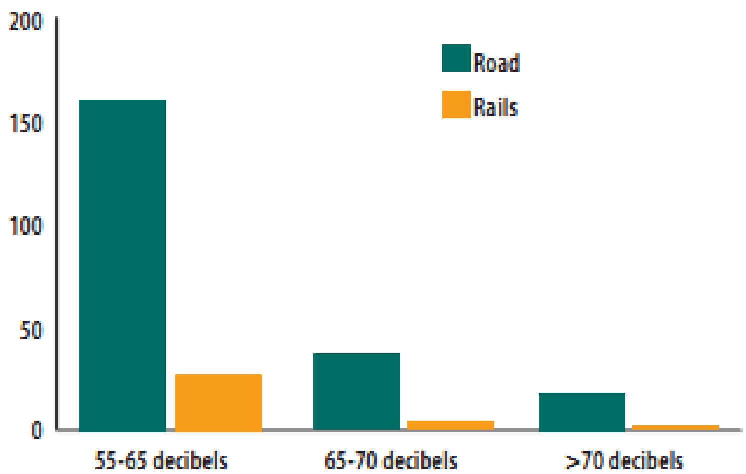


Figure 6-13 Number of people exposed (in millions) to road and rail traffic noise in 25 EU countries in 2000

Railway accounts for 10% of total emissions by transportation. Noise comes from the construction activities during the time the railway is constructed, and from operation activities, from the engine, the friction of wheels over the rails, and whistle blowing.

Vibration

Ground-borne vibration can be a serious concern for residents. The effects of ground-borne vibration include perceptible movement of building floors, interference with vibration sensitive instruments, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds.

Vibration consists of rapidly fluctuating motions. However, human response to vibration is a function of the average motion over a longer (but still short) time period, such as one second. In contrast to airborne noise, ground-borne vibration is not a phenomenon that most people experience every day.

The background vibration level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans, which is around 65 VdB.

Most perceptible indoor vibration is caused by sources within a building such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads.

Vibration as it relates to railway movements is generally caused by uneven interactions between the wheels of the train and the railway surfaces. Examples of this include wheels rolling over rail joints and flat spots on wheels that are not true. These uneven interactions result in vibration that travels through the adjacent ground. This vibration can range from barely perceptible to very disruptive.

The basic concept of the ground-borne vibration is presented in Figure *6-14*; the train wheels rolling on the rails create vibration energy that is transmitted through the track support system into the transit structure. The vibration of the transit structure excites the adjacent ground, creating vibration waves that propagate through the various soil and rock strata to the foundations of nearby buildings. The maximum vibration amplitudes of the floors and walls of a building often will be at the resonance frequencies of various components of the building. The ground-borne vibration is perceptible for people who are inside buildings, never annoying to people who are outdoors.

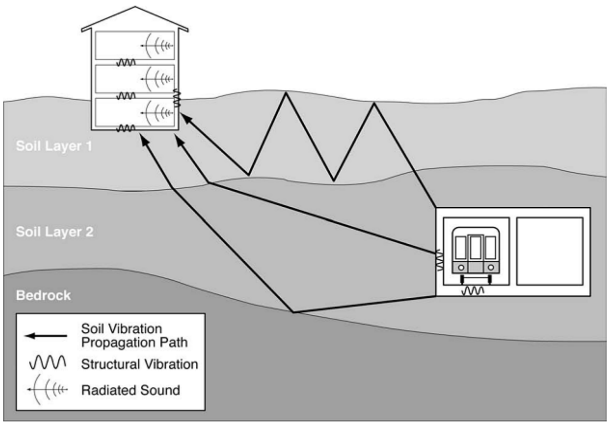


Figure 6-14 Propagation of ground-borne vibration into buildings

The following potential impacts on noise and vibration have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

<u>Construction phase</u>

- Impairment of acoustic quality due to noise emissions from construction vehicles and machinery.

Operation phase

- Impairment of acoustic quality due to train traffic noise emission;
- Annoyance to residents and damages to buildings due to vibrations from train traffic.

CONSTRUCTION PHASE

Impairment of acoustic quality due to noise emissions from construction vehicles and machinery

During the construction phase, different outdoor machinery and equipment is applied in the process, which cause rather high noise and vibration emissions to the environment, affecting the population inhabiting the surrounding area. The camps and the auxiliary areas will also be busy areas that will generate noise.

Noisy construction operations (earth movements, tunnels and bridges construction, demolition, dredging, production of gravel and concrete, transport of materials in and out the construction site, etc.) will take place in areas which are currently very quiet, with several small villages along the route.

Estimation of magnitude

The magnitude of the noise impact from the outdoor equipment will depend on the machinery, mechanization vehicles, transportation vehicles and tools intended to be used during construction works, their noise emission levels (noise specification of equipment should be declared by the manufacturer based on the noise certification), the location where the equipment will be positioned during the work, the number of the equipment used at one place at the same, and the distance from the sensitive receptors.

Table 6-54 shows average noise level specifications for the outdoor equipment most commonly used for different purposes in the construction of civil works. The different elements of this equipment usually will be dispersed along the alignment under construction and not all machines will work at the same time.

ype of equipment (extraction-discharge work)	Sound level (dB)A	Time of duration	Type of equipment (excavation –earth work)	Sound level (dB)A	Time of duration
Bulldozer	90	long-term	Distributor	83	long-term
Compressor	80	short-term	Finisher	83	long-term
Grader	83	long-term	Trampling machine	90	long-term
Water jet machine	87	long-term	Truck	85	linear
Truck	85	short-term	Watering machine	87	long-term
Trampling machine	90	long-term	Electrical welding machine	95	short-term
Drilling machine	85	short-term	Metal plate cutting machine	95	short-term
Concrete pump	110	short-term	Pneumatic drill	85	short-term

Table 6-54 Common used outdoor equipment during extraction and excavation works on railway projects with noise specifications

Because the noise energy dissipates in the air as it propagates, the noise levels will be attenuated as the distance to the source increases. Noise will also be dissipated by objects, walls, hills, buildings, etc. as well as by temperature and wind, but the attenuation due to distance is the primary estimator of the drop in noise level in an outdoor setting.

Considering the noise from the construction works at a given site as a point source, the attenuation of the noise level with distance can be estimated with the equation below:

Noise level at receptor = 20 Log10 (DS/DR)

Where DS is the reference distance to the source (normally 1 meter or 10 meters from the source emitting the sound) and DR is the distance between the source and the receptor.

This relationship can be simplified with the rule of thumb that the noise level drops 6 decibels when the distance doubles.

As an example, in table below noise level decreasing trend is presented as a result of increasing of the distance from the construction site (various construction activities) to the nearest noise receptors.

Distance from the construction site to the receptors [m]	Sound equivalent level [(dB) A}	Distance from the construction site to the calculation point [m]	Sound equivalent level [(dB) A}
40	81	40	73
60	78	60	71
80	76	80	68
100	74	100	66
200	68	200	60
300	64	300	57
400	62	400	54
500	60	500	52

Table 6-55 Noise levels at various distances from the construction site during ground extraction, transportation and earth work stage

In order to assess the noise impact during the construction works of the railway project, it has been taken into account that construction works in Section 1 will have a much lower intensity than construction works required for sections 2 and 3. This is, only rehabilitation works will be carried out, which will not require large equipment units generating high noise levels. The construction of the bridge across the Pcinja river (K.P. 24+768) may require more construction equipment, but no sensitive receptors are located in their proximity.

For Section 2, although all the cuttings and embankments have been constructed, several tunnels are still to be constructed and several bridges completed. These construction activities will require a substantial amount of earth movements needing heavy machinery and vehicles.

Section 3 is to be constructed over its entire length; therefore, heavy, noisy machinery will be required along the entire length of this section.

With these considerations, it has been assumed a value of 95 dB(A) at construction sites in Section 1.The same value has been assumed for Section 2, except in the areas where tunnels and bridges near sensitive receptors have to be constructed, where a value of 105 dB(A) has been assumed. This latter value has also been assumed for all Section 3. With these assumptions, the expected increases on noise levels at the locations of the most sensitive residential receptors living along the alignment (residents) have been calculated. *Table 6-56* shows the noise levels that would occur at each location and the increase in noise levels with respect to the existing noise levels.

It should be pointed out that the source noise level values in Section 2 have always been 95 dB(A) since the construction of the nearest tunnels or bridges will always occur at a distance greater than 1km from the receptor. As for the construction of train stations, a source noise level of 95 dB(A) is applied.

Receptor	Position along the alignment (km)	Baseline noise level dB(A)	Min distance/ Max distance to alignement (m)	Construction aspect	Estimated noise at constructio n site / receptor dB(A)	Expected noise level increase dB(A)
Section 1						
Chereskoselo	0.00	65	35/299		95 / 64-45	- /-
Lopate	03.00	65	20/75		95 / 69-57	4 /-
Rezanovce	04.50	65	10/130		95 / 75-53	>5 /-
Sredorek	08.50	65	20/52		95 / 69-61	4 /-
PeroCico	09.30	65	10/45		95 / 75-62	>5 /-
Proevce 1	10.20	65	13/57		95 / 73-60	>5 /-
Proevce 2	11.50	65	8/40		95 / 77-63	>5 /-
Kumanovo spa	17.00	48	32/32		95 / 65-65	>5 />5
ShupliKamen	19.00	40	10/79		95 / 75-57	>5 />5
Dovezance	28.00	40	25/43		95 / 67-62	>5 />5
Section 2						
Krilatica/Ketenovo	48.00	50	39/103	Bridge[1] 48+803 Tunnel 49+802 Kratovo Station 47+400	95 / 63-55	>5 /5
Odreno	52.00	35	25/60	Bridge[2] 54+400 0% Tunnel 52+948	95 / 67-59	>5 />5
Petralica	59.00	45	37/107	Bridge[2] 57+820 0% Tunnel 62+677 Ginovci station 58+100	95 / 64-54	>5 />5
T'liminci	67.00	40	70/110	Tunnel 64+364	95 / 58-54	>5 />5
Section 3						
K. Palanka 1	71.00	49	31/65	All	105 / 75-69	>5 />5
K. Palanka 2	72.00	60	15/55	All	105 / 81-70	>5 />5
K. Palanka 3	73.00	65	10/65	All	105 / 85-69	>5 /1
Zidilovo	81.00	70	10/60	All	105 / 85-69	>5 /-
[1] 50% superstructure to be completed [2] 100% to be completed (substructure and superstructure)						

Table 6-56 Estimated noise levels from construction activities for sensitive receptors in the railway alignment

The following rating scale is applied to assess the magnitude of the change in noise levels:

Noise change, $L_{A10,18h}$	Magnitude of Impact
0 – 0.9	Negligible/No Change
1 – 2.9	Low
3 – 4.9	Medium
5+	High

Table 6-57 Change in noise levels magnitude of impacts

It is observed, that for most of the receptors in any Section that live nearer to the railway alignment, the impact on noise from construction will be high. Only for the residents of Chereskoselo, in Section 1, the impact will be negligible. For the residents of Lopate and Sredorek, also in Section 1, will be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Impairment of the acoustic environment will occur because of the execution of construction works
Reversibility	Reversible	Noise levels will return to baseline levels when the construction works are over.
Geographic Extent	Local	Noise increases will be limited to the footprint of the project
Time when the impact occurs	Immediate	Noise levels will increase as soon as vehicles, machinery, equipment enter the construction site.
Duration	Short term	During the time construction works take place at a given location
Likelihood of appearance	Certain	Construction vehicles and equipment are sources of outdoor noise.
Magnitude	High	See above

Table 6-58 Assesment of impacts

Considering to the high sensitivity of receptors, according to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is Large.

OPERATIONAL PHASE

Impairment of acoustic quality due to train traffic noise emission

The most significant environmental effect of the railways is the noise caused by different sources. The most important source of noise from railways is rolling noise caused by wheel and rail vibrations induced at the wheel/rail contact. Roughness of the wheel and rail running surfaces induces vertical vibration of the wheel and rail systems according to their dynamic properties (shown in *Figure 6-15*). An illustration of the mechanism of generation of rolling noise and framework of source-path-receiver is presented in *Figure 6-16.*

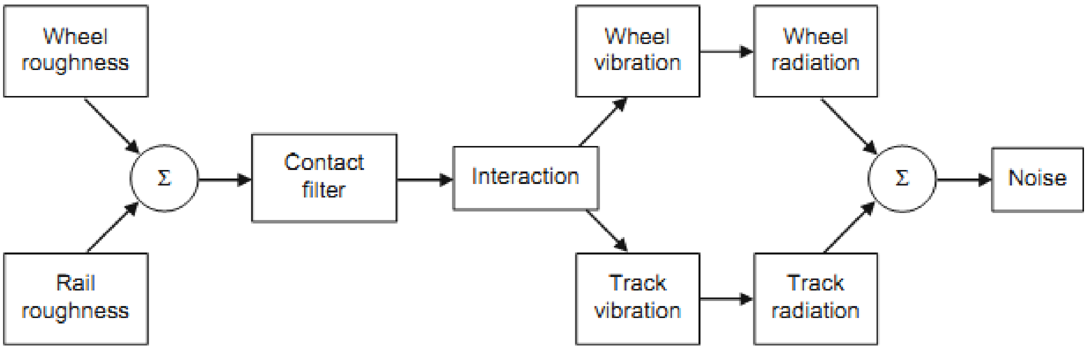


Figure 6-15 Generation of rolling noise

The wheels fitted with cast-iron brake blocks have large roughness, causing the wheel to vibrate and thus emit noise. The poor maintenance of the railway tracks could cause rough rails, further increasing noise level. The rolling noise increases with train speed (V) at a rate of about 30 log10 V, i.e. a 9 dB increase in sound level for a doubling of speed.

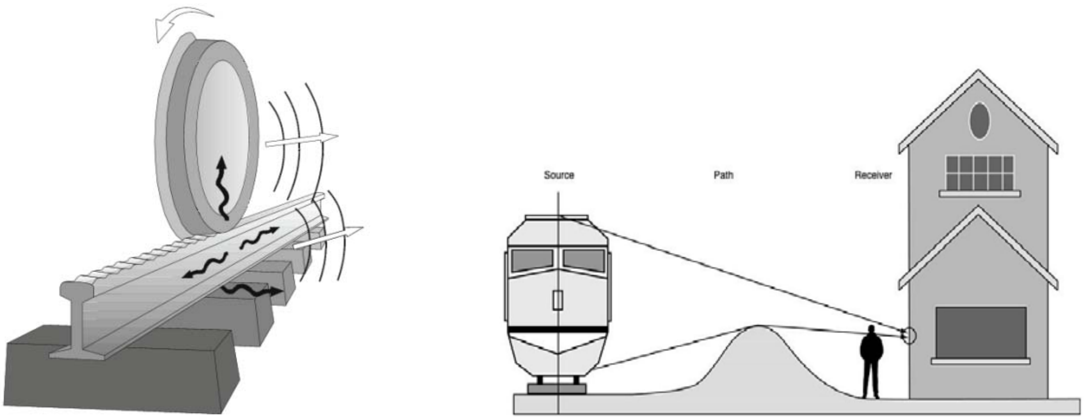


Figure 6-16 Illustration of the mechanism of generation of rolling noise and the source-path-receiver framework

The curve squeal noise is also caused by the interaction between wheel and rail, but it is strongly tonal and being associated with the vibration of the wheel in one of its resonances. A similar phenomenon is brake squeal in which tonal or multi-tonal noise is emitted during braking.

When a train runs over a bridge the noise (bridge noise) emitted can increase considerably (there are several bridges along the railway alignment), depending on the type of bridge. Steel bridges with direct fastenings are usually the noisiest and can be more than 10 dB noisier than plain ballasted track, in some cases up to 20 dB.

In contrast to most other railway noise sources which are caused by the radiation of sound by the vibration of solid structures, aerodynamic noise is caused by unsteady air flow over the train. Aerodynamic sources of noise generally increase much more rapidly with speed than mechanical sources, typically between 60 $\log_{10} V$ and 80 $\log_{10} V$.

Other sources of railway noise are: warning signals from trains (horns) and fixed installations (level crossings), track maintenance equipment and shunting noise (the noise from impacts between vehicles). Also the quality of materials used to manufacture brakes, dampers and the rail track is very important and has a great impact on the performance of the rail traffic, and to human health or environment in general.

Estimation of magnitude

The assessment of the noise impacts on the inhabited areas along the alignment requires a methodology which includes the identification of the current noise exposure levels in the settlements at risk, and modelling the potential future noise exposures taking into account the technical characteristics of the train operations.

The prediction of project noise exposures was made using the FTA-VA-90-1003-06 Transit Noise and Vibration Impact Assessment (Federal Transit Administration, U.S. Department of Transportation, 2006) and the 2007 Federal Transit Administration Noise Impact Assessment Software , taking into consideration the following technical specifications of the trains that will pass across the railway: a) speed of the trains, b) number of trains passing per day/per evening/per night, c) type of train (electrified/diesel traction DMU), d) braking system, e) type of wheels, f) type of land (soil category) and other characteristics.

It was also taken into consideration the two project stages:

- Stage 1. During the period mid 2015 – 2018, only section1 will be operational and the railway will operate with diesel traction from Kumanovo to Beljakovce in total length of 30.8 km.
- Stage 2. The railway will be entirely electrified along sections 1, 2 and 3 starting in 2019

Therefore, two separate noise models were prepared for Stage 1 (Section 1) and Stage 2 (sections 1, 2 and 3).

The data used in the modelling was as follows in the table below.

<table>
<tr><td colspan="2">Existing noise exposure</td><td colspan="2">The values of existing noise levels are based on field measurements performed in July 2011 and the data obtained from the Annual Environmental Report by the MEPP of Macedonia, 2010.</td></tr>
<tr><td colspan="2">Predicted noise exposure to recipient</td><td colspan="2">Values obtained by the FTA Noise impact software, 2007</td></tr>
<tr><td colspan="2">Noise source parameters</td><td colspan="2">Basic parameters for train operations</td></tr>
<tr><td colspan="2">Train configuration</td><td>passengers service</td><td>freight services</td></tr>
<tr><td colspan="2"></td><td>up to 16 daily passenger trains per direction</td><td>up to 10 daily freight trains per direction</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="2">Source type</td><td colspan="2">Fixed Guide way</td></tr>
<tr><td colspan="2">Specific source</td><td colspan="2">Diesel Multiple Unit (DMU)
Electric locomotive</td></tr>
<tr><td colspan="2">Number of trains passing in the noisiest hour</td><td colspan="2">1</td></tr>
<tr><td colspan="2">Train Speed (km/h)</td><td colspan="2">100</td></tr>
<tr><td rowspan="2">During daytime</td><td>Average number of wagons per train</td><td colspan="2">5</td></tr>
<tr><td>Average number of passing/hour</td><td colspan="2">1.74</td></tr>
<tr><td rowspan="2">During nighttime</td><td>Average number of wagons per train</td><td colspan="2">5</td></tr>
<tr><td>Average number of passing/hour</td><td colspan="2">0.43</td></tr>
<tr><td colspan="2">Distance from source to receiver (m)</td><td colspan="2">Different values for each settlement</td></tr>
<tr><td colspan="2">min</td><td colspan="2">5</td></tr>
<tr><td colspan="2">max</td><td colspan="2">110</td></tr>
<tr><td colspan="2">Number of house rows</td><td colspan="2">0-4</td></tr>
</table>

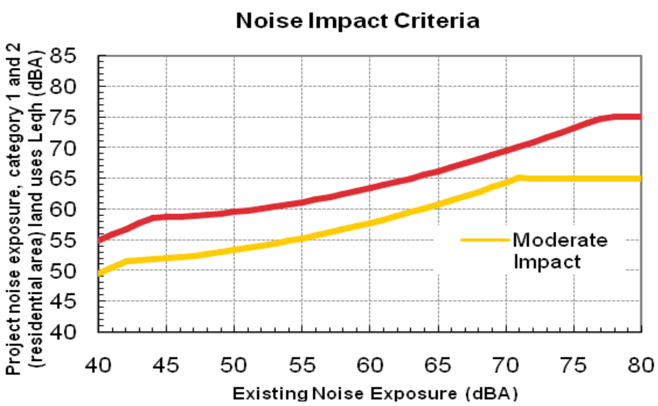
Table 6-59 Input Data for FTA Preliminary noise modelling

Tables below show the summary results of noise exposure levels at each sensitive receptor identified along the railway line.

The magnitude rate has been established according to the rating graphs provided in the FTA-VA-90-1003-06 Transit Noise and Vibration Impact Assessment for residential areas, and which are automatically generated by the software, as shown *Figure 6-17*.The categories used in this assessment method are no impact, moderate impact and severe impact.

In order to use the rating terminology in a consistent manner across the ESIA study, the following equivalence has been established between the two rating scales:

FTA-VA-90-1003-06	ESIA
No impact	Negligible/Low
Moderate impact	Medium
Severe impact	High



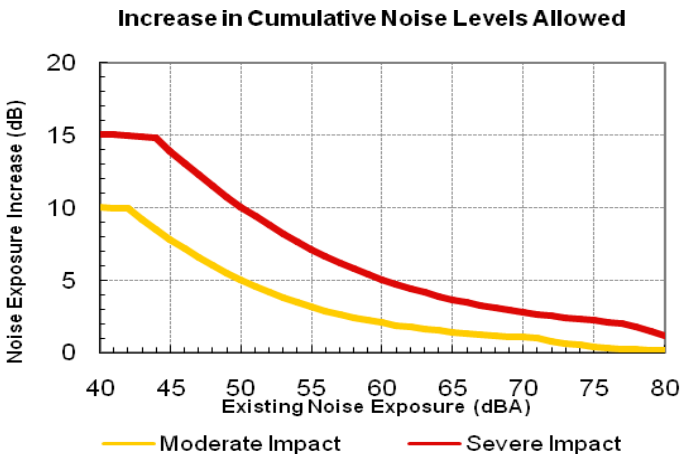


Figure 6-17 Noise impact criteria for transit projects / Figure 6-18 Increase in cumulative noise levels allowed for residential areas

Noise sensitive receptors/ Settlements	Distance to the first row buildings (m)	Project noise		Project noise impact exposure	Existing noise[1]	Total noise exposure	Increase of noise exposure	Magnitude of the Noise Impact
		Leq (day) dBA	Leq (night) dBA	Ldn dBA	Ldn dBA	**Ldn dBA**	dB	FTA VA 90 1003-06/ ESIA
Section 1								
Cheresko selo	35	53,4	47,7	55,5	65	**65**	0	None /Negligible
Lopate	20	57	51.3	59,2	65	**66**	1	None/Low
Rezanovce	10	61,5	55,9	63,7	65	**67**	2	Moderate/Medium
Sredorek	20	57	51,3	59,2	65	**66**	1	None/Low
Pero Cico	10	61,5	55,9	63,7	65	**67**	2	Moderate/Medium
Proevce 1	13	59,8	54,1	62	65	**67**	2	Moderate/Medium
Proevce 2	8	63	57,3	65,1	65	**68**	3	Moderate/Medium
Kumanovo spa	32	54	48,3	56,1	48	**57**	9	Moderate/Medium
Shupli Kamen	10	61,5	55,9	63,7	40	**64**	24	Severe/High
Dovezance	25	55,6	49,9	57,7	40	**58**	24	Severe/High

Table 6-60 Total noise exposure for high sensitive receptors along the railway alignment for Section 1 (Diesel Traction in the period mid 2015 – 2018)

Noise sensitive receptors/ Settlements	Distance to the first row buildings (m)	Project noise		Project noise impact exposure	Existing noise[2]	Total noise exposure	Increase of noise exposure	Magnitude of Impact
		Leq (day) dBA	Leq (night) dBA	LdndBA	LdndBA	**LdndBA**	dB	FTA VA 90 1003-06/ ESIA
SECTION 1								
Chereskoselo	35	59.3	53.6	61.5	65	**67**	2	Moderate/ Medium
Lopate	20	63	57.3	65.1	65	**68**	3	Moderate/ Medium
Rezanovce	10	67.5	61.8	69.6	65	**71**	6	Severe/High
Sredorek	20	63	57.3	65	65	**68**	3	Moderate/ Medium
PeroCico	10	67.5	61.8	70	65	**71**	6	Severe/High
Proevce 1	13	65.8	60.1	68	65	**70**	5	Severe/High
Proevce 2	8	68.9	63.3	71	65	**72**	7	Severe/High
Kumanovo spa	32	59.9	54.2	62	48	**62**	14	Severe/High
ShupliKamen	10	67.5	61.8	70	40	**70**	30	Severe/High
Dovezance	25	61.5	55.8	64	40	**64**	24	Severe/High
SECTION 2								
Krilatica/Kete	39	58.6	52.9	61	50	**61**	11	Severe/High

[1] The values of existing noise is based on field measurements performed in July 2011 and data obtained from the Annual Environmental Report by the MEPP of Macedonia, 2010

[2] The values of existing noise is based on field measurements performed in July 2011and data obtained from the Annual Environmental Report by the MEPP of Macedonia, 2010

Noise sensitive receptors/ Settlements	Distance to the first row buildings (m)	Project noise		Project noise impact exposure	Existing noise[2]	Total noise exposure	Increase of noise exposure	Magnitude of Impact
		Leq (day) dBA	Leq (night) dBA	LdndBA	LdndBA	LdndBA	dB	FTA VA 90 1003-06/ ESIA
novo								
Odreno	25	61.5	55.8	64	35	**64**	29	Severe/High
Petralica	36.5	59	53.3	61	45	**61**	16	Severe/High
T'liminci	70	54.8	49.1	57	40	**57**	17	Severe/High
Section 3								
K. Palanka 1	31	60.1	54.4	62	49	**62**	13	Severe/High
K. Palanka 2	15	59.3	53.6	61.5	60	**64**	4	Moderate/ Medium
K. Palanka 3	5	72	66.3	74.1	65	**75**	10	Severe/High

Table 6-61 Total noise exposure for high sensitive receptors along the railway alignment

The data presented in *Table 6-60* and *Table 6-61* show that for all the sensitive receptors along the railway alignment, the predicted noise value will be higher than the national thresholds for areas with degree of noise protection I and II to which the receptor areas belong (see *Table 6-62*).

Area defined by the degree of noise protection	Noise level(dB)		
	L_d	L_e	L_n
Area of first degree (hospitals, national parks, schools)	50	50	40
Area of second degree (residential area)	55	55	45
Area of third degree(mixed-residential and commercial area)	60	60	55
Area of fourth degree(industrial area)	70	70	60

Table 6-62 National noise levels allowed for various areas

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Stage 1 (Section 1)

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Impairment of the acoustic environment will occur because of the traffic of trains
Reversibility	Reversible	Noise levels should return to baseline levels when the railway operations stop
Geographic Extent	Local	Noise increases will be limited to the footprint of the project

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Time when the impact occurs	Immediate	Noise levels will increase as soon as the railway traffic starts.
Duration	Long term	During the operational life of the railway
Likelihood of appearance	Certain	Train traffic is a major source of noise
Magnitude	Medium	See *Table 6-60*

Table 6-63 Assesment of impact

Considering the high sensitivity of the receptors (residential areas and one health care area), according to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Moderate to Large.

Stage 2 (Sections 1, 2 and 3)

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	Impairment of the acoustic environment will occur because of the traffic of trains
Reversibility	Reversible	Noise levels should return to baseline levels when the railway operations stop
Geographic Extent	Local	Noise increases will be limited to the footprint of the project
Time when the impact occurs	Immediate	Noise levels will increase as soon as the railway traffic starts.
Duration	Long term	During the operational life of the railway
Likelihood of appearance	Certain	Train traffic is a major source of noise
Magnitude	High	See *Table 6-61*

Table 6-64 Assesment of impact

Considering the high sensitivity of the receptors (residential areas and one health care area), according to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is Large.

Annoyance to residents and damages to buildings due to vibrations from train traffic

The root mean square (RMS) amplitude of a motion over a one second period is commonly used to predict human response to vibration. For convenience, decibel notation is used to describe vibration relative to a reference level. In this assessment, vibration decibels (VdB) relative to a reference of 10^{-6} inches per second (1 µin/sec) are used.

Figure 6-19 illustrates the different levels of human and structural responses to increasing vibration levels at a distance of approximately 15 meters from the source of vibration. The background vibration velocity level in residential areas is usually 50 VdB or lower, below the threshold of perception for humans, which is around 65 VdB. Although the perceptibility threshold is about 65 VdB, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Residential annoyances for the category "infrequent events", where most rapid transit projects fall into, is around 80 VdB. Minor cosmetic damages in fragile buildings may occur at vibrations velocity levels of 100VdB.

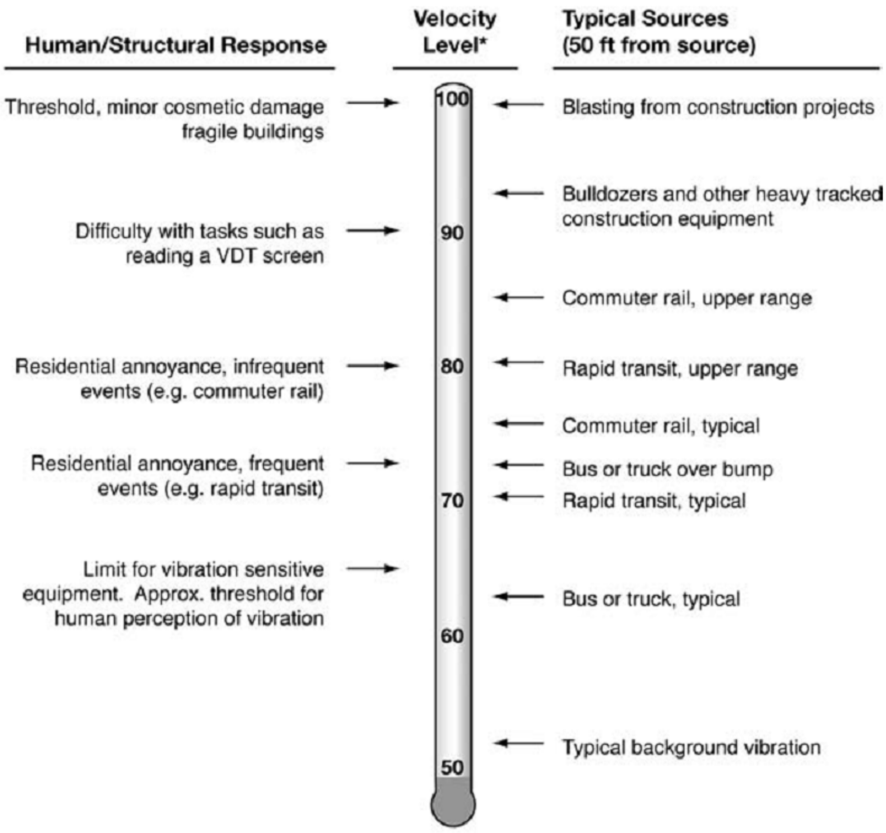


Figure 6-19 Typical levels of ground-borne vibration (FTA Transit Noise and Vibration Impact Assessment Manual, 2006)

Recommended threshold vibration velocity levels for various types of land uses are provided in table below.

Land use category	Ground-born Vibration (GBV) Impact Level (V dB) relative to 1 micro-inch/sec)		
	Frequent events (more than 70 vibration events of the same source per day)	Occasional events (between 30-70 vibration events of the same source per day)	Infrequent events (fewer than 30 vibration events per day)
Category 1: Building where vibration would interfere with interior operations (vibration-sensitive research and manufacturing, hospitals using vibration-sensitive equipment and university research operations)	65 V dB	65 V dB	65 V dB
Category 2: Residences and buildings where people normally sleep such as hotels and hospitals	72 V dB	72 V dB	80 V dB
Category 3: Institutional land with primarily daytime use (schools, churches and other institution	75 V dB	78 V dB	83 V dB

Table 6-65 Ground-born vibration (FTA Transit Noise and Vibration Impact Assessment Manual, 2006)

Estimation of magnitude

A very simple estimation on the magnitude of the vibration impact has been made using the chart on prediction of ground-borne vibration from train systems presented in the FTA Transit Noise and Vibration Impact Assessment Manual.

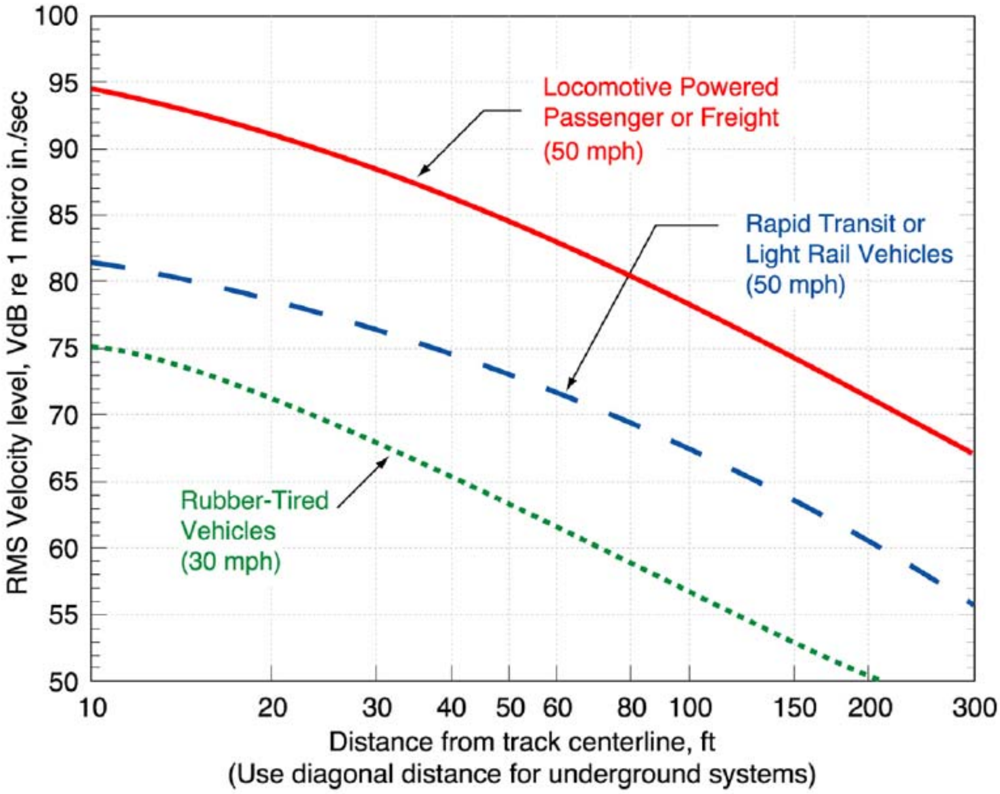


Figure 6-20 Predicition of ground-borne vibration from train systems (FTA Transit Noise and Vibration Impact Assessment Manual, 2006)

With this chart the approximate threshold distances at which a given type of response to vibration occurs has been calculated. The types of response considered and the distances at which these responses occur are presented in the following table. A magnitude rating has also been assigned to each response.

Response to vibration	Threshold distance (m)	Magnitude
Vibration is not perceptible	>300	Negligible
Vibration is perceptible, but not annoying	27-300	Low
Vibration causes annoyance	15-27	Medium
Potential structural damages to building	<15	High

Table 6-66 Threshold distances for vibration human and structural responses

The results obtained after applying the threshold distance criterion to the vibration receptors along the railway alignment are presented in the table below.

Receptor	Position along the alignment (km)	Estimated baseline velocity vibration level (V dB)	Minimum distance (m)	Estimated human/structural response	Magnitude
Section 1					
Chereskoselo	0.00	50	35	Perceptible	Low
Lopate	03.00	50	20	Annoyance	Medium
Rezanovce	04.50	50	10	Potential damages to buildings	High
Sredorek	08.50	50	20	Annoyance	Medium
PeroCico	09.30	50	10	Potential damages to buildings	High
Proevce 1	10.20	50	13	Potential damages to buildings	High
Proevce 2	11.50	50	8	Potential damages to buildings	High
Kumanovo spa	17.00	50	32	Perceptible	Low
ShupliKamen	19.00	50	10	Potential damages to buildings	High
Dovezance	28.00	50	25	Annoyance	Medium
Section 2		50			
Krilatica/Ketenovo	48.00	50	39	Perceptible	Low
Odreno	52.00	50	25	Annoyance	Medium
Petralica	59.00	50	37	Perceptible	Low
T'liminci	67.00	50	70	Perceptible	Low
Section 3		50			
K. Palanka 1	71.00	50	31	Perceptible	Low
K. Palanka 2	72.00	50	15	Potential damages to buildings	High
K. Palanka 3	73.00	50	10	Potential damages to buildings	High
Zidilovo	81.00	50	10	Potential damages to buildings	High

Table 6-67 Estimated response to vibrations and magnitude of the impact for the receptors along the railway corridor

The overall magnitude for the impact is estimated as medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Type of Impact	Direct	The vibrations producing the effects are generated by the train traffic
Reversibility	Irreversible	In severe cases of health effects derived of annoyance and damages to buildings
Geographic Extent	Local	Noise increases will be limited to the footprint of the project
Time when the impact occurs	Immediate	Perception and annoyance from vibrations start with train operations
Duration	Long term	During the operational life of the railway
Likelihood of appearance	Certain	Train traffic is a major source of vibrations and the houses are very close to the railway
Magnitude	Medium	See above

Table 6-68 Assesment of impact

Considering the high sensitivity of the receptors (residential areas and one health care area), according to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is Moderate to Large.

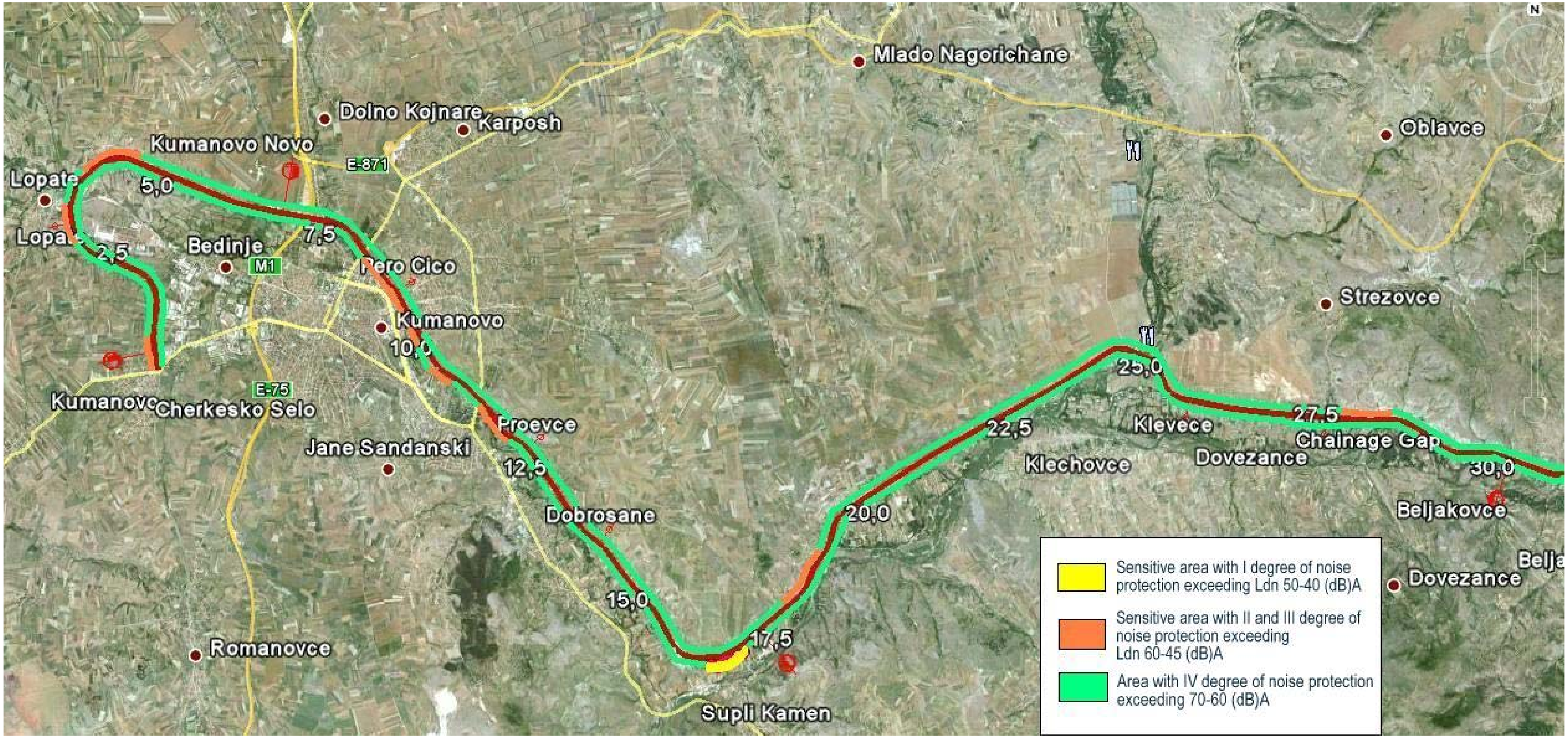


Figure 6-21 Noise high sensitive settlements in Section 1

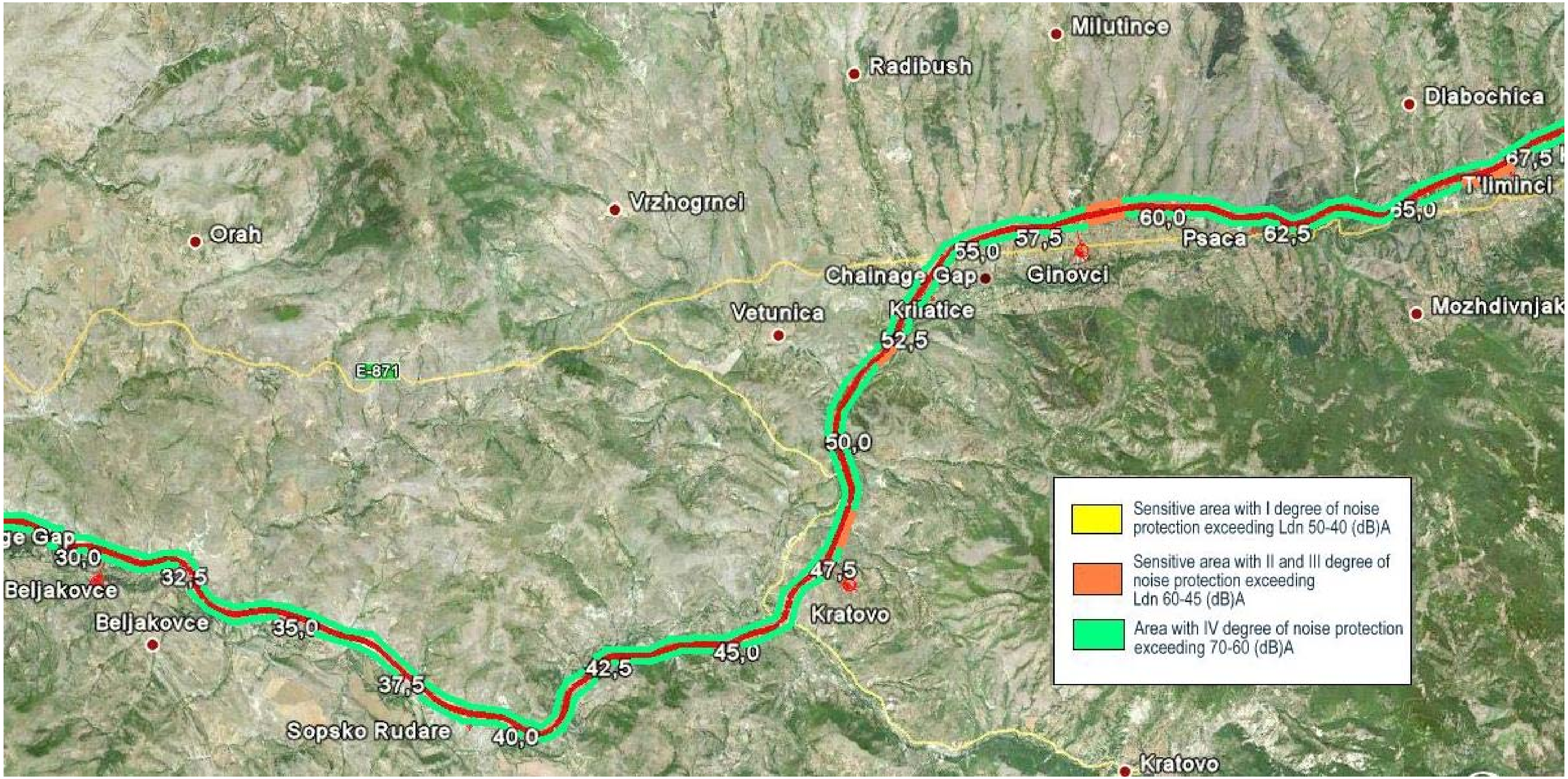


Figure 6-22 Noise high sensitive settlements in Section 2

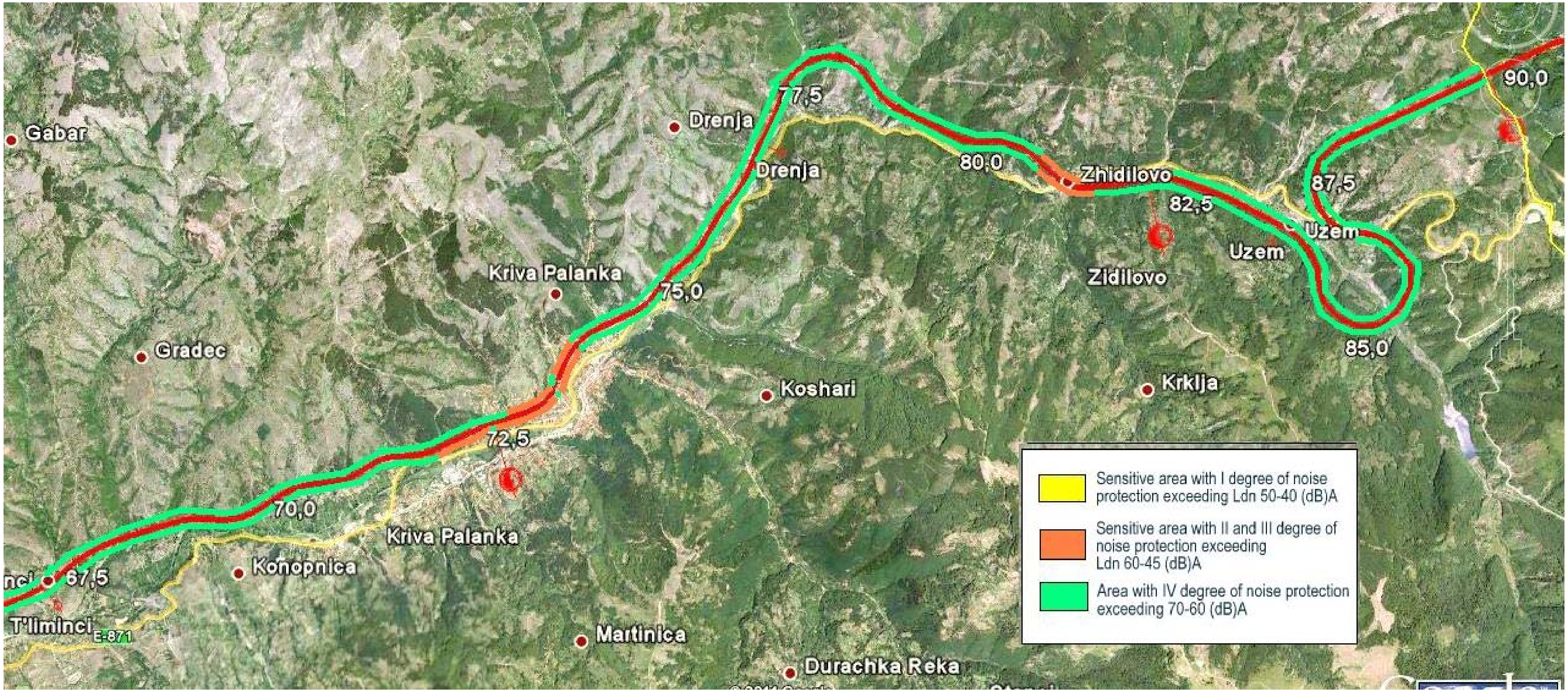


Figure 6-23 Noise high sensitive settlements in Section 3

6.2.7 POTENTIAL IMPACTS ON HABITATS

6.2.7.1 ASSESSMENT OF HABITATS' SENSITIVITY

Methodology for assigning habitats'sensitivity

Based on the description of current situation of biodiversity (habitats and related species) in *Chapter 5.1.7*, and using nationally and internationally recognized criteria, the sensitivity of habitats was assessed. In order to facilitate the subsequent assessment of the impacts on habitats of railway construction and operation, the most sensitive, valuable sites were then highlighted with regards to their natural or human induced values.

Habitat's sensitivity was assessed using a matrix that was specifically designed for this purpose. The matrix was used to evaluate the sensitivity of natural habitats and also that of those of an anthropogenic origin. In order to generate the matrix, the ecosystems/sites (presented in the rows of the matrix table) were evaluated against the criteria (presented in the columns of the matrix table).

Twelve different criteria were applied in order to evaluate the sensitivity of the habitats:

1. Habitat Directive (habitats);
2. Rare communities in Macedonia;
3. Well preserved natural communities;
4. Presence of species from IUCN Global Red List;
5. Presence of species important for Europe (Habitat Directive);
6. Presence of threatened birds;
7. Presence of endemic species;
8. Biocorridor function;
9. Landscape value;
10. Economic value;
11. Erosion prevention;
12. Pollution prevention value.

The criteria were selected in order to demonstrate national and international (European and global) importance of the habitats and their species composition as it can be found in the area of the project interest. The highest criteria values can be applied to the habitat, the more sensitive it will be. The description of the criteria is as follows:

> Criterion 1 - Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). The list of important habitats is given in Annex I - Natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
>
> Criterion 2 - Rare communities in Macedonia. Rareness of the community was estimated on the basis of experts' experience and current knowledge about distribution of the community.
>
> Criterion 3 - Well preserved natural communities. The degree of naturalness, i.e. the extent of human intervention and land use pattern was evaluated on the basis of expert judgment.
>
> Criterion 4 - Presence of species listed in IUCN Global Red List. The number of species listed on IUCN Global Red List in the habitat determines the value. The categories of the IUCN Red List used for this purpose are Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).
>
> Criterion 5 - Presence of species important for Europe. This criterion takes into account Habitats Directive. The important species in Habitats Directive are listed in Annex II - Animal and plant

species of community interest whose conservation requires the designation of special areas of conservation, and Annex IV - Animal and plant species of community interest in need of strict protection.

Criterion 6 - Presence of threatened birds. This criterion is based on several conventions. Birds were evaluated separately as they are treated as so in EU legislation and several international conventions. The following conventions were taken into account:

A. Bird Directive - Council Directive 79/409/EEC on the conservation of wild birds (Annex I - Species of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution; Annex II);
B. Bonn Convention: Appendix I - Species threatened by extinction; Appendix II - Migratory species conserved through Agreements;
C. SPEC - Species of European Conservation Concern (for birds only);
D. European Threat Status (ETS)

Criterion 7 - Presence of endemic species. This criterion evaluates the number of endemic species present in the habitat. The score presented in the matrix table is the average of the scores for endemic species of flora and fauna.

Criterion 8 – Biocorridor function. This criterion is related to migration movement of animals (and wild plants) throughout the landscape. It evaluates the size and growth pattern of the habitat patches as well as naturalness of the habitat. Natural, dense and old forests that cover large areas will have greatest value (natural stands – offer more food resources to animals). Natural grasslands in forested areas were also considered important since they serve as foraging habitats for ungulates.

Criterion 9 - Landscape value. The landscape value was estimated based on several characteristics: structural and functional importance of certain landscape, aesthetic value, rarity in Macedonia etc.

Criterion 10 - Economic value. The importance of the ecosystem for human economy is considered in this criterion. The most important economic values in the project area concern forestry, water potential and livestock breeding.

Criterion 11 - Erosion prevention. One of the important features for the preservation of the natural conditions is the erosion prevention potential of the habitat. The presence of natural riparian vegetation in natural streams is considered as erosion preventive.

Criterion 12 - Pollution prevention value. The absorption capacity for pollutants is a very important feature of the ecosystems. The evaluation was based on expert judgment.

For each criterium, a scoring value from 0 to 3 was applied, with the following meaning:

0. - No occurrence/importance
1. - Low occurrence/importance
2. - Medium occurrence/importance
3. - High occurrence/importance

The sum of scores for a habitat determines its sensitivity. The highest possible score is 36. The rating of sensitivity was performed on the basis of the following ranges:

0 - 3 - negligible sensitivity (ns)

4 - 9 - low sensitivity (ls)

10-17 - medium sensitivity (ms)

18-27 - high sensitivity (hs)

28-36 - very high sensitivity (vhs)

The sensitivity of natural, seminatural and anthropogenic habitats was assessed according to the described methodology. The results are presented in table below.

HABITATS	Habitat Directive	Rare communities in Macedonia	Well preserved natural communities	Presence of species on IUCN Red List	Presence of species important for Europe	Presence of threatened birds	Presence of endemic species	Biocorridor function	Landscape value	Economic value	Erosion prevention	Pollution prevention value	SUM	Sensitivity
Xerothemophilous oak forests	3	0	1	1	1	1	1	2	1	1	2	2	16	ms
Degraded xerothemophilous oak forests	1	0	0	1	1	1	1	1	0	0	1	1	8	ls
Thermophilous oak forests	1	0	2	1	1	1	1	3	2	2	2	2	18	hs
Degraded thermophilous oak forests	0	0	0	1	1	1	1	1	1	1	1	1	9	ls
Mesophilous oak forests	1	0	2	1	1	1	1	3	3	3	2	2	20	hs
Degraded mesophilous oak forests	0	0	0	1	1	1	1	2	2	1	1	2	12	ms
Forested ravines and dales	0	0	1	0	1	0	0	1	1	1	2	1	8	ls
Submontane beech forest	3	0	2	1	1	0	2	3	3	3	3	3	24	hs
Riparian willow-poplar woodland	3	1	3	2	2	1	0	3	3	1	3	3	25	hs
Riparian willow-poplar belts	2	0	1	2	2	0	0	2	3	0	2	2	16	ms
Riparian scrub communities - Tamarisk shrubland	3	2	1	1	2	1	0	2	2	0	2	2	18	hs
Gravely and sandy river banks	1	0	1	1	1	1	0	0	1	0	0	1	7	ls
Hill pastures	3	0	3	2	2	3	2	0	1	2	1	1	20	hs
Hill Pastures with sparse shrubs	3	0	1	2	2	2	2	1	1	1	1	1	17	ms
Hill pastures on stony sites	3	0	2	2	2	2	2	0	2	1	0	0	16	ms
Unmanaged mesic grasslands	0	0	2	1	2	1	1	1	2	2	2	1	15	ms
Rocky and stony areas - hasmophytic vegetation	2	0	1	1	1	2	1	0	3	2	0	0	13	ms
Rivers and streams - epipotamal and hiporhitral streams	2	0	2	3	3	0	1	2	3	2	1	2	21	hs
Montane streams - Metarhitral streams	2	0	2	3	3	0	1	1	2	2	1	2	19	hs
Intermitent streams - ravines	2	0	1	2	3	0	1	2	1	1	2	2	17	ms
Artificial ponds	0	0	0	3	3	1	0	1	1	1	2	2	14	ms
Reedbeds (not mapped)	0	0	0	2	1	1	0	1	1	1	2	2	11	ms
Black locust stands and	0	0	0	1	1	0	0	2	0	1	3	2	10	ms

HABITATS	Habitat Directive	Rare communities in Macedonia	Well preserved natural communities	Presence of species on IUCN Red List	Presence of species important for Europe	Presence of threatened birds	Presence of endemic species	Biocorridor function	Landscape value	Economic value	Erosion prevention	Pollution prevention value	SUM	Sensitivity
plantations														
Black Pine plantations	0	0	0	1	1	0	1	2	0	2	2	2	11	ms
Mixed Conifer-Black Locust plantations with oaks	0	0	0	1	1	0	1	2	1	2	3	3	14	ms
Small broadleaf plantations	0	0	0	0	0	0	0	1	1	2	2	2	8	ls
Tree lines and belts	0	0	0	0	1	1	0	2	1	1	2	1	9	ls
Meadows – mesophilous	3	2	2	1	1	1	1	1	2	3	2	2	21	hs
Wet meadows	0	3	2	2	1	1	0	1	2	3	3	2	20	hs
Abandoned fields, ruderal and trampled sites	0	0	0	0	0	1	0	0	0	1	1	1	4	ls
Fields and acres	0	0	0	0	0	1	0	0	1	3	1	1	7	ls
Orchards and vineyards	0	0	0	0	0	1	0	1	2	3	2	2	11	ms
Parks	0	0	0	0	0	0	0	1	1	1	2	2	7	ls
Rural settlements - villages and gardens	0	0	0	0	1	0	0	0	3	3	2	0	9	ls
Urban settlements	0	0	0	0	0	0	0	0	1	3	1	0	5	ls
Urbanized areas - roads and railway line	0	0	0	0	0	0	0	0	0	3	0	0	3	ns

Table 6-69 Sensitivity estimation matrix

It is important to note that there are no habitats of a very high sensitivity (vhs) present along the railway corridor. In the following paragraphs high sensitive (hs) habitats are briefly described below (the reference for the full description of the habitat in chapter 5 is given in brackets) since project affections to these more sensitive habitats are likely to have a greater incidence with regards to the assessment of the impacts on habitats. Medium sensitive (ms) and low sensitive habitats (ls) will not be treated in such detail, notwithstanding they will be taken into account. High sensitive and medium sensitive habitats are marked with hachures in the habitat map (Appendix IV).

Mesophilous oak forests - forest of flowering ash and sessile oak

Sessile oak forest habitat has low significance at European scale and it has moderate importance as far as biodiversity is concerned (presence of rare, endemic and threatened species). The high sensitivity of this forest habitat comes mostly from its economic, pollution prevention and erosion prevention value (20 points in total). Major conflict with the project intention is the need of forest cut - destruction the habitat.

Submontane beech forest

Beech forest habitat is one of the most sensitive habitat types in the whole railway corridor. It is an important habitat type from a European perspective (EU HD Annex I habitat). It harbors important species, but it also has great economic, pollution prevention and erosion prevention values. Thus, it is very sensitive to destruction and fragmentation (24 points in total). The conflict will be high in the area where the railway crosses this forest type.

Riparian willow-poplar woodland

Riparian willow and poplar forests in their natural appearance are very rare habitat type in Europe, due to melioration and canalization of the rivers in the past. It is also a rare habitat in Macedonia, but in the railway corridor numerous patches have been left undisturbed. At some parts of the corridor, this habitat creates long continuous belts along the Kriva river. Willow and poplar forests support a significant number of rare species in Macedonia and threatened species in Europe. It has also high pollution prevention and erosion prevention values (25 points in total). Thus, it is very sensitive to any kind of disturbance and destruction. The most important stands of this habitat along the railway corridor are along Pchinja river and some parts of the Kriva river (see *Habitat map, Annex 5*).

Hill pastures

Hill pastures in the area of the railway corridor are characterized by dry grassland vegetation. Dry grassland on silicate ground is a habitat type that is threatened in Europe. On the other hand, it has a significant biodiversity value since it harbors considerable numbers of important species on European and global scales. Although not very important from economic and erosion prevention perspectives, it is very sensitive to anthropogenic activities (20 points in total).

Rivers and streams - Epipotamal and hiporhitral streams

Well preserved and clean watercourses are important habitats on a European scale. Their sensitivity (21 point in total) to destruction and pollution comes from their biodiversity importance (they harbor endangered and protected species on European and global scales), but also from their significant economic value, both direct (for irrigation and drinking water) and potential (green energy resource).

Montane streams - Metarhitral streams

Fast flowing streams of the lower mountain zone are usually well preserved and still possess high biological values. Their gravely bottom represents important biotope for rare, endemic and threatened invertebrates, especially water insects (dragon flies, mayflowers and others) and various algal species (diatoms in particular). Besides, they have a high economic value (especially as drinking water resources). Due to all of the above, they are habitats with a high sensitivity to any kind of disturbance and destruction (19 points in total).

Meadows – mesophilous

Meadows on hills and montane zones of the area of Kriva Palanka possess a high biodiversity value (21 points in total) due to the presence of rare and internationally important species. They also have high economic value. They have become rare in Macedonia (2 points) due to the abandonment of the traditional agricultural practices (extensive cattle breeding and mowing of the hay meadows). Thus, they are considered as a threatened habitat type in Europe and in Macedonia. According to this, sub-montane meadows are very sensitive habitat types, sensitive to disturbance and destruction. A detailed distribution of these meadows is presented on the Habitat map, in Annex 5.

Wet meadows

This type of meadows is distributed in lowland part of the railway corridor, in the Kumanovo area, but also along the Kriva river up to Kriva Palanka. They are also faunistically and floristically very rich and possess a high biodiversity value (20 points in total). However, they are very scarce in the surrounding agricultural landscape and there are not many of them left in the area of the project interest. According to this, lowland meadows are very sensitive habitat types, sensitive to disturbance and destruction.

Other medium sensitive habitats

Numerous habitats along the railway corridor possess a high biodiversity value. Medium sensitive natural and semi-natural habitats are: xerothemophilous oak forests, thermophilous oak forests, degraded mesophilous oak forests, riparian scrub communities - tamarisk shrubland, rocky and stony areas - chasmophytic vegetation, unmanaged mesic grasslands, intermittent streams – ravines, artificial ponds and reedbeds. High valuable anthropogenic habitats (medium sensitivity to disturbance) in the railway corridor are: black locust stands and plantations, black pine plantations, mixed conifer-black locust plantations with oaks, orchards and vineyards. Their value comes mostly from their high economic value.

6.2.7.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on habitats have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Habitats loss
- Temporary severance of riparian biocorridors

Operation phase

- Habitats fragmentation

CONSTRUCTION PHASE

Habitats Loss

The construction of the railway tracks involves the clearance of the land strip necessary to lay the rail track with its substructural and superstructural objects. Also, the construction of the train stations will require the clearance of the terrain where the station and platforms will be installed. This means the elimination of the vegetation cover and earth movements to prepare the corridor for the laying down of the track and, therefore, the destruction and loss of the habitats along the land strip along the railway line. In addition, there will be land temporarily used for the installation of construction camps were vegetation will also be cleared and earth movements carried out.

Because Section 1 is already constructed and construction works at Stage 1 will not involve major land clearance, the impact on habitat loss has focused on Stage 2 of the project, and particularly in Section 3, where no railway construction works have ever been conducted and habitats have not been disturbed, on one hand, and where most of the most sensitive habitats concentrate.

Estimation of magnitude

The magnitude for the Loss of Habitat impact will be estimated by determining the total surface of high sensitive and medium sensitive habitats that is intersected by the railway line.

With regards to the high sensitive habitats, the broad railway corridor comprises the following habitats: Beech forest, Mesophilous oak forest, Riparian willow-poplar woodland, Hill pastures, Rivers and streams, Mesophilous meadows, and Wet meadows. Of these habitats, all of them will be intersected by the railway track, except for the riparian forests and belts along the rivers and streams.

In the case of riparian forests, these habitats are distributed in sections 1 and 2 of the alignment, where the railway has already been constructed or the majority of the earth works are already finished, and where no occupation of new land where this kind of habitat exist is anticipated. As for the belts along the rivers and streams, these habitats will be crossed by means of bridges and although there may be some occupation of these habitats to build these structures, it has been considered that the surface occupied will be negligible. Moreover, this type of habitat will be thoroughly considered in the impact on Temporary severance of corridors.

For certain types of habitats like Hill pastures, it has been taken into account that although the railway route stretches through a large portion of different types of hill pastures: dry grasslands, grasslands with shrubs and grasslands on stony and rocky ground, most of these are encountered at parts of the alignment where the railway is already constructed (Section 1) or the earth works for setting the railway are almost finished in a large portion of the alignment (Section 2). It has been considered, anyhow, that some additional destruction or damage of this habitat may still occur in the close vicinity of the railway due to the extension of the construction sites, land occupation with construction materials, storage sites, or operation of the construction machinery. A 20% additional destruction/damage of this habitat has been estimated that may occur for the purpose of calculating the total surface affected.

Direct contact of the railway alignment with mesophilous meadows is not likely to occur. However, at certain points of the alignment these lay under a projected bridge or very close to the railway line (km 74+500, 76+700, 80+050, km 51+200). Potential destruction of this type of habitat could occur from land occupation with construction materials, storage sites, operation of construction vehicles and machinery, setting bridge pillars.

The medium sensitive habitats present in the railway corridor include: Xerothemophilous oak forests, Thermophilous oak forests, Degraded mesophilous oak forests, Riparian scrub communities - tamarisk shrubland, Rocky and stony areas - chasmophytic vegetation, Unmanaged mesic grasslands, Intermittent streams – ravines, artificial ponds and reedbeds, Black locust stands and plantations, Black pine plantations, Mixed conifer-black locust plantations with oaks, and Orchards and vineyards.

All of these medium sensitive habitats will be intersected by the railway line except for Tamarisk shrublands. There are well preserved tamarisk communities in the region and in the railway corridor, but these under already constructed high viaducts.

With regards to the Rocky areas with chasmophytic plant communities, the earth works in the areas where this habitat is present were already performed 15 years ago. Since no changes of the alignment are foreseen, no additional destruction of this habitat should occur in these steep areas.

The magnitude of the impact Loss of Habitat has been quantified through the equivalent surface of lost habitat indicator. For this, it has been considered the following set of weighing factors for the different categories of habitats sensitivities, derived from the ranges of scores to determine the sensitivity category:

Habitat sensitivity category	Weighting factor
Very high	1
High	0,75
Medium	0,5
Low	0,25

Thus, the equivalent surface of a medium sensitive habitat is half of that of the very high sensitive habitat.

For calculating the actual surface of loss habitat, it has been estimated a 10 meter wide land strip occupied by the railway facility.

Forest type	Railway chainage	Length impacted (m)	Surface (ha)	Weight factor	Equivalent surface (ha)
High sensitive habitats					
Beech forest	Km 82-83	650	0.65	0.75	0.4875
Mesophilous oak forest	Km 76+800	*70*	*0.07*		
	Km 80-81	*520*	*0.52*		
	Km 81-82	*650*	*0.65*		
	Total	1,240	1.24	0.75	0.930
Hill pastures	Km 29-54	7,300	*1.40	0,75	1.095
Meadows – mesophilous	Km 51+200-51+300 Km 74+500	50	0.05	0.75	0.375

Forest type	Railway chainage	Length impacted (m)	Surface (ha)	Weight factor	Equivalent surface (ha)
Wet meadows	Km 18+700 Km 41+500	75	0.075	0.75	0.056
Medium sensitive habitats					
Mesophilic grasslands	km 86+600-87+000	100	0.10	0.5	0.050
Degraded mesophilous oak forest	Km 86-87+300	700	0.70	0.5	0.035
Degraded mesophilous oak forest	Km 86-87+300	*70*	*0.07*		
	Km 67+500	*50*	*0.05*		
	Km 76-77	*300*	*0.30*		
	Km 78	*100*	*0.10*		
	Total	520	0.52	0.5	0.260
Degraded thermophilous oak forest	Km 73+600-75+500	600	0.60	0.5	0.300
Xerothermophilous oak forest	Km 62+700-64+500	50	0.05	0.5	0.025
Degraded xerothermophilous oak forest	Km 66+500-67+000	*400*	*0.40*		
	Km 69+800-70+250	*300*	*0.30*		
	Total	700	0.70	0.5	0.35
Black pine plantations	Km 68-69	*500*	*0.50*		
	Km 69-70	*470*	*0.47*		
	Km 70-71	*300*	*0.30*		
	Km 75+800	*150*	*0.15*		
	Total	1420	1.42	0.5	0.710
Black locust plantations	Km 67-69	*400*	*0.40*		
	Km 70-71	*250*	*0.25*		
	Total	650	0.65	0.5	0.325
Mixed anthropogenic plantations	Km 78-79	780	0.78	0.5	0.250
TOTAL EQUIVALENT SURFACE AREA OF LOST HABITAT					**4.911**
*habitat already disturbed by construction works in the 1994-2004 period. It is considered that an additional 20% could be disturbed with the project construction works					

Table 6-70 Surface area of lost habitat

The following magnitude rating will be applied:

Equivalent surface area of lost habitat	Magnitude of the impact
0-0,5	Negligible/No change
0,6-12,0	Low
12,0-29,9	Medium
+30	High

Table 6-71 Magnitude of the impact

Therefore, the magnitude of the impact on loss of habitat is low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The loss of habitat derives directly from the land clearance needed for the construction of the track
Reversibility	Irreversible	Except for the construction camps, the loss of habitat will be, for practical purposes, irreversible on the long term
Geographic Extent	Local	The loss of habitats is limited to the footprint of the project
Time when the impact occurs	Immediate	The loss of habitat occurs as soon as land clearance is executed
Duration	Long-term	It will last during the operational life of the project and later
Likelihood of appearance	Certain	The land will necessarily be cleared for the railway construction
Magnitude	Low	See above

Table 6-72 Assesment of impact

Considering a medium to high sensitivity of the receptor, according to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures is Slight to Moderate.

Temporary severance of riparian biocorridors

This impact refers to those areas that will be occupied during construction and which not necessarily will remain permanently occupied by the railway tracks. These areas generally correspond to valleys of permanent or stational water courses that are crossed by means of bridges or viaducts. They also refer to the landfill sites for inert waste foreseen in Section 3 in watersheds of the Kriva river forming short valleys, which will be rehabilitated after railway construction works are completed.

Water courses and their banks provide shelter and food to animals of the riparian habitat and of adjacent habitats, and are used as natural corridors in their movements to search for foraging, breeding or nesting areas. The construction of the pillars of bridges and viaducts requires punctual elimination of the vegetation at the area where the pillars will be constructed, but above all it is the presence of extraneous elements (workers, moving vehicles and machinery, deposits of construction materials) what will frighten wild animals, causing them not to use the biocorridor. An even more severe severance effect will occur in the areas to be used as landfills, where the original riparian habitat will be buried during the construction phase, even if the area is later rehabilitated, and a riparian habitat reproduced.

The temporary severance impact may be extended to those areas where habitats will be destroyed to install temporary facilities that will be abandoned upon completion of the railway construction (e.g. material storage areas, construction camps), and to the very same construction front areas where the presence of construction workers, vehicles and machinery will keep away the fauna that using the corridor.

<u>Estimation of magnitude</u>

The magnitude of this impact has been evaluated in a qualitative manner. For this, the areas of vegetation belts along the rivers and streams crossed by the railway alignment in each Section have been considered as areas that are likely to be used as biocorridors. Moreover, the types of the other habitats existing in their proximities have also been considered so as to estimate the usage of the riparian biocorridors by wild animals. Thus, those corridors that are in or close to populated areas of low sensitivity (urban or rural settlements and ruderal and agricultural lands) would be expected to have a lesser usage than those that connect high and medium sensitive habitats.

Using this approach, it is observed that Section 2 is the one where the railway alignment crosses the larger number of riparian biocorridors (46), compared to Section 1 (16) and Section 3 (10). There are also differences in the expected usage of the biocorridors. In Section 1 of the alignment, which is a densely populated area compared to sections 2 and 3, most of the biocorridors (12) are located in urban areas (Kumanovo area) or areas of intensive agricultural uses, and only a few ones (4) are in more natural, quieter areas. In sections 2 and 3, 39 out of 46 and 8 out of 10 riparian biocorridors, respectively, are surrounded by high or medium sensitive habitats, where wild animals are likely to found optimal conditions for their movements.

As for the 35 landfills of inert waste to be located in watersheds of Section 3, most of them, but not all of them, will occupy areas that are considered to have optimal conditions to function as riparian biocorridors (river or stream with a vegetation belt surrounded by high or medium sensitive habitats). Thus, some of them will be located in urban areas (e.g. six located in the Kriva Palanka area), and several of them will be located in depressions formed by the mountains that are not streams, covered with agricultural land or man-made plantations of conifers and black locust, and near populated areas.

For those landfills that will occupy riparian biocorridors, the impact will be over larger extensions of habitats than that of the simply occupation of the biocorridor to execute the construction works of railway substructures. This has been taken into account in estimating the magnitude of the impact since some of the landfills are in highly sensitive habitats with an important function as biocorridors, such as beech forests and thermophilous oak forests.

The magnitude of the impact temporary severance of riparian biocorridors is estimated as Medium due to:

1. there is a high number of riparian biocorridors with optimal conditions for wild animals movements that will be affected, particularly in sections 2 and 3 (therefore, the main impact will occur during stage 2 of the project), and
2. there will be a loss in the availability of wild animals to use their biocorridors, and also a loss of resource due partial destruction of the biocorridor habitats (in the construction of pillars, in the landfilling of inert wastes), but
3. because these losses are expected to be limited to the time the construction works take place at the spot under construction (or landfilling), minor adverse effects on the movements of wild animals are expected to occur.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The unavailability to use the biocorridor arises from the execution of the construction works in the affected biocorridor
Reversibility	Reversible	The biocorridor will be usable again as the construction works abandon the biocorridor. In the areas used as inert waste landfills, when rehabilitation works are completed.
Geographic Extent	Local	The severance effect is limited to the footprint of the project
Time when the impact occurs	Immediate	The severance effect starts with the arrival of construction works to the spot.
Duration	Short term	The presence of the construction works at a given biocorridor will be limited to a few weeks or months. In the case of landfills, this time will be longer (longer time to perform filling operations, and longer time to perform the rehabilitation)
Likelihood of appearance	Certain	The biocorridors needs to be occupied to carry out the construction works
Magnitude	Medium	See above

Table 6-73 Assesment of impact

According to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Moderate.

OPERATIONAL PHASE

Habitat fragmentation

The cleared land strip along the railway line will be permanently occupied by the track and the free-vegetation buffer at both sides of the track throughout the operational life of the railway. This will cause the fragmentation of habitats, this is, their division into a number of discrete parts. Over time, the populations become divided into a number of subpopulations, and if they are too small they may be prone to local extinction. Also, fragmentation of habitats can lead to a reduction in genetic diversity within populations at both sides of the railway, which can make the populations susceptible to extinction as well.

In addition to the physical presence of the railway track, a busy railway (in the case of Railway Corridor VIII-Eastern Section, this traffic is expected to be of approximately 67 trains per day) can constitute an almost impermeable layer for animals, especially for shy species. In fact, for some species, the railway line may be taken as a border of its home range.

Also, if there is the possibility of colonising areas or accessing to foraging and drinking areas or to breeding areas across the rail track, then the animals will try to cross the transport corridor, thus further increasing their potential for extinction. Likewise, small animals like mice or toads are often not able to climb over railroad tracks and will follow them for hundreds of meters to find an opening, making them susceptible to predation.

<u>Estimation of magnitude</u>

The magnitude of this impact has been evaluated in a qualitative manner, taking into account the types and sensitivities of the habitats that will be separated by the railway tracks, their abundance along the railway alignment, their predominance in a given area of the alignment, and the length of the stretches with no bridges or tunnels that effectively create the fragmentation of the habitats. Also, the overlap of the corridor with important regional biocorridors, with prospects of becoming part of the national ecological network of the Republic of Macedonia, has been taken into consideration.

Thus, the effects of fragmentation will be generally more important in those areas where high sensitivity habitats are predominant at both sides of the railway alignment, or there are medium sensitivity habitats having a high biodiversity and hosting fauna species that are rare, endemic or designated as priority species in the Habitats Directive.

In this regards, Section 1 of the alignment is dominated by human settlements, agricultural land, other cultivation areas, and the already constructed railway. This is, it is an area of poor biodiversity, where the fragmentation effect already exists, not only because of the presence of the railway line, but of these types of degraded habitats, which separate the richest riparian habitats (when they have not been altered), especially in the Pcinja and Kriva rivers, from those also rich habitats of the high lands.

The last 2 kilometers of Section 1, and practically all Section 2 (except for the stretch between K.P. 54 and K.P. 60) of the railway corridor is dominated by hill pastures, often alternating with degraded xerothermophilous oak forest. Hill pastures provide good possibilities for breeding and feeding to animals, and consequently are rich habitats concerning animal biodiversity. The Balkan short-tailed mouse, *Mus macedonicus*, and the long horn beetle Balkan endemic species *Dorcadion lineatocolle*, are characteristic of hill pastures with sparse bushy vegetation present along the railway corridor. Among other mammals, the wolf *Canis lupus*, a EU priority species may be encountered in xerothermophilous oak forests. In Section 2 of the railway alignment, tunnels and bridges comprise approximately 6,8 km out of the 34 km of the section. This is, the railway tracks will create a severance effect over long distances of the alignment (more than 2 km in some areas).

As for Section 3, it can be observed that in the first 5 to 6 km of the railway corridor, up to the vicinity of the town of Kriva Palanka, hill pastures and degraded xerothermophilous oak forest continue to be dominant. This part of the alignment has two stretches with a length of more than 600 meters and several of approximately 200 meters. In addition to the biodiversity richness associated to this area, this stretch of the railway alignment is important in considering the fragmentation impact because it intersects with the Osogovo-German landscape biocorridor, an important biocorridor, which is expected to be part of the national ecological network of the Republic of Macedonia. This corridor extends on a South-North direction from Osogovski Planini mountains in the region of the villages of Mozhdivnjak and Konopnica to the mountain German in the region of the village of Petralica.

From P.K. 74 to P.K. 78, the railway corridor is mostly dominated by thermophilous oak forests (more degraded in the proximities of Kriva Palanka and well preserved as the alignment advances towards the less populated areas), with some alternation of hill pastures and black pine plantations. In this area, however, although the habitats continue to be rich in fauna, most of the railway track runs on bridges and viaducts or through tunnels (more than 3.500 m), and therefore, the fragmentation effect would be greatly minimized (none of the railway fragmenting stretches, are more than 175 meter-long) .

From P.K.78 to the border of Bulgaria, the railway corridor is basically comprised of a succession of forested areas; mixed plantations of black locust and pine with oak at the beginning, and then woods of mesophilous oak in the north-faced slopes and thermophilous oak woods in the south-faced slopes, with areas of submontane beech in the north-faced slopes. These are all habitats rich in fauna where the presence of wolf and the sporadic presence of bear (*Ursus arctos*), both priority species under the Habitat Directive, have been reported.

Although there are several bridges and tunnels in this part of the railway, there are several stretches of more than 250 m, where the fragmentation effect may occur. Moreover, this part of the alignment overlaps with the Osogovo-Bilina Planina linear biocorridor (also expected to be part of the national ecological network of the Republic of Macedonia) that extends on a South-North direction from the northern slopes of Osogovski Planini mountains, in the area of the villages of Krklja and Uzem, through the road crossover Deve Bair to Bilina Planina, in the area of the villages of Kiselica and Trnovo.

The magnitude of the impact habitat fragmentation is estimated as High because the physical presence of the railway tracks and the heavy traffic of trains along the day (>65 trains/day) will considerably limit the free movement of animals across relatively long stretches of habitats that are rich in fauna and host important species like wolf and bear, including several Macedonian endemic species. Moreover, the railway overlaps with two fauna corridors connecting regions within Macedonia and between Macedonia and Bulgaria.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The fragmentation effect arises from the physical presence of the rail track and the traffic of trains.
Reversibility	Irreversible	Once the fragmentation effects commence, it may be difficult to revert them.
Geographic Extent	Regional	Some species of large mammals like bear, wolf, roe deer, wild boar, etc, use large portions of the territory encompassing the mountains that are North and South of the alignment and the Bulgarian mountains East of the alignment.
Time when the impact occurs	Delayed	The effects of fragmentation will take a time (years) to be observable.
Duration	Long term	The fragmentation effect will continue throughout the operational life of the railway.
Likelihood of appearance	Probable	The railway has many bridges and tunnels that attenuate the fragmentation effects, but it would be expected to occur at least in some areas of the alignment and with some species.
Magnitude	Medium	See above

Table 6-74 Assesment of impact

According to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Large.

6.2.8 POTENTIAL IMPACTS ON FLORA

6.2.8.1 VALUE OF VEGETATION

Vegetation communities along the railway alignment are numerous and varied.

For the assessment of relevant flora, in the absence of a national red list of threatened plants, current international documents and lists (IUCN Global Red Lists, IUCN European Red Lists, EU HD Annex II and Annex IV, Bern Convention) were used to identify threatened species among the plant species included in the inventory of plants prepared for this ESIA. The results of this search showed that none of the species in the inventory are included in any of these lists as rare or threatened.

In the absence of this criterion, the degree of preservation of vegetal communities found along the railway alignment was used, based on criterion No. 3 used in Section 6.2.9.2 for the assignment of sensitivity values to habitats. This criterion measures the degree of naturalness (i.e. the extent of human intervention) and was evaluated on the basis of expert judgment. Given that the habitats along the corridor represent distinct types of plant communities, the use of this criterion is considered to be relevant for the assessment of impacts on vegetation. For this assessment habitats have been considered as plant communities.

Based on the values assigned to the different habitats along the railway corridor for this criterion, the corresponding plant communities were assigned a sensitivity value as shown in table below.

Abandoned fields, ruderal and trampled sites; Fields and acres; Orchards and vineyards; Parks; Rural settlements - villages and gardens; Urban settlements; Urbanized areas - roads and railway line.	Negligible
Degraded xerothemophilous oak forests; Degraded thermophilous oak forests; Degraded mesophilous oak forests; Artificial ponds; Black locust stands and plantations; Black Pine plantations; Mixed Conifer-Black Locust plantations with oaks; Small broadleaf plantations; Tree lines and belts.	Low
Xerothemophilous oak forests; Forested ravines and dales; Riparian willow-poplar belts; Riparian scrub communities - Tamarisk shrubland; Gravely and sandy river banks; Hill Pastures with sparse shrubs; Rocky and stony areas - hasmophytic vegetation; Intermitent streams - ravines	Medium
Thermophilous oak forests; Mesophilous oak forests; Submontane beech forest; Hill pastures on stony sites; Unmanaged mesic grasslands; Rivers and streams - epipotamal and hiporhitral streams; Montane streams - Metarhitral streams; Meadows – mesophilous; Wet meadows.	High
Riparian willow-poplar woodland; Hill pastures.	Very high

Table 6-75 Degree of preservation of natural communities along the railway alignment

6.2.8.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

One of the most important impacts during the construction phase of a railway project is the destruction of the vegetation cover along the strip of land to be occupied by the railway track and the right of way. In some cases it may occur that individuals of threatened plant species are present in this strip and are also destroyed, which further aggravates the risk of extinction of the species. For the impact regarding destruction of plant communities, it is considered that this impact is already evaluated under the impact habitats loss in Section 6.2.7 and therefore will not be assessed here. With regards to the potential destruction of sensitive species, the baseline study on flora has not indicated the presence of threatened species in the area of the railway corridor.

During the operation of the railway, the main impact on flora that has been identified is the potential effects that the herbicides used in the railway track to inhibit the growth of vegetation adjacent to the railroad tracks may have on non-target plants in the vicinity of the railway alignment. This is because herbicides are toxic to a wide variety of plant species, and not just the weeds. Thus, spraying of herbicides may result in exposures of non-pest species, which can cause an unintended but substantial mortality of non-target plants.

Therefore, the following potential impact on flora is assessed:

<u>Operational phase</u>

Affection to plant formations in the vicinity of the railway derived from the use of herbicides for maintenance operations

OPERATIONAL PHASE

Affection to plant formations by herbicides used in maintenance operations

There is the potential that herbicides sprayed on the tracks and adjacent areas could also affect the vegetation outside the target areas, either by leaching off the tracks and into water bodies or by the spray being carried by wind. In the first case, where the herbicide is transported by water, the affection would most likely occur in riparian areas relatively far from the railway alignment. In the second case, the affection would be expected to occur in the area immediately adjacent to the right of way.

Estimation of magnitude

The magnitude of this impact has been evaluated in a qualitative manner, taking into account the types and sensitivities of the plant formations along the railway alignment, including the water courses crossed or near the alignment, in which the riparian and aquatic vegetation (as well as the rest of the hydrobionts) may be affected.

In Section 1, the potential affection to the plants adjacent to the railway alignment will be mainly on agricultural plantations, which have little interest as plant communities. However, at some points and with regards to railway effluents potentially contaminated with herbicides, the alignment passes near areas of the Pcinja and Kriva Reka flood plains with high and medium sensitivity riparian vegetation: riparian willow-poplar woodland, and riparian shrub communities - tamarisk shrubland-and riparian willow-poplar belts (K.P. 18 to 19, 22 to 25, and 28 to 30.5). Also, at the end of this Section an area of very high sensitivity hill pastures is crossed (K.P: 28 to 30.5).

In Section 2, the railway crosses several water courses with associated riparian and aquatic vegetation. It crosses two areas where very high sensitivity plant communities, including riparian willow-poplar woodland and hill pastures (K.P. 33 to 36, 46 to 49 and 61 to 63) are predominant. The rest corresponds to medium (mainly forested ravines and dales and hill pasture on stony ground or with sparse shrubs), low (mainly degraded xerothermophillous oak forests) and negligible (mainly agricultural lands) sensitivity plant communities.

In Section 3, the railway crosses some areas with plant communities of a very high sensitivity, mainly riparian willow-poplar woodland in K.P. 66 to 69, and 73 to 77, and high sensitivity, mainly mesophillous oak forest and submontane beech forest in K.P. 80 to 83. The rest corresponds to vegetation of a medium sensitivity (mainly hill pastures with sparse shrubs), low sensitivity (mainly degraded xerothemophilous oak forests, black locust stands and plantations, and black pine plantations), and negligible sensitivity (urban area of Kriva Palanka).

It is expected that this impact has a limited extension, some meters at each side of the alignment and the areas of the water courses immediately downstream of the point receiving the discharge of the railway drainage system. Also, this impact will have a limited extension in time, since herbicide treatment is carried out once or twice a year. The impact would affect to the majority of the plant communities along the railway, but only at some specific locations there are very high or high sensitive communities, and there the loss would be partial. The impact is therefore medium.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The noxious effects on non-target plants will be through wind or water transportation.
Reversibility	Reversible	Plants will grow again when application of herbicide stops
Geographic Extent	Local	The effect is limited to the footprint of the project.
Time when the impact occurs	Immediate	The effects on non-target plants will occur upon herbicide application on the railway (or a short time later for railway drainage effluents)
Duration	Long term	The noxious effects on non-target plants will last throughout the operational life of the railway.
Likelihood of appearance	Probable	It is likely that the herbicide applied to railway permanent and right of ways can be transported by wind and/or water.
Magnitude	Medium	See above

Table 6-76 Assesment of impact

Considering an overall medium sensitivity for the plant communities along the railway, according to the significance matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Moderate.

6.2.9 POTENTIAL IMPACTS ON FAUNA

6.2.9.1 VALUE OF FAUNA RECEPTORS

A fairly large number of fauna species have been identified in the baseline study that are present or may be present in the area of the railway corridor. This presence is based on the indicative species known to be present in each of the habitats identified along the railway corridor and survey observations of the actual corridor to check habitat conditions are adequate to host the species, and record their actual presence through visual contacts, acoustic signals, tracks, and other traces left by wild animals.

In order to carry out the assessment of impacts of the railway on these receptors, a reduction in the number of species to be considered in the assessment was deemed necessary to facilitate the assessment procedure.

A selection process was undertaken to identify the most sensitive animal species among all the species that may be present in the area of the railway corridor. The sensitivity of species was evaluated in accordance to their level of threat and, therefore, need for protection. It was considered that if relevant species can be adequately protected from adverse impacts that might arise from the project, then all the fauna as a group will be protected.

For this purpose, and since the Republic of Macedonia has not yet published red lists of endangered fauna species, the current international lists of endangered species were used. The particular lists utilized are shown in the following sections describing the value assessments performed for each fauna class.

Mammals

In total, 30 mammal species are expected to be present in the habitats along the railway corridor, and therefore affected by the construction works and/or operation of the railway.

The value of each one of these species was assessed according to the category of threat level assigned to the species in the endangered species lists established in EU regulations (Habitat Directive) and the various international treaties the Republic of Macedonia has subscribed. In particular, the following lists were utilized.

EU regulation/International Convention	List of endangered species
EU Habitats Directive Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora	Annex II. Animal and plant species of community interest whose conservation requires the designation of special areas of conservation.
	Annex IV. Animal and plant species of community interest in need of strict protection
	Priority species
Bern Convention	Appendix II. Strictly protected fauna species
	Appendix III. Protected fauna species
Bonn Convention	Appendix I. Migratory species threatened with extinction
	Appendix II. Migratory species that need or would significantly benefit from international co-operation
CITES Convention	Appendix I. Species that are threatened with extinction and are or may be affected by trade
	Appendix II. Species that are not necessarily now threatened with extinction but that may become so

EU regulation/International Convention	List of endangered species
	unless trade is closely controlled
IUCN	European Red List **LC**: Least Concern **NT**: Near Threatened **VU**: Vulnerable **EN**: Endangered **CR**: Critically Endangered

Table 6-77 Red lists used for mammal species value assessment

Table 6-78 shows the threat level assigned to each of the 30 mammal species present or potentially present in the railway corridor, according to the red lists indicated in Table 1. The table also includes the geographical extent of the species distribution, and the types of habitats hosting the species. An explanation of the abbreviations used in the table is provided at the end of the table.

	Scientific name	English name	Bern Convention appendices	Habitat Directive Annexes	Bonn Convention	CITES Appendices	Emerald species 2002	The IUCN Red List	Distribution	Habitat
	Carnivora									
1	*Canis lupus*	Grey wolf	II	* II IV		II	•	**LC**	**WS**	**VA**
2	*Ursus arctos*	Brown bear	II	* II IV		II	•	**LC**	**WS**	**VA**
3	*Lutra lutra*	Eurasian otter	II	II IV		I	•	**NT**	**WS**	**13**
4	*Felis sylvestris*	Wildcat	II	IV		II		**LC**	**WS**	**1,3,7, 12**
5	*Vormela peregusna*	Marbled polecat	II					**VU**	**WS**	**9,14**
6	*Martes foina*	Beech marten	III					**LC**	**WS**	**1,10, 11**
7	*Martes martes*	Pine marten	III					**LC**	**WS**	**1,6,7**
8	*Meles meles*	Badger	III					**LC**	**WS**	**1,5,11**
9	*Mustela nivalis*	Least weasel	III					**LC**	**WS**	**VA**
10	*Mustela putorius*	European polecat	III					**LC**	**EU**	**VA**
	Lagomorpha									
11	*Lepus europaeus*	European hare	III					**LC**	**WS**	**VA**
	Rodentia									
12	*Sciurus vulgaris*	Red squirrel	III					**LC**	**WS**	**1,3,7**
13	*Glis glis*	Edible dormouse	III					**LC**	**EU**	**1,3,6,7**
	Artiodactyla									
14	*Capreolus capreolus*	Roe deer	III					**LC**	**WS**	**1,3,6,7, 10,12**
	Insectivora									
15	*Erinaceus concolor*	Southern White-breasted Hedgehog	III					**LC**	**BA, ME**	**3,12**
16	*Crocidura suaeveolens*	Lesser white-toethed screw	III					**LC**	**WS**	**VA**
	Chiroptera									

	Scientific name	English name	Bern Convention appendices	Habitat Directive Annexes	Bonn Convention	CITES Appendices	Emerald species 2002	The IUCN Red List	Distribution	Habitat
17	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	II	II IV	II			NT	WS	1.5.6
18	*Rhinolophus hipposideros*	Lesser Horseshoe Bat	II	II IV	II			NT	WS	1,2
19	*Myotis mystacinus*	Whiskered bats	II	IV	II			LC	WS	3,4
20	*Myotis nattereri*	Natterer's bat	II	IV	II			LC	WS	1,7
21	*Myotis myotis*	Greater mouse-eared bat	II	II IV	II			LC	WS	3,8
22	*Vespertilio murinus*	Parti-coloured Bat	II	IV	II			LC	WS	1,3,10
23	*Eptesicus serotinus*	Serotine bat	II	IV	II			LC	WS	1,3,7
24	*Nyctalus noctula*	Common Noctule	II	IV	II			LC	WS	1
25	*Pipistrellus pipistrellus*	Common Pipistrelle	III	IV	II			LC	WS	3,6,11, 12
26	*Pipistrellus nathusii*	Nathusius' Pipistrelle	II	IV	II			LC	WS	3,4,11
27	*Pipistrellus kuhlii*	Pipistrellus kuhlii	II	IV	II			LC	WS	3,12
28	*Hypsugo savii*	Savi's Pipistrelle	II	IV	II			LC	WS	3,4,5, 11
29	*Barbastella barbastellus*	Barbastelle	II	II IV	II			VU	EU	1,7,12
30	*Plecotus austriacus*	Grey long-eared bat	II	IV	II			LC	EU	11,12

Abbreviations for Habitats:
1. Decidious woodlands
2. Limestone
3. Rural and urban settlements
4. Riparian habitas
5. Pastures
6. Mediteranean and submediterraean shrublands
7. Coniferous forests
8. Caves
9. Steppes
10. High mountain pastures
11. Open woodlands
12. Farmland
13. Acquatic habitats
14. Desert and semi-desert areas

VA. Variety of habitats

Abbreviations for Distribution:
WS – Wide spread
EU – Europe only
BA – Balkans
ME – Middle East
VA – Variety of habitats

Abbreviation UICN
LC: Least Concern
NT: Near Threatened
VU: Vulnerable
EN: Endangered
CR: Critically Endangered

Symbols:
* Priority species
• Species included in the Emerald list

Table 6-78 Threat levels assigned to the mammals species in the railway corridor (Kumanovo - Deve Bair)

In the table above, those species showing the highest level of threat in any of the red lists considered have been marked by highlighting in orange the corresponding box (this is, those in appendix II under Bern Convention, annex IV and priority species under Habitat Directive, appendix I in CITES Convention, appendix I under Bonn Convention, and threatened level under UICN (NT, VU, EN, CR).

Thus, it can be observed that the most sensitive species would be:

Among carnivores

- *Canis lupus* (Grey wolf),
- *Ursus arctos* (Brown bear),
- *Lutra lutra* (Eurasian otter),

- *Felis sylvestris* (Wildcat), and
- *Vormela peregusna* (Marbled polecat).

Among bats (All 14 species)

- *Rhinolophus ferrumequinum* (Greater Horseshoe Bat),
- *Rhinolophus hipposideros* (Lesser Horseshoe Bat),
- *Myotis mystacinus* (Whiskered bats),
- *Myotis nattereri* (Natterer's bat),
- *Myotis myotis* (Greater mouse-eared bat),
- *Vespertilio murinus* (Parti-coloured Bat),
- *Eptesicus serotinus* (Serotine bat),
- *Nyctalus noctula* (Common Noctule),
- *Pipistrellus pipistrellus* (Common Pipistrelle),
- *Pipistrellus nathusii* (Nathusius' Pipistrelle),
- *Pipistrellus kuhlii* (Pipistrellus kuhlii),
- *Hypsugo savii* (Savi's Pipistrelle),
- *Barbastella barbastellus* (Barbastelle),
- *Plecotus austriacus* (Grey long-eared bat).

Birds

In addition to the red lists of UICN and the Bern, Bonn and CITUS Conventions, the species value assessment for birds was based on the lists contained in EU Bird Directive, BirdLife International Species of European Conservation Concern (SPEC) list, BirdLife International European Threat Status (ETS) list, and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).

The threat categories in these biodiversity conservation documents are indicated below.

- Bird Directive - Council Directive 79/409/EEC on the conservation of wild birds
  - Annex I – Species in need of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. In this connection, account shall be taken of:
    - (a) species in danger of extinction;
    - (b) species vulnerable to specific changes in their habitat;
    - (c) species considered rare because of small populations or restricted local distribution;
    - (d) other species requiring particular attention for reasons of the specific nature of their habitat.
  - Annex II - Owing to their population level, geographical distribution and reproductive rate throughout the community, the species listed in annex II may be hunted under national legislation. Member states shall ensure that the hunting of these species does not jeopardize conservation efforts in their distribution area.
    - Annex II/1 - The species referred to in Annex II/1 may be hunted in the geographical sea and land area where this directive applies.
    - Annex II/2 - The species referred to in Annex II/2 may be hunted only in the member states in respect of which they are indicated.
    - Annex III - Member states shall prohibit, for all of naturally occurring birds in the wild state in the European territory of the member states, the sale, transport for sale, keeping for sale and the offering for sale of live or dead birds and of any readily recognizable parts or derivatives of such birds
- BirdLife International Species of European Conservation Concern (SPEC)list

- SPEC 1 European species of global conservation concern
- SPEC 2 Unfavourable conservation status in Europe, concentrated in Europe
- SPEC 3 Unfavourable conservation status in Europe, not concentrated in Europe
- Non-SPECE Favourable conservation status in Europe, concentrated in Europe
- Non-SPEC Favourable conservation status in Europe, not concentrated in Europe

- BirdLife International European Threat Status (ETS) list
  - CR - Critically Endangered - if the European population meets any of the IUCN Red List Criteria for Critically Endangered.
  - EN - Endangered - if the European population meets any of the IUCN Red List Criteria for Endangered
  - VU - Vulnerable - if the European population meets any of the IUCN Red List Criteria for Vulnerable
  - D - Declining - if the European population does not meet any of the IUCN Red List Criteria, but declined by more than 10% over 10 years or three generations, whichever is longer
  - R - Rare - if the European population does not meet any of the IUCN Red List Criteria and is not Declining, but numbers fewer than 10.000 breeding pairs (or 20.000 breeding individuals or 40.000 wintering individuals) and is not marginal to a larger non-European population.
  - H - Depleted - if the European population does not meet any of the IUCN Red List Criteria and is not Rare or Declining, but has not yet recovered from a moderate or large decline suffered during 1970-1990.
  - L - Localised - if the European population does not meet any of the IUCN Red List Criteria and is not Declining, Rare or Depleted, but is heavily concentrated, with more than 90% of the European population occurring at 10 or fewer sites.
  - S - Secure - if the European population does not meet any of the criteria listed above.
  - DD - Data Deficient - if there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.
  - NE - Not Evaluated - if its European population has not yet been evaluated against the criteria.

African-Eurasian Migratory Waterbirds (AEWA)

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is the largest of its kind developed so far under the Bonn Convention. It was concluded on 16 June 1995 in The Hague (The Netherlands) and entered into force on 1 November 1999 after the required number of at least fourteen Range States, comprising seven from Africa and seven from Eurasia had ratified it. Since then the Agreement is an independent international treaty. Parties to the Agreement are called upon to engage in a wide range of conservation actions which are described in a comprehensive Action Plan. This detailed plan addresses such key issues as: species and habitat conservation, management of human activities, research and monitoring, education and information, and implementation. The agreement contains the following annexes:

- Annex 1. Definition of the Agreement Area
- Annex 2. Waterbird species to which the Agreement applies
- Annex 3. Action Plan

Table 6-79 shows the threat level assigned to each of the 160 bird species present or potentially present in the railway corridor, according to these red lists.

In this table, those species showing the highest level of threat in any of the red lists considered have been marked by highlighting in orange the corresponding box. From the species list that resulted from these first screening, the list of sensitive bird species was reduced by selecting those that are categorized as Rare, Vulnerable, Endangered, or Criticaly Endangered, according to BirdLife ETS criteria, and Near Threatened, Vulnerable, Endangered, or Criticaly Endangered, under IUCN red list.

Using these screening criteria, the list of sensitive bird species to be considered in the assessment of impacts is as follows:

1. Black Stork (*Ciconia nigra*),
2. Egyptian Vulture (*Neophron percnopterus*),
3. Short-toed Snake-eagle (*Circaetus gallicus*),
4. Long-legged Buzzard (*Buteo rufinus*),
5. Eastern Imperial Eagle (*Aquila heliaca*),
6. Red-footed Falcon (*Falco vespertinus*),
7. Lanner Falcon (*Falco biarmicus*),
8. Peregrine Falcon (*Falco peregrinus*),
9. Eurasian Thick-knee (*Burhinus oedicnemus*),
10. European Roller (*Coracias garrulous*), and
11. Masked Shrike (*Lanius nubicus*).

In addition, in the opinion of the experts that performed the bird study for this ESIA, there are other three species that should be classified as sensitive, namely:

1. Griffon Vulture (*Gyps fulvus*),
2. Montagu’s Harrier (*Circus pygargus*), and
3. Eurasian Eagle Owl (*Bubo bubo*).

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
1	Great Cormorant *Phalacrocorax carbo*	LC	Non-SPEC	S			III			
2	Little Bittern *Ixobrichus minutus*	LC	SPEC Cat. 3	H	I	Included	II	II	Included	
3	Little Egret *Egretta garzetta*	LC	Non-SPEC	S	I	Included	II		Included	
4	Great White Egret *Casmerodius albus*	LC	Non-SPEC	S	I	Included	II	II		
5	Grey Heron *Ardea cinerea*	LC	Non-SPEC	S			III			
6	Purple Heron *Ardea purpurea*	LC	SPEC Cat. 3	D	I	Included	II	II	Included	
7	White Stork *Ciconia ciconia*	LC	SPEC Cat. 2	H	I	Included	II	II	Included	
8	**Black Stork *Ciconia nigra***	LC	SPEC Cat. 2	R	I	Included	II	II	Included	II
9	Mallard *Anas plathyrhynchos*	LC	Non-SPEC	S	II/A; III/A		III	II	Included	
10	Garganey *Anas querquedula*	LC	SPEC Cat. 3	D	II/A		III	II	Included	
11	European Honey Buzzard *Pernis apivorus*	LC	Non-SPEC-E	S	I	Included	II	II		II
12	**Egyptian Vulture *Neophron percnopterus***	EN	SPEC Cat. 3	EN	I	Included	II	I; II		II
13	**Griffon Vulture *Gyps fulvus***	LC	Non-SPEC	S	I	Included	II	II		II
14	**Short-toed Snake-eagle *Circaetus gallicus***	LC	SPEC Cat. 3	R	I	Included	II	II		II
15	Northern Harrier *Circus cyaneus)*	LC	SPEC Cat. 3	H	I	Included	II	II		II
16	**Montagu's *Harrier Circus pygargus***	LC	Non-SPEC-E	S	I	Included	II	II		II
17	Northern Goshawk *Accipiter gentilis*	LC	Non-SPEC	S			II	II		II
18	Eurasian Sparrow hawk *Accipiter nisus*	LC	Non-SPEC	S			II	II		II
19	Common Buzzard *Buteo buteo*	LC	Non-SPEC	S			II	II		II
20	**Long-legged Buzzard *Buteo rufinus***	LC	SPEC Cat. 3	VU	I	Included	II	II		II
21	**Eastern Imperial Eagle *Aquila heliaca***	VU	SPEC Cat. 1	R	I	Included	II	I; II		I
22	Common Kestrel Falco tinnunculus	LC	SPEC Cat. 3	D			II	II		II
23	**Red-footed Falcon *Falco vespertinus***	NT	SPEC Cat. 3	VU	I	Included	II	II		II
24	Eurasian Hobby *Falco subbuteo*	LC	Non-SPEC	S			II	II		II
25	**Lanner Falcon *Falco biarmicus***	LC	SPEC Cat. 3	VU	I	Included	II	II		II
26	**Peregrine Falcon *Falco peregrinus***	LC	Non-SPEC	S	I	Included	II	II		I
27	Rock Partridge *Alectoris graeca*	LC	SPEC Cat. 2	D	I; II/A		III			
28	Grey Partridge *Perdix perdix*	LC	SPEC Cat. 3	VU	II/A; III/A		III			

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
29	Common Quail *Coturnix coturnix*	LC	SPEC Cat. 3	H	II/B		III	II		
30	(Water Rail *Rallus aquaticus*	LC	Non-SPEC	S	II/B		III			
31	**Eurasian Thick-knee *Burhinus oedicnemus***	LC	SPEC Cat. 3	VU	I	Included	II	II		
32	Little Ringed Plover *Charadrius dubius*	LC	Non-SPEC	S			II	II	Included	
33	Northern Lapwing *Vanellus vanellus*	LC	SPEC Cat. 2	VU	II/B		III	II	Included	
34	Ruff *Philomachus pugnax*	LC	SPEC Cat. 2	D	I; II/B	Included	III	II	Included	
35	Common Snipe *Gallinago gallinago*	LC	SPEC Cat. 3	D	II/A; III/B		III	II	Included	
36	Green Sandpiper *Tringa ochropus*	LC	Non-SPEC	S			II	II	Included	
37	Common Sandpiper *Actitis hypoleucos*	LC	SPEC Cat. 3	D			II	II	Included	
38	Rock Pigeon *Columba livia*	LC	Non-SPEC	S	II/A		III			
39	Stock Dove *Columba oenas*	LC	Non-SPEC-E	S	II/B		III			
40	Common Wood Pigeon *Columba palumbus*	LC	Non-SPEC-E	S	II/A; III/A		Not included			
41	Eurasian Collared Dove *Streptopelia decaocto*	LC	Non-SPEC	S	II/B		III			
42	European Turtle Dove *Streptopelia turtur*	LC	SPEC Cat. 3	D	II/B		III	II		
43	Common Cuckoo *Cuculus canorus*	LC	Non-SPEC	S			III			
44	Barn Owl *Tyto alba*	LC	SPEC Cat. 3	(D)			II			I
45	Common Scops Owl *Otus scops*	LC	SPEC Cat. 2	(H)			II			II
46	**Eurasian Eagle Owl *Bubo bubo***	LC	SPEC Cat. 3	H	I	Included	II			II
47	Little Owl *Athene noctua*	LC	SPEC Cat. 3	D			II			II
48	Tawny Owl *Strix aluco*	LC	Non-SPEC-E	S			II			II
49	Long-eared Owl *Asio otus*	LC	Non-SPEC	S			II			II
50	Eurasian *Nightjar Caprimulgus europaeus*	LC	SPEC Cat. 2	H	I	Included	II			
51	Common Swift *Apus apus*	LC	Non-SPEC	S			III			
52	Common Kingfisher *Alcedo atthis*	LC	SPEC Cat. 3	H	I	Included	II			
53	European Bee-eater *Merops apiaster*	LC	SPEC Cat. 3	H			II	II		
54	**European Roller *Coracias garrulus***	NT	SPEC Cat. 2	VU	I	Included	II	II		
55	Eurasian Hoopoe *Upupa epops*	LC	SPEC Cat. 3	D			II			
56	Eurasian Wryneck Jynx torquilla	LC	SPEC Cat. 3	D			II			
57	Grey-faced Woodpecker Picus canus	LC	SPEC Cat. 3	H	I	Included	II			

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
58	Eurasian Green Woodpecker Picus viridis	LC	SPEC Cat. 2	H			II			
59	Black Woodpecker *Dryocopus martius*	LC	Non-SPEC	S	I	Included	II			
60	Great Spotted Woodpecker *Dendrocopos major*	LC	Non-SPEC	S			II			
61	Syrian Woodpecker *Dendrocopos syriacus*	LC	Non-SPEC-E	S	I	Included	II			
62	Middle Spotted Woodpecker *Dendrocopos medius*	LC	Non-SPEC-E	S	I	Included	II			
63	Lesser Spotted Woodpecker *Dendrocopos minor*	LC	Non-SPEC	S			II			
64	Calandra Lark *Melanocorypha calandra*	LC	SPEC Cat. 3	D	I	Included	II			
65	Greater Short-toed Lark *Calandrella brachydactyla*	LC	SPEC Cat. 3	D	I	Included	II			
66	Crested Lark Galerida cristata	LC	SPEC Cat. 3	H			III			
67	Wood Lark *Lullula arborea*	LC	SPEC Cat. 2	H	I	Included	III			
68	Eurasian Skylark *Alauda arvensis*	LC	SPEC Cat. 3	H	II/B		III			
69	Eurasian Crag Martin *Ptyonoprogne rupestris*	LC	Non-SPEC	S			II			
70	Barn Swallow *Hirundo rustica*	LC	SPEC Cat. 3	H			II			
71	Red-rumped Swallow *Hirundo daurica*	LC	Non-SPEC	S			II			
72	Northern House Martin *Delichon urbica*	LC	SPEC Cat. 3	D			II			
73	Tawny Pipit *Anthus campestris*	LC	SPEC Cat. 3	D	I	Included	II			
74	Tree Pipit *Anthus trivialis*	LC	Non-SPEC	S			II			
75	Meadow Pipit *Anthus pratensis*	LC	Non-SPEC-E	S			II			
76	Water Pipit *Anthus spinoletta*	LC	Non-SPEC	S			II			
77	Yellow Wagtail *Motacilla flava*	LC	Non-SPEC	S			II			
78	Grey Wagtail *Motacilla cinerea*	LC	Non-SPEC	S			II			
79	White Wagtail *Motacilla alba*	LC	Non-SPEC	S			II			
80	White-throated Dipper *Cinclus cinclus*	LC	Non-SPEC	S			II			
81	Winter Wren *Troglodytes troglodytes*	LC	Non-SPEC	S			II			
82	Hedge Accentor *Prunella modularis*	LC	Non-SPEC-E	S			II			
83	European Robin *Erithacus rubecula*	LC	Non-SPEC-E	S			II	II		
84	Common Nightingale *Luscinia megarhynchos*	LC	Non-SPEC-E	S			II	II		
85	Black Redstart *Phoenicurus ochruros*	LC	Non-SPEC	S			II	II		
86	Common Redstart *Phoenicurus phoenicurus*	LC	SPEC Cat. 2	H			II	II		
87	Whinchat *Saxicola rubetra*	LC	Non-SPEC-E	S			II	II		

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
88	Common Stonechat *Saxicola torquata*	LC	Non-SPEC	S			II	II		
89	Northern Wheatear *Oenanthe oenanthe*	LC	SPEC Cat. 3	D			II	II		
90	Black-eared Wheatear *Oenanthe hispanica*	LC	SPEC Cat. 2	H			II	II		
91	Rufous-tailed Rock Thrush *Monticola saxatilis*	LC	SPEC Cat. 3	H			II	II		
92	Blue Rock Thrush *Monticola solitarius*	LC	SPEC Cat. 3	H			II	II		
93	Eurasian Blackbird *Turdus merula*	LC	Non-SPEC-E	S	II/B		III	II		
94	Fieldfare Turdus pilaris	LC	Non-SPEC-EW	S	II/B		III	II		
95	Song Thrush *Turdus philomelos*	LC	Non-SPEC-E	S	II/B		III	II		
96	Redwing *Turdus iliacus*	LC	Non-SPEC-EW	S	II/B		III	II		
97	Mistle *Thrush Turdus viscivorus*	LC	Non-SPEC-E	S	II/B		III	II		
98	Cetti's warbler *Cettia cetti*	LC	Non-SPEC	S			II	II		
99	Sedge Warbler *Acrocephalus schoenobaenus*	LC	Non-SPEC-E	S			II	II		
100	Marsh Warbler *Acrocephalus palustris*	LC	Non-SPEC-E	S			II	II		
101	Great Reed Warbler *Acrocephalus arundinaceus*	LC	Non-SPEC	S			II	II		
102	Eastern Olivaceous Warbler *Hippolais pallida*	LC	SPEC Cat. 3	H			II	II		
103	Olive-tree Warbler *Hippolais olivetorum*	LC	Non-SPEC-E	S	I	Included	II	II		
104	Icterine Warbler *Hippolais icterina*	LC	Non-SPEC-E	S			II	II		
105	Subalpine Warbler *Sylvia cantillans*	LC	Non-SPEC-E	S			II	II		
106	Orphean Warbler *Sylvia hortensis*	LC	SPEC Cat. 3	H			II	II		
107	Barred Warbler *Sylvia nisoria*	LC	Non-SPEC-E	S	I	Included	II	II		
108	Lesser Whitethroat *Sylvia curruca*	LC	Non-SPEC	S			II	II		
109	Common Whitethroat *Sylvia communis*	LC	Non-SPEC-E	S			II	II		
110	Blackcap *Sylvia atricapilla*	LC	Non-SPEC-E	S			II	II		
111	Bonelli's Warbler *Phylloscopus bonelli*	LC	SPEC Cat. 2	D			II	II		
112	Wood Warbler *Phylloscopus sibilatrix*	LC	SPEC Cat. 2	D			II	II		
113	Common Chiffchaff Phylloscopus collybita	LC	Non-SPEC	S			II	II		
114	Willow Warbler *Phylloscopus trochilus*	LC	Non-SPEC	S			II	II		
115	Goldcrest *Regulus regulus*	LC	Non-SPEC-E	S			II	II		
116	Firecrest *Regulus ignicapilla*	LC	Non-SPEC-E	S			II	II		
117	Spotted Flycatcher *Muscicapa striata*	LC	SPEC Cat. 3	H			II	II		

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
118	Collared Flycatcher *Ficedula albicollis*	LC	Non-SPEC-E	S	I	Included	II	II		
119	European Pied Flycatcher *Ficedula hypoleuca*	LC	Non-SPEC-E	S			II	II		
120	Long-tailed Tit *Aegithalos caudatus*	LC	Non-SPEC	S			III			
121	Marsh Tit *Parus palustris*	LC	SPEC Cat. 3	D			II			
122	Sombre Tit *Parus lugubris*	LC	Non-SPEC-E	S			II			
123	Coal Tit *Parus ater*	LC	Non-SPEC	S			II			
124	Blue Tit *Parus caeruleus*	LC	Non-SPEC-E	S			II			
125	Great Tit *Parus major*	LC	Non-SPEC	S			II			
126	Wood Nuthatch *Sitta europea*	LC	Non-SPEC	S			II			
127	Western Rock Nuthatch *Sitta neumayer*	LC	Non-SPEC-E	S			II			
128	Eurasian Treecreeper *Certhia familiaris*	LC	Non-SPEC	S			II			
129	Eurasian Penduline Tit *Remiz pendulinus*	LC	Non-SPEC	S			III			
130	Eurasian Golden Oriole *Oriolus oriolus*	LC	Non-SPEC	S			II			
131	Red-backed Shrike *Lanius collurio*	LC	SPEC Cat. 3	H	I	Included	II			
132	Lesser Grey Shrike *Lanius minor*	LC	SPEC Cat. 2	D	I	Included	II			
133	Great Grey Shrike *Lanius excubitor*	LC	SPEC Cat. 3	H			II			
134	Woodchat Shrike *Lanius senator*	LC	SPEC Cat. 2	D			II			
135	**Masked Shrike *Lanius nubicus***	LC	SPEC Cat. 2	D	I		II			
136	Eurasian Jay *Garrulus glandarius*	LC	Non-SPEC	S	II/B		Not included			
137	Black-billed Magpie *Pica pica*	LC	Non-SPEC	S	II/B		Not included			
138	Eurasian Jackdaw *Corvus monedula*	LC	Non-SPEC-E	S	II/B		Not included			
139	Rook *Corvus frugilegus*	LC	Non-SPEC	S	II/B		Not included			
140	Hooded Crow *Corvus cornix*	LC	Non-SPEC	S	II/B		Not included			
141	Common Raven *Corvus corax*	LC	Non-SPEC	S			III			
142	Common Starling *Sturnus vulgaris*	LC	SPEC Cat. 3	D	II/B		Not included			
143	Rosy Starling *Sturnus roseus*	LC	Non-SPEC	S			II			

Nr	Species	IUCN	SPEC	ETS	Birds Directive	Emerald Network	Bern Convention	Bonn Convention	AEWA	CITES
144	House Sparrow *Passer domesticus*	LC	SPEC Cat. 3	D			Not included			
145	Spanish Sparrow *Passer hispaniolensis*	LC	Non-SPEC	S			III			
146	Eurasian Tree Sparrow *Passer montanus*	LC	SPEC Cat. 3	D			III			
147	Rock Sparrow *Petronia petronia*	LC	Non-SPEC	S			II			
148	Eurasian Chaffinch *Fringilla coelebs*	LC	Non-SPEC-E	S			III			
149	Brambling *Fringilla montifringilla*	LC	Non-SPEC	S			III			
150	European Greenfinch *Carduelis chloris*	LC	Non-SPEC-E	S			II			
151	European Goldfinch *Carduelis carduelis*	LC	Non-SPEC	S			II			
152	Eurasian Linnet *Carduelis cannabina*	LC	SPEC Cat. 2	D			II			
153	Eurasian Bullfinch *Pyrrhula pyrrhula*	LC	Non-SPEC	S			III			
154	Hawfinch *Coccothraustes coccothraustes*	LC	Non-SPEC	S			II			
155	Yellowhammer *Emberiza citrinella*	LC	Non-SPEC-E	S			II			
156	Cirl Bunting *Emberiza cirlus*	LC	Non-SPEC-E	S			II			
157	Rock Bunting *Emberiza cia*	LC	SPEC Cat. 3	H			II			
158	Ortolan Bunting *Emberiza hortulana*	LC	SPEC Cat. 2	H	I	Included	III			
159	Black-headed Bunting *Emberiza melanocephala*	LC	SPEC Cat. 2	H			II			
160	Corn Bunting *Miliaria calandra*	LC	SPEC Cat. 2	D			III			

Table 6-79 Threat levels assigned to the ornithofauna in the railway corridor (Kumanovo - Deve Bair)

Fishes

The assessment of species value for fishes has been done according to the IUCN European Red List and the Habitat Directive as shown in table below.

	Fishes	HD	IUCN	Distribution in MK/ endemism
1	*Squalius cephalus L*		LC	
2	*Chondrostoma nasus L*		LC	
3	*Gobio gobio L*		LC	
4	*Barbus macedonicus*		DD	Balkan endemic
5	*Barbus balcanicus*		LC	Balkan endemic
6	*Vimba melanops*		DD	
7	*Alburnus alburnus*		LC	
8	*Cobitis taenia*	II	LC	
9	*Salmo trutta*		LC	

Table 6-80 Threat levels assigned to the ichtyofauna in the railway corridor (Kumanovo - Deve Bair)

From the fishes reported to be present in the permanent water courses along the railway corridor, all of them are listed as species of Least Concern or Data Deficient in the IUCN European Red List. Two of them are endemic and one is listed in Annex II of Habitat Directive (Animal and plant species of community interest whose conservation requires the designation of special areas of conservation). These three species and the trout, which is characteristic of the clean waters of the upper streams of the Kriva river will be considered as the sensitive fish species to be considered in the assessment of impacts:

- *Barbus macedonicus*
- *Barbus balcanicus*
- *Cobitis taenia*
- *Salmo trutta*

Amphibians and Reptiles

The assessment of species value for amphibians and reptiles has been done according to the international conventions and legislation for protection of threatened species at European and Global levels. The same lists as the ones used for mammals were used.

The last column shows the species that are restricted to small areas in Macedonia, like *A.kitaibelii*, and also species or subspecies that are endemic for the Balkans such as *B.variegata scabra*, *R.graeca*, *E.hermanni boettegeri* and *P.erhardii riveti*.

Figure 6-24 The Erhard's wall lizard (*Podarcis erhardii*), a Balkan endemic species

Table below shows the threat level assigned to each of the 9 amphibian species and 17 reptile species present or potentially present in the railway corridor, according to these red lists.

In this table, those species showing the highest level of threat in any of the red lists considered have been marked by highlighting in orange the corresponding box. From the species list that results from this first screening, the list has been reduced by selecting those that are endemic and are categorized as Near Threatened, Vulnerable, Endangered, or Criticaly Endangered, under IUCN red list.

Species		Convention					
	Amphibians	**Bern**	**HD**	**Emerald**	**CITES**	**IUCN**	**Distribution in MK/ endemism**
1	*Lissotriton vulgaris*	III				LC	
2	*Salamandra salamandra*	III				LC	
3	*Bombina variegata*	II	IV	X		LC	Balkan endemic
4	*Rana graeca*	III	IV			LC	Balkan endemic
5	*Pelophylax ridibundus*	III				LC	
6	*Rana dalmatina*	II	IV			LC	
7	*Bufo bufo*	III				LC	
8	*Pseudopidalea viridis*	II	IV			LC	
9	*Hyla arborea*	II	IV			LC	
	Reptiles						
10	*Eurotestudo hermanni*	II	IV	X	II		Balkan endemic
11	*Testudo graeca*	II	IV	X	II	VU	
12	*Anguis fragilis*	III					
13	*Ablepharus kitaibelii*	II	IV			LC	Rare distribution
14	*Podarcis muralis*	II	IV			LC	
15	*Podarcis erhardii*	III	IV			LC	Balkan endemic
16	*Podarcis taurica*	II	IV			LC	
17	*Lacerta viridis*	II	IV			LC	
18	*Lacerta trilineata*	II	IV			LC	
19	*Platyceps najadum*	II	IV			LC	
20	*Zamenis longissimus*	II	IV			LC	
21	*Elaphe quatuorlineata*	II	IV	X			
22	*Coronella austriaca*	III	IV				
23	*Dolichophis caspius*	II	IV				
24	*Natrix natrix*	III				LR/LC	
25	*Natrix tessellata*	II	IV			NT	
26	*Vipera ammodytes*	II	IV			LC	

Table 6-81 Threat levels assigned to the ornithofauna in the railway corridor (Kumanovo - Deve Bair)

Using these screening criteria, the list of sensitive amphibian and reptile species to be considered in the assessment of impacts is as follows:

<u>Amphibians</u>

- *Bombina variegata*
- *Rana graeca*

<u>Reptiles</u>

- *Eurotestudo hermanni*
- *Testudo graeca*

- *Ablepharus kitaibelii*
- *Podarcis erhardii*
- *Natrix tessellata*

Insects

The assessment of species value for insects has been done according to the international conventions and legislation for protection of threatened species at European and Global levels, including the IUCN red list, the Bern Convention and the Habitats Directive.

In table below, those species showing the highest level of threat in any of the red lists considered have been marked by highlighting in orange the corresponding box.

	Species		IUCN	Bern Convention	EU Habitats Directive
2.	*Paracaloptenus caloptenoides*	Orthoptera			II/IV
3.	*Anax imperator*	Odonata	LC		
4.	*Calopteryx splendens*	Odonata	LC		
5.	*Cordulegaster bidentata*	Odonata	NT		
6.	*Cordulia aenea*	Odonata	LC		
7.	*Ischnura elegans*	Odonata	LC		
8.	*Orthetrum albistylum*	Odonata	LC		
9.	*Orthetrum brunneum*	Odonata	LC		
10.	*Orthetrum cancellatum*	Odonata	LC		
11.	*Platycnemis pennipes*	Odonata	LC		
12.	*Symmpetrus sanguineum*	Odonata	LC		
13.	*Carabus intricatus*	Coleoptera	LR/NT		
14.	*Cerambyx cerdo*	Coleoptera	VU	II	IV
15.	*Morimus funereus*	Coleoptera	VU		II
16.	*Lucanus cervus*	Coleoptera			II
17.	*Euphydryas aurinia*	Lepidoptera		II	
18.	*Phengaris arion*	Lepidoptera	LR/NT	II	
19.	*Lycaena dispar*	Lepidoptera	LR/NT	II	II/IV
20.	*Parnassius mnemosyne*	Lepidoptera		II	IV
21.	*Zerynthia polyxena*	Lepidoptera		II	IV

Table 6-82 Threat levels assigned to the insect fauna in the railway corridor (Kumanovo - Deve Bair)

Using these screening criteria, the list of sensitive insect species to be considered in the assessment of impacts is as follows:

- *Paracaloptenus caloptenoides*
- *Cordulegaster bidentata*
- *Cerambyx cerdo*
- *Morimus funereus*
- *Lycaena dispar*
- *Parnassius mnemosyne*
- *Zerynthia polyxena*

Among these, special attention should be paid to *Morimus funereus* (longhorn beetle) characteristic of old forests. It is enlisted as vulnerable (VU) according to the IUCN red list due to the decline of the quality of the forest habitats in Europe. This species is quite common in Macedonia and occurs in various forest types. In the railway corridor area it is present mainly in the submontane beech forests with stable populations.


Figure 6-25 The Clouded Apollo (*Parnassius mnemosyne*) – left, and the stag beetle (*Lucanus cervus*) – right.

As a summary of the assessment of the value or sensitivity of fauna receptors present or potentially present in the railway corridor, it is considered that the overall sensitivity is medium.

6.2.9.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on fauna have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

<u>Construction phase</u>

Decrease in animal populations due to:

- Killing of animals by vehicles and machinery/illegal hunting by construction workers;
- Destruction of nests, burrows, and other animal sheltering/breeding structures;
- Animals moving away from the area due to the presence of humans and running vehicles and machinery.

<u>Operation phase</u>

Decrease in animal populations due to:

- Killing of animals by trains;
- Animals moving away from the area due train traffic.

CONSTRUCTION PHASE

Decrease in animal populations

Right-of-way construction activities along a railway alignment may adversely affect wild animal populations, including terrestrial, aerial and aquatic species.

For terrestrial and aerial species (mainly birds and several species of insects), the main deleterious effects that may reduce local wildlife populations would come from:

- Traffic of construction vehicles and machinery in the construction areas and access roads, which may cause death or damage to individuals due to collisions or crushing;
- Destruction or loss of nesting sites and other animal sheltering/breeding structures. These may include bird nests in trees to be cut, or rocks/earth to be removed/buried in the construction of cuttings and embankments; bat roosts in hollows, crevices, foliage, and even the partially constructed tunnels in Section 2; or ground burrows of hare, mice, and other medium to small mammals, which can be destroyed with earth movements. Some species of amphibians and reptiles that have underground burrows or develop their periods of hibernation or aestivation buried may also be affected. Reptiles tend to bury their spawn in the surface layers of sand, earth or among plant debris, so the site preparation work may affect their position;
- Illegal hunting and poaching that could be practiced by construction workers while not on duty;
- Visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment may cause the avoidance of the area by most of the wild animal, which prefer quite areas;
- Destruction of habitats (already discussed in Section 6.2.9.3).

With regards to the sensitive species of fauna identified in the railway corridor it is most likely that during construction works large mammals like the bear and the wolf, and also the smaller ones, wildcat and marbled polecat will avoid the area.

As for the bat species, since it can be assumed that their shelters can be found in various habitats, including tunnels, natural or artificial caves, rock crevices, tree holes, roofs of houses, etc., construction works are likely to affect them. Bats usage of these sites may be as maternity sites (where babies are born and raised to independence), hibernation sites (where bats may be found during the winter), mating sites (where males and females gather during the autumn), feeding sites (where bats rest between feeding bouts during the night but are rarely present by day), transitional or swarming sites (where bats may be present during the spring or autumn) or summer roost (used by males and non-breeding females).

The most significant impact of railway construction upon bats will be the destruction of these sites during the clearance phase of the scheme, namely treefelling, the removal of hedgerows and other vegetation, during the execution of earth movements for making embankements, cuttings and tunnels, during works for completing unfinished tunnels, and during demolition of buildings.

For birds, several nests of imperial eagle, falcon peregrine, black stork or long legged buzzard are recorded to exist in the proximity of the railway corridor. Moreover, most of the first half of the railway corridor runs within the IBA River Pcinja-River Petrosnica- Kriva river, and the other half between two Emerald sites, Pchinja-German and Osogovo, and within Osogovo, at the end of the corridor. Therefore, it could be possible that nests of sensitive species were encountered during the construction of the railway near or in the construction area.Sensitive species of amphibians include *Bombina variegata* and *Rana graeca*, which inhabit beech, oak and riparian forests, and therefore may be affected by construction works in Section 3. As for reptiles, *Eurotestudo hermanni*, *Testudo graeca*, *Ablepharus kitaibelii*, and *Podarcis erhardii* may inhabit oak and riparian forests and areas of hill pasture, while *Natrix tessellate* can be found in riparian areas. It would also possible to find these species in the construction area.

Sensitive species among insects include *Cerambyx cerdo* and *Morimus funereus* that can be found in oak forests and beech forests, *Lycaena dispar* in riparian habitats, and *Paracaloptenus caloptenoides*, *Parnassius Mnemosyne*, and *Zerynthia polyxena*, that can be found in areas of pastures. Therefore, could also be found in the construction area.

For aquatic species, the adverse effects contributing to the reduction of local animal populations would mainly come from the construction works to be carried out in rivers and streams, and would include:

- Disruption of flow in watercourses for the construction of drainage structures and bridge pillars (excavation of earth, stones and rocks and filling with construction materials). This may destroy shelter, spawning and nursery sites for aquatic mammals, fishes and other hydrobionts;
- Increase in turbidity of surface water and disruption of the waterbed by deposition of sediments from soil erosion due to construction works and stormwater runoff. The disturbance to the stream bed may hinder salmonid spawning; turbidity may affect fish gills and make breathing difficult; it also may make the benthic macroinvertebrates that serve as food to salmonids to flee away;
- Water pollution from spills of vehicles and construction machinery, in particular oils and lubricants, which could result in a high mortality of hydrobionts;
- Water pollution with domestic sewage effluents from a 200 population workers, which could give rise to eutrophication, changes in biocenosis composition, and mortality of most sensitive species;
- Illegal fishing by workers.

With regards to species associated to aquatic media, the construction works will cause the destruction of temporary pools, especially those along Section 2 of the alignment. This will result in direct kill of living organisms in these standing water biotopes. However, it should be taken into account that these biotopes are man-made habitats created after the earth works on the railway more than 5 years ago.

Identified sensitive species of fishes like *Barbus macedonicus*, *Barbus balcanicus*, and *Cobitis taenia* would be found in the Kriva and Pcinja rivers, in stretches with fast current, over stone and gravel bottom. *Salmo trutta* would only be found in the upper course of the Kriva river. Among mammal species associated to aquatic environments, the otter (*Lutra lutra*) could be encountered during construction works in riparian habitats.

<u>Estimation of magnitude</u>

The magnitude of this impact has been evaluated in a qualitative manner. For this purpose, the construction works to be accomplished in each Section and the potential presence of relevant sensitive species in the habitats along the railway corridor have been considered. Riparian and river habitats and terrestrial habitats are addressed separately, as the species affected and the effects that might generate the decrease in their populations are different.

In considering the magnitude of the impact, the local and temporary characteristics of the effects are taken into account. This is, the killing of animals or destruction of/affection to their nesting/sheltering sites will occur at the specific location where the damaging construction activities take place, and during the time this activities take place at this location.

The magnitude of this impact during construction works in Section 1 during Stage 1 is estimated to be negligible for most of the railway corridor because of the low intensity of the construction works (rehabilitation of the existing way) and the poorer biodiversity in this area dominated by human settlements and agricultural activity. This is so, except for the area of the Pcinja river (between K.P. 24 and K.P. 25), where a new bridge will be constructed, and at some punctual spots, where the railway line runs close to hill pastures (along K.P. 11 to K.P. 15), or close to areas of riparian communities next to the Pcinja river (between K.P. 16.5 and K.P. 19), and from K.P. 28.5 to the end of the section, where hill pastures start to dominate in one side of the railway alignment and riparian vegetation in the river side.

At these points, and particularly at the Pcinja river, the magnitude of the impact increases as the works in the river bed for the construction of the bridge, and in areas close to the river, will alter their conditions, potentially affecting to sensitive fish populations (e.g. *Barbus macedonicus*, *Barbus balcanicus*, and *Cobitis taenia*) and other sensitive populations such as that of otter (*Lutra lutra*) that may be present in the area. In fact, the River Pcinja - Staro Nagoricane village area for the management of otter is located along the Pcinja river, North of the railway corridor, and limits with the railway.

The end of Section 1 and practically all Section 2 (except for the stretch between K.P. 54 and K.P. 60) of the railway corridor is dominated by hill pastures, often alternating with degraded xerothermophilous oak forest. The corridor also crosses numerous streams tributary of the Kriva river. In this section, most of the construction works which could result in any impact on fauna was completed by 2004. Since then, however, many animals, particularly the smaller ones, may have recolonized the area. For instance, bats have started colonizing the tunnel that was constructed at that time.

Although with less intensity than if the Section was to be newly constructed, the works that need to be completed in tunnels and bridges will potentially cause damage to animal populations. Of the 14 tunnels to be constructed, in 4 of them the Entrance/Exit approach cutting is to be performed. Direct killing of animals by collision or crushing and destruction of nesting sites and shelters of sensitive species such as bats, small rodents, reptiles, amphibians and reptiles may occur. Sensitive species affected could include Hermann'Tortoise (*Eurotestudo hermanni*), greek tortoise (*Testudo graeca*), snake-eyed Skink (A*blepharus kitaibelii*), Erhard's wall lizard (*Podarcis erhardii*), grasshopper (*Paracaloptenus caloptenoides*), sombre goldenring (*Cordulegaster bidentata*), greater capricorn beetle (*Cerambyx cerdo*), long-horned beetle (*Morimus funereus*), large cupper butterfly (*Lycaena dispa*r) or southern festoon butterfly (*Zerynthia polyxena*). The rehabilitation and completion of the tunnels already or partially constructed will affect the population of the Great Horseshoe bat (*Rhinolophus ferrumequinum*) and other bats that are colonizing these sites.

For the 34 bridges in this section, the substructure is complete in all of them but 7; 6 have to be built and 1 has to be completed. One of them is the Vakuf bridge at K.P.41+350, which will cross the Kriva river valley at a very high level (about 60 meters above the river), in anticipation to a project of dam just upstream. The others will be constructed above tributaries of the Kriva river, in a close location upstream. Therefore, the populations of animals associated to these water courses, including the Kriva river, like otter (*Lutra lutra*) and fish (e.g. *Barbus macedonicus*, *Barbus balcanicus*, and *Cobitis taenia*), may be affected. It is noted that between K.P. 31 and K.P. 44, the Kriva Reka – Beljakovce village area designated for the management of otter (and also birds) can be found.

The highest intensity of the impact is expected to occur in Section 3, where the railway line will be newly built. The main works will comprise of the execution of earthworks and drainage, the construction of 47 bridges and 23 tunnels, the reconstruction of the border tunnel, the construction of 23.5 km main track and 4.3 km station tracks, and the construction of a substation west of KrivaPalanka.

The first 5 to 6 km of the railway corridor, up to the vicinity of the town of Kriva Palanka in K.P. 71, habitat conditions are similar to those of Section 2. However, since this stretch has never been disturbed, the intensity of the impact would then be higher (more animals displaced/killed, more nesting/nursing/shelter sites destroyed, more water courses disrupted/polluted). In this stretch the railway alignment intersects with the Osogovo-German landscape biocorridor, where larger animals populations could be expected. It would be reasonable to assume that the animals that use this corridor would move away and avoid the construction site, thus avoiding being killed or hurt.

In Kriva Palanka (K.P.71 to K.P. 74) the railway crosses the town, part of it throughout a tunnel. Impacts on animals would be expected to occur during the construction of the railway and the station, but it is presumed most of them would affect domestic type of fauna.

From P.K. 74 to the end of the railway line in the Bulgarian border, the railway corridor is mostly dominated by oak forests (more degraded in the proximities of Kriva Palanka and well preserved as the alignment advances towards the border), with areas of submontane beech in the north-faced slopes, at the end of the alignment between K.P. 81.5 and K.P. 84.5. The railway alignment runs parallel to the Kriva river, crosses it once, and crosses two tributaries by means of bridges.

In the rich biodiversity oak and beech forests, the construction works will be affecting populations of various species, especially of smaller animals, including sensitive species potentially present in this area such as Hermanns Tortoise (*Eurotestudo hermanni*), greek tortoise (Testudo graeca), snake-eyed Skink (*Ablepharus kitaibelii*), Erhard's wall lizard (*Podarcis erhardii*), grasshopper *Paracaloptenus caloptenoides,* sombre goldenring (*Cordulegaster bidentata*), greater capricorn beetle (*Cerambyx cerdo*), long-horned beetle (*Morimus funereus*), large cupper butterfly (*Lycaena dispar*) or southern festoon butterfly (*Zerynthia polyxena*). The larger animals, like the wild boar, the roe deer, or sensitive species like the grey wolf (*Canis lupus*) or the wildcat (*Felis sylvestris*) would most likely avoid the area during construction works, using alternative paths.

The impact to bird populations in Section 3 will also be more important, as trees as well as other sites where they make their nests (a depression or a burrow dug into the ground, a pile of vegetation and earth) may be destroyed as the vegetation is cleared and earth movements executed. The same may occur with bat roost sites, which are often made in cavities and crevices of trees and rocks.

The disturbance of river and riparian areas for the construction of bridge pillars or through erosion and polluted influents from the nearby railway construction works may affect the populations of sensitive fishes like the trout (*salmo trutta*), and mammals like otter (*Lutra lutra*).

The overall magnitude of impact decrease in animal populations during construction is considered as low. The effects that may generate the decrease in animal populations are not expected to adversely affect their integrity; they will occur for a short period of time at the site of the construction front and the populations have the capability to recover their numbers once the construction front passes the site.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct / Cumulative	The decrease of local animal population results from killings and destruction of nesting/sheltering sites produced by the construction activities.
Reversibility	Reversible	The animal populations have the capability to recover after construction works. This will happen for populations associated to aquatic environments under bridges.
Geographic Extent	Local	The decrease will affect local populations in the footprint of the project
Time when the impact occurs	Imediate	The effects will occur while the construction works take place.
Duration	Short term	The effects will last the time the construction works take place at a given location
Likelihood of appearance	Probable	Killing and destruction of nesting/sheltering sites are unavoidable; therefore, there are chances that animal population numbers are affected.
Magnitude	Low	See above

Table 6-83 Assesment of impact

For fauna receptors having a medium sensitivity, according to the sensitivity matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Slight.

OPERATIONAL PHASE

Decrease in animal populations

During the operational phase, negative impacts on wild animal population levels may also occur due to animals being killed on the tracks by the trains or by the fixed physical structures associated to the railway, and by drived from the area due to the disturbance by the train movements.

Wildlife mortality due to collisions with trains can be significant; mammals and birds are particularly vulnerable, but reptiles and amphibian are also victims.

For many reptiles, the sun-exposed, sandy embankments form suitable habitat and corridors for seasonal migrations or the colonization of new habitats where they find suitable places for wintering or maintaining (high) body temperature. The rail lines may also be used as resting sites and as a shelter by smaller animals, especially in rainy days. It may also offer possible den sites (e.g. red fox and badger dens in railroad embankments) or dormitories (e.g. bats and bears in railroad tunnels).

Individual animals may l try to cross the railway in search of food and water, new territories, or mating, and be hit by a train. Furthermore, the presence of live and dead animals near or in the railway track will in turn attract other wildlife to railroads, predators and carrion eaters, among them, sensitive mammal species like the bear, the wolf, the bobcat or the marble polecat or prey birds like buzzards, falcons or eagles and carrion eaters birds like vultures.

Another factor that may attract animals and and put them at risk from rail traffic are grain spills from freight trains during normal operations and occasionally due to accidental spills.

Fences will be installed in the parts of the right of way corresponding to tunnels or bridges in forested areas and in non-populated open terrains. These fences should deter animals from crossing the railway and lead them towards adequate railway crossing sites. Escaping devices will be provided to allow animals, which accidentally enter in the railway corridor, leaving the area.

During winter, small clearings of snow along the railway will be carried out every 50-100 m in the areas of biocorridors Osogovo-BilinaPlanina and Osogovo-German.

Birds deaths can occur through train impacts, through the disorientation in the headlights of the train or sucked into the path of the train by the air currents created by the train. This latter point may be especially true for larger birds in narrow, long and high cuttings where their escape routes from an approaching train are limited.

Birds may also be killed by electrocution on the overhead electricity transmission lines of the railway infrastructures. The pole top where the power line is attached, often used as a perch site represents a high electrocution risk for birds. Also, a configuration of the overhead electrical lines and the catenary in different planes increases the risk of bird electrocution.

The displacement of some species of fauna from along the route of the railway may occur due to disturbance form noise, light, and pollution from trains as well as associated activities (e.g. maintenance, and management of the right-of-ways), as already described in the habitat fragmentation impact. There is also the degradation of habitat quality; storm water discharges, alterations in stream hydrology can degrade habitats ranging up to several hundred meters from railways. Finally, an increase of the local population induced by the railroad could result in an undesirable increase of hunting and poaching.

Estimation of the Magnitude

The magnitude of this impact has been evaluated in a qualitative manner, taking into account the likely presence of relevant sensitive species in the habitats along the railway corridor, and the overlap of the corridor with prospective designated areas and important regional biocorridors (expected to become part of the national ecological network of the Republic of Macedonia).

Thus, mortality rates may be expected to be higher at the interSection of railroads with important wildlife habitats and migration routes, and the effects of mortality would be generally more important in those areas with higher biodiversity and hosting sensitive fauna species.

In this regards, Section 1 of the alignment is dominated by human settlements, agricultural land, other cultivation areas, and the already constructed railway. It is an area of poor biodiversity, at least for terrestrial animals, where, nonetheless, identified sensitive species like the wolf or the wildcat may be occasionally present in search of food.

It is anticipated that in this Section 1, fauna mortality due to the passing trains and the railway infrastructures would affect birds to a greater extent, since from approximately K.P .15 to K.P. 55, the alignment crosses IBA River Pcinja-River Petrosnica-River Kriva Reka (IBA Code: MK006). This IBA hosts Imperial eagle, European roller, Long-legged buzzard, Peregrine falcon, Lanner falcon, Short-toed snake eagle, Black stork, and Masked shrike, all of them sensitive bird species. Zubovce village, an area designated for the management of large birds of prey such as Imperial eagle and Long-legged buzzard, lies immediately to the South of the railway between K.P. 19 and K.P. 28.

Moreover, the proposed protected area Bislimska Klisura Gorge on river Pcinja, known by the nesting sites of several birds of prey, is less than 1 km South of P.K. 16 of the railway alignment. This area is also presumably rich in bat fauna that could potentially be affected by the railway.

As indicated above, IBA MK006 extends until K.P. 55 of the railway alignment. This Section 2 of the railway corridor lies almost entirely within this important bird area. It also intersects, between K.P. 31 and K.P. 44, Kriva Reka – Beljakovce village, an area designated for the management of birds of prey (Imperial eagle, Long-legged buzzard), Black stork, and Roller.

Practically all Section 2 (except for the stretch between K.P. 54 and K.P. 60) of the railway corridor is dominated by hill pastures, often alternating with degraded xerothermophilous oak forest. These two habitats are rich habitats concerning animal biodiversity and host most of the identified terrestrial sensitive species: several bats, wolf (*Canis lupus*), marbled polecat (*Vormela peregusna*), Hermanns Tortoise (*Eurotestudo hermanni*), greek tortoise (Testudo graeca), snake-eyed Skink (*Ablepharus kitaibelii*), Erhard's wall lizard (*Podarcis erhardii*), grasshopper *Paracaloptenus caloptenoides,* sombre goldenring (*Cordulegaster bidentata*), greater capricorn beetle (*Cerambyx cerdo*), long-horned beetle (*Morimus funereus*), large cupper butterfly (*Lycaena dispar*) or southern festoon butterfly (*Zerynthia polyxena*), as well as bats.

Thus, it is considered that in Section 2, the risk of animals being killed by passing trains and the electrical infrastructures of the railway will be highest for flying species (birds and bats) as well as for terrestrial species of mammals, amphibians, reptiles and insects because: 1) hill pastures and oak forests are rich in biodiversity and host many sensitive species of these animal classes, 2) there are long stretches without bridges and tunnels (more than 2 km in some areas) where terrestrial animals are prone to crossing the tracks, thus increasing their probabilities of being hit by the train, there are areas where the railway runs between high cutting talus, from where birds may find difficult to escape.

As for Section 3, the first 5 to 6 km of the railway corridor, up to the vicinity of the town of Kriva Palanka in K.P. 71, is a continuation of the high risk conditions for animal collision existing in Section 2, but increased by the fact this stretch of the railway alignment intersects with the Osogovo-German landscape biocorridor, extending from Osogovski Planini mountains, in the South, to the mountain German, in the North.

In Kriva Palanka (K.P.71 to K.P. 74) the railway crosses the town, and any animals fatalites which occurred in this Section would be expected to be dominantly domestic animals.

From P.K. 74 to the end of the railway line in the Bulgarian border, the railway corridor is mostly dominated by oak forests (more degraded in the proximities of Kriva Palanka and well preserved as the alignment advances towards the border), with areas of submontane beech in the north-faced slopes, at the end of the alignment between K.P. 81.5 and K.P. 84.5. These oak and beech forests have a rich biodiversity and host sensitive species, including that of the bear (*Ursus arctos*) for which sporadic occurrences from Bulgaria, through Osogovo mountains have been registered. Other identified sensitive mammals known to be present in these areas are the grey wolf and the wildcat (*Felis sylvestris*). Reptiles are represented by Hermanns Tortoise, greek tortoise, and snake-eyed skink, and beetles by greater capricorn beetle and long-horned beetle.

Moreover, this part of the alignment overlaps with the Osogovo-Bilina Planina linear biocorridor that extends from the northern slopes of Osogovski Planini mountains to the road crossover Deve Bair to Bilina Planina. In the process of the national ecological network development, for which the brown bear (*Ursus arctos*) was selected as representative species (because the bear as a large animal has great ecological demands and so providing conditions for its conservation will at the same time provide conditions for free interaction among other organisms) this corridor was deemed to enable the main connection between populations of large carnivores from Osogovski Planini mountains to the northern border mountains, specifically Bilina Planina[3].

The area is also abundant in birds; in fact, the Special Protection Area (SPA) Osogovo (BG0002079) of the Natura 2000 network lies right across the border of the project railway corridor.

Although there are several tunnels in this part of the railway, there are several stretches of greater than 250 m where collisions with terrestrial animals could occur, as well as bridges, where birds and bats can also be hit by trains or electrocuted by aerial electrical lines and supporting poles.

For all of the above, the risk of collision and animals mortality, and therefore the potential for a decrease in animal populations is also considered to be high in Section 3.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct / Cumulative	The decrease in animal population result from direct killing by trains or railway infrastructure.
Reversibility	Irreversible	Once the decrease in population occurs, it may be difficult to revert.
Geographic Extent	Regional	Some species of large mammals like bear, wolf, roe deer, wild boar, etc, use large portions of the territory encompassing the mountains that are North and South of the alignment and the Bulgarian mountains East of the alignment.
Time when the impact occurs	Immediate	Populations would start decreasing as the railway starts to operate and collisions occur.
Duration	Long term	The effect will continue throughout the operational life of the railway.
Likelihood of appearance	Probable	Collisions may occur in any part of the alignment.
Magnitude	High	See above

Table 6-84 Assesment of impact

Considering the fauna receptors have a medium sensitivity, and according to the sensitivity matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Moderate or Large.

6.2.10 POTENTIAL IMPACTS ON PROTECTED AND DESIGNATED AREAS

6.2.10.1 VALUE OF PROTECTED AND DESIGNATED AREAS

For the assessment of the impacts on protected and designated areas, the following sensitivity ratings are assigned:

[3] The Project for development of the national ecological network in the Republic of Macedonia, implemented by the Macedonian Ecological Society (MES) and European Centre for Nature Conservation (ECNC) in cooperation with the Ministry of Environment and Physical Planning of the Republic of Macedonia in the period 2008-2011 has resulted with the following products:

• Map of the national ecological network (MAK-NEN) – identifying ecological corridors of large carnivores and restoration areas connecting the existing core areas of national importance, and

• Management Plan for Ecological Corridors of Brown Bear – as a tool for better understanding of ecological functions of core areas and corridors, connection of habitats and the concept of ecological networks in general.

Receptor	Sensitivity
Declared protected natural areas, Emerald sites and Natura 2000 sites	Very high
Proposed protected natural areas, ecological corridors	High
Proposed areas for the management of species, IBAs and IPAs	Medium
Other natural areas	Low
Areas subject to a high anthropogenic pressure (urban and industrial areas)	Negligible

Table 6-85 Protected and disgnated areas sensitivity ratings

According to this rating scale, the protected and designated areas in the railway corridor, which may be affected by the project, have the following sensitivities:

Protected / Designated area	Type	Main characteristics DISTANCE	Value
Monument of Nature Kuklica	Protected area	Specific geomorphological features. The railway alignment (km 43 of Section 2) is more than 500 meters towards the South.	Very high
Pchinja-German (MK0000029)	Emerald site	Type C, important for birds, other species and/or habitats. The eastern end of the railway project lies South of this site and intersects it between km 76 to 78.	Very high
Osogovo (MK0000026)	Emerald site	Type C, important for birds, other species and/or habitats. The railway runs parallel, North of the border of the site since km 54 to the end. The nearest distances are at the end of the alignment, since km 80, where the site lays about 1 km to the South.	Very high
Osogovo (BG0002079)	Natura 2000	Special Protected Area under Birds Directive. The site lies across the Bulgarian border and limits with the eastern end of the project	Very high
Osogovska Planina, (BG0001011)	Natura 2000	Special Area for Conservation under Habitat Directive. The site lies across the Bulgarian border and limits with the eastern end of the project	Very high
Osogovo-Bilina Planina	Ecological corridor	Daily, periodical or seasonal movements and migrations of animals or dispersal of plants. Important for amphibians, grey wolf, ungulates and brown bear. Intersected between km 77 and 89.	High
Osogovo-German	Landscape corridor	Daily, periodical or seasonal movements and migrations of animals or dispersal of plants. Important for amphibians, grey wolf, ungulates and brown bear. Intersected between km 64.5 and 68.5.	High
Bislimska Klisura. Gorge on river Pcinja	Proposed protected area	Nesting sites of several birds of prey and presumably rich bat fauna.	High

Protected / Designated area	Type	Main characteristics DISTANCE	Value
		Railway alignment (at km 17 of Section 1) runs more than 500 m to the North.	
Kiselicka Reka	Proposed protected area	Important for mammals and birds. Section 3 of the railway alignment intersects with this area between km 76 and 79.	High
Osogovo Mountains	Proposed protected area	Unique landscape characteristics and specific interactions of people with nature. Section 3 of the railway alignment runs parallel to the border of this proposed area (approximately 2 km to the North) and intersects it at the end, near the Bulgarian border (since km 83).	High
River Pcinja - Staro Nagoricane village	Management of species	Management of Otter. Section 1 of the railway alignment runs along the southern limit of this area between km 24 and 25.	Medium
Zubovce village.	Management of species	Management of large birds of prey (Imperial eagle, Long-legged buzzard). The railway alignment borders the northern limit of this area between km 18 and 27	Medium
Kriva Reka – Beljakovce village	Management of species	Management of Otter, birds of prey (Imperial eagle, Long-legged buzzard), Black stork, and Roller. The railway intersects with this area between km 31 and 44	Medium
River Vetunica	Management of species	Management of birds of prey (Long-legged buzzard and historical site of Egyptian vulture). The railway intersects with this area between km 50 and 53.	Medium
River Pcinja-River Petrosnica-River Kriva Reka (MK006)	Important Bird Area (IBA)	Important for Imperial eagle, Roller and Long-legged buzzard, Peregrine falcon, Lanner falcon, Short-toed snake eagle, Black stork, Masked shrike. Railway intersects this site between km 15 and 55.	Medium
Okonovo	Important plant area (IPA)	Selected based on the importance of habitats. The eastern end of the railway intersects this area (approx. km 83 to end of alignment)	Medium

Table 6-86 Protected and disgnated areas sensitivities

6.2.10.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

In order to carry out the assessment of potential impacts and likely significance on protected and designated sites, an Appropriate Assessment Screening, based on the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC) has been conducted.

More specifically, the assessment was prepared using a modified screening matrix of the European Communities (2002) Assessment of plans and projects significantly affecting Natura 2000 sites:

Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Thus, the sections corresponding to "Brief description of the project" and "Brief description of the Natura 2000 sites" have not been included, since this matrix forms part of this ESIA where project description and protected and designated sites are described in chapters 3 and 5, respectively. Also the Section corresponding to indicators of significance has not been developed as this is done in the Section corresponding to the description of the likely impacts on the protected/designated site as a whole.

In this assessment, in addition to the only two Natura 2000 sites (for which Article 6 of Directive 92/43/EC is intended) existing in the project area, which are Bulgarian, all the protected and designated sites in Macedonia have been included and assessed in the same way as Natura 2000 sites are assessed.

Screening matrix	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the protected/designated site.	**Construction phase** • Construction of the railway permanent way and right of way, and stations. • Construction of bridges and viaducts in valleys of permanent or stationary water courses. • Creation of landfill sites for inert waste in Section 3 in watersheds of the Kriva river forming short valleys (will be rehabilitated after railway construction works are completed). **Operational phase** • Physical presence of the permanent way, right of way, stations. • Trains traffic. • Electrical overhead electricity transmission lines. • Maintenance operations in the railway line.
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the protected/designated site by virtue of: • size and scale; • land-take; • distance from the Natura 2000 site or key features of the site; • resource requirements (water abstraction etc.); • emissions (disposal to land, water or air); • excavation requirements; (potential loss of area). • transportation requirements; duration of construction, operation, decommissioning, etc.; • other.	**Construction phase** • Permanent elimination of vegetation and earth movements in the land strip necessary to lay the permanent way and right of way of the railway corridor, and stations (sections 2 and 3). • Temporary occupation of land for the installation of construction camps, access to construction sites and storage of materials (sections 1, 2, 3). • Temporary presence of workers. • Traffic and movement of vehicles and machinery in the construction site and access roads. • **Operational phase** • Permanent land take by the railway linear structure forming a band devoid of original vegetation. • Passing of trains • Creation of air currents by the passing of the train • Colonization of railway ballast by small animals • Transmission of electricity through overhead lines • Headlights of locomotives • Noise of passing trains • Effluent from railway drainage system contaminated with hydrocarbons and metals. • Effluent from railway drainage system contaminated with herbicides. • Herbicide transported by wind to areas adjacent to railway.
Describe any likely changes to the site arising as a result of:	**Construction phase** ***Permanent and temporary destruction and loss of the habitats*** along the land strip along the railway corridor.

Screening matrix	
• reduction of habitat area; • disturbance to key species; • habitat or species fragmentation; • reduction in species density; • changes in key indicators of conservation value from the site, (water quality etc.); • climate change.	***Temporary reduction of habitat area*** by severance of riparian bicorridors, Frightening of wild animals, causing them not to use the biocorridor. ***Death or damage to terrestrial individuals*** due to collisions or crushing by vehicles and machinery, destruction of nesting and sheltering sites, illegal hunting, alteration of quietness conditions by excessive movements, noise and light. ***Death or damage to animals associated to aquatic environment***s due to direct destruction of shelters, spawning and nursery sites for aquatic mammals, fishes and other hydrobionts; increased turbidity of surface water and disruption of the waterbed by deposition of sediments; water pollution from spills of vehicles and construction machinery (e.g. oils and lubricants) and domestic sewage effluents from workers camps, Illegal fishing by workers. **Operational phase** ***Permanent habitat fragmentation and severance effect***; physical barrier for small animals; virtual barrier for larger animals represented by trains passing frequently; animals fleeing from railway adjacent areas disturbed by noise and lights. ***Death or damage to terrestrial individuals*** due to them being hit by passing trains as the animal tries to cross the track , is resting on the rail or is searching for a prey or eating carrion; collision of birds attracted by headlight or sucked by air currents; electrocution of birds in the overhead lines and other electrified structures of the railway ***Death or damage to animals associated to aquatic environments*** due to contamination of riparian habitats and water bodies with effluent from the railway drainage system contaminated with hydrocarbons, metals and herbicide. ***Damage to plant formations*** outside the target maintenance areas due to the effect of herbicides transported by runoff water from the railway drainage system or wind.
Describe any likely impacts on the protected/designated site as a whole in terms of: Interference with the key relationships that define the structure of the site; interference with key relationships that define the function of the site.	The construction and operational activities could cause a reduction of animal population, particularly birds and to a lesser extent bats. In sections 1 and 2, the railway crosses IBA River Pcinja-River Petrosnica-River Kriva Reka (MK006), and bird management areas Zubovce village (the railway borders this area), Kriva Reka – Beljakovce village and River Vetunica. Both during construction and operation birds may die or injured (mainly due to collisions with passing trains), or their nests destroyed or damaged (mainly during clearance of the terrain during construction). These designated areas are important for the presence of sensitive bird species such as the Imperial eagle, Long-legged buzzard, Black stork, Roller, Peregrine falcon, Lanner falcon, Short-toed snake eagle, or Masked shrike. Bislimska Klisura. The Gorge on river Pcinja, located 500 meters South of the railway is important for nesting sites of several of these birds of prey and is presumably rich in bat fauna. Therefore, its bird and bat populations could also potentially be affected by the operation of the railway. The areas crossed by the railway alignment have been classified as having medium sensitivity. Given the large extension of these bird

Screening matrix	
	areas with a good conservation, it is estimated that there could be some loss of resource (mainly birds killed by the passing trains or electrocuted in overhead power lines), but it would not affect the integrity of the sites. The magnitude of the impact is estimated to be low. The construction activities and operational activities of the railway project could cause a reduction of the vegetation cover (by destruction of plant indiduals and growth inhibiting effects of herbicides) in IPA Okonovo, intersected by the railway at the end of the alignment (km 83 to end). This is a medium sensitivity site, where no affection to the integrity of the site is expected. The impact is estimated to be low. The construction and operational activities may have a habitat fragmentation effect and reduction of animal populations that could affect high and very high sensitivity designated areas in the eastern part of the alignment, particularly in Section 3, where the railway passes near or crosses Emerals sites Pchinja-German (MK0000029) and Osogovo (MK0000026), ecological corridors Osogovo-Bilina Planina and Osogovo-German, proposed protected areas Kiselicka Reka and Osogovo Mountains. Moreover, two overlapping Natura 2000 sites lie across the Bulgarian border, which are a continuation of the Macedonian Emerald sites: Special Protection Area (SPA) for birds Osogovo (BG0002079) and Special Area for Conservation (SAC) Osogovska Planina, (BG0001011). These areas are important for the presence of European priority species such as the grey wolf, whose presence in these areas is certain, and the brown bear, whose presence in the project area is rare; one of the aims of the Emerald sites and the ecological corridors being the establishment of sound bear populations in the future in these Macedonian areas. Other important animals for which these areas have been designated are ungulates, particularly roe deer, and birds. The railway alignment occupies small extensions of these designated areas, but given that it completely intersects the two designated ecological corridors that enable the various daily, periodical and seasonal movements and migrations of different animals, it is considered that if measures to warrantee the permeability of the railway corridor are not taken, the integrity of the sites could be affected. The magnitude of the impact would be high.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	The impacts are likely to have be a moderate to large significance in Section 3 where the severance effect of the railway project, particularly on ecological corridors Osogovo-Bilina Planina and Osogovo-German, may hinder animal movements, including those of European priority species such as wolf and bear, across the different important designated sites in the vicinity of this part of the railway corridor.

Table 6-87 Screenig matrix

6.2.11 POTENTIAL IMPACTS ON CULTURAL HERITAGE

6.2.11.1 VALUE OF CULTURAL HERITAGE RECEPTORS

Cultural heritage receptors identified to be present in the study area include Cultural Monuments declared under Macedonian Law on Preservation of Cultural Heritage and archaeological sites.

As for Cultural Monuments, they are all located at a distance greater than 1 km.

With respect to archaeological sites, during the works for the construction of Section 2 in 1995, five sites were identified and investigated that were in the close vicinity of the railway alignment. These were:

- Locality Gradishte village Konjuh (km 33+600 – km 34+500)
- Savin Rid/Breg village Krilatica (km 48+400 – km 48+700)
- Locality Gradishte village Opila (km 50+806 – km 52+700)
- Mal Kamlesh village Rankovci (km 53+700 – km 54+200)
- Locality Crkvishte st. Marijana village LJubinci (km 55+600 – km 55+800)

Once the archaeological investigations concluded, the archaeological sites were preserved and the railway construction works continued with the authorization of the Republic Institute for Protection of Cultural Heritage.

Section 1, which is already constructed, shall not affect the archaeological sites identified in the area.

For Section 3, four sites have been identified, but they are all located more than 500 m from the railway, on the opposite side of the Kumanovo – Deve Bair road. Consultations made by the investor (PERI) to the Administration for Protection of Cultural Heritage of the Ministry of Cuture, have confirmed there is no other known archaeological sites in the vicinity of the railway alignment in Section 3.

The North-Eastern region of the Republic of Macedonia has been inhabited for hundreds of centuries and hence has a very rich cultural and spiritual past, testified by the abundance of cultural and historical artefacts and monuments. Any known or yet to be known archaeological site provides valuable information to better know the past human life and culture of the region and hence is considered to have a high value.

6.2.11.2 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on cultural heritage have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

Destruction of non-identified buried archaeological sites

Operation phase

Plundering of archaeological sites

CONSTRUCTION PHASE

Destruction of non-identified buried archaeological sites

The fact that there are no known archaeological sites along the railway alignment (except in Section 2, where the sites were investigated and preserved, and construction continued with the corresponding mitigation measures) does not mean they do not exist. Construction works, and particularly earth movement operations might expose previously unknown buried archaeological (also paleontological) sites and destruct them.

To a greater or lesser extent, this impact may occur in all three sections of the railway corridor. In Section 1, it could occur at the sites that need to be set up for their use as construction camps. In Section 2, where most of the substructures of bridges have been completed, there are still 9 bridges to be constructed. Earth movements at the base of the pillars could uncover archaeological or paleontological remains. In Section 3, archaeological findings could potentially occur at any point of the alignment as earth movements are executed.

Estimation of magnitude

Should the destruction of archaeological sites occur, the magnitude of the impact would depend on the importance of the site as assessed by an expert archaeologist. Assuming the findings were to have a high value and were destroyed by construction works, the magnitude of the impact would be high, as the integrity of the resource would be lost.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Direct	The destruction of the archaeological site results from earth movements carried out during construction.
Reversibility	Irreversible	Once destroyed, the site can not be recovered
Geographic Extent	Local	The destruction will affect to sites in the footprint of the project
Time when the impact occurs	Immediate	The effects will occur while the construction works take place.
Duration	Long term	If destruction occurs it will be for ever
Likelihood of appearance	Probable	The abundance of archaeological sites in the area and its rich history increases the likelihood to find other sites.
Magnitude	High	See above

Table 6-88 Assesment of impact

Considering the potential high value of the archaeological site and the potential high magnitude of the impact, according to the sensitivity matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Large.

OPERATIONAL PHASE

Plundering of archaeological sites

The easier access to the area brought by the train will attract visitors from other areas of the Republic of Macedonia. Among these visitors, the presence of individuals dedicated to the poaching of archaeological sites is possible. These individuals would be knowledgeable of the currently known archaeological sites as well as new ones that might appear.

Estimation of the Magnitude

The magnitude of this impact has been considered medium, as the effect of poaching would result in a partial loss of the resource, but not affecting to the integrity of the site; the limited number of poachers and the probably relatively long walking distances to the archaeological sites would prevent the sites from being devastated.

The criteria thresholds to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Not desirable
Type of Impact	Indirect	The plundering of archaeological would result from an increased in the affluence of visitors induced by the easier access to the area brought by the train.
Reversibility	Irreversible	Stolen artefacts will hardly be returned to the site.
Geographic Extent	Local	Plundering would mostly affect to those sites close to the railway through which visitors have access to the area
Time when the impact occurs	Immediate	Plundering would start as soon as visitors have access to the area when train operation will start.
Duration	Long term	The effect will continue throughout the operational life of the railway.
Likelihood of appearance	Probable	Poachers are aware of the existence and location of unprotected archaeological sites.
Magnitude	Medium	See above

Table 6-89 Assesment of impact

Considering a high sensitivity for cultural heritage receptors and a medium magnitude, according to the sensitivity matrix presented in chapter 4.6.3, the initial significance of this impact, without mitigation measures, is Moderate or Large.

6.3 POTENTIAL SOCIAL IMPACTS

6.3.1 INTRODUCTION

This chapter assesses the impacts that project activities will have on the different socio-economic and land use receptors/resources which were identified in the social baseline conditions. The assessment considers effects on the following: Land and Property, Community Health and Safety, Community Tensions, Access & Severance, Utilities, Economy, Employment, Education & Training, Vulnerable Groups, Workforce related effects and “Quality of Life” .

6.3.2 POTENTIAL IMPACTS ON LAND AND PROPERTY

6.3.2.1 SUMMARY OF RESOURCES/RECEPTORS

For the construction of the new part of the railway line (i.e. Section 3) a permanent land take of 11 meters on both sides of the railway line is required. This is in accordance with the Law on Railway Systems (Official Gazette of RM. No. 48/2010, Article 59).

For Section 1 and Section 2 the legal procedures for permanent land expropriation are completed. For Section 3, the planned railway line will mostly go through the open land and according to the preliminary assessments; a total of 424,379 m^2 of land will have to be expropriated. Most of the land is agricultural land of which 225,380m^2 will need to be expropriated and forest land of which 185,800m^2 will need to be exproriated. Within the agricultural land affected grazing accounts for 160,616m^2, and crop fields comprise of 24,095m^2, 81m^2 of vineyard and 19,783m^2 of orchards and 20,805m^2 of gardens. The remaining 13,199m^2 comprise of old roads, dry streams and similar.

The preliminary assessments concluded that 25 residences in total will be affected by the Project within Section 3. The following settlements within the Municipality of Kriva Palanka will be affected by physical displacement by the Project activities: Gradec – 1 residence, Kriva Palanka town – 19 residences and Uzem – 5 residences.

During construction works, most land to be utilized will be of a temporary nature and is a result of requirements for construction of compounds and working sites along or close to the line, in addition to space for storage of plants, materials and site offices etc. Contractors' may temporarily also require land for Borrow Pits & Landfills. Necessary agreements and consents will be secured for any temporary land required for the Project.

6.3.2.2 ASSESSMENT OF THE SENSITIVITY OF LAND AND PROPERTY

During establishing of the sensitivity of Land & Property resources the following criteria were applied:

1. Monetary value
2. Size
3. Location
4. Sentimental value
5. Possibility for regular income (renting, agricultural activities, etc)

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores was used to determine the sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0-3 – low sensitivity (ls)

4-7 – medium sensitivity (ms)

8-11 – high sensitivity (hs)

12-15 – very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Monetary value	Size	Location	Sentimental value	Possibility for regular income (renting, agricultural land	Sensitivity
Houses	3	3	3	3	2	14
Agricultural land	2	3	2	3	3	13
Pastures	2	2	2	3	2	11
Vineyard	2	1	2	3	1	9
Orchards	3	2	2	2	2	11
Forest	2	2	2	2	2	10

Table 6-90 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

TYPE OF LAND / PROPERTY RESOURCE	VALUE (SENSITIVITY)
Houses	Very high sensitivity
Agricultural land	Very high sensitivity
Pastures	High sensitivity
Vineyard	High sensitivity
Orchards	High sensitivity
Forest	High sensitivity

Table 6-91 Results from sensitivity estimation matrix

Houses have high importance in regards to their monetary value, size, location and sentimental value. The people living in the houses have through their lives there invested in them and they are of high monetary value to them. Although sentimental value cannot be measured or compensated it is of big importance since the families have lived in their houses generally for many years may have probably been born there as houses are normally inherited property. The location of the houses to be expropriated within Kriva Palanka town is good with close proximity to the center of the town and thus the importance is generally considered to be high. Due to the economic situation in the town, most people are trying to find a job in the bigger towns like Kumanovo and Skopje. There are no educational centres in the town so there is no demand for renting out on that base and thus possibility of income from renting has medium importance. Based on importance from different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Agricultural land has medium importance in regards with the monetary value and location. In this part of the region, the value of land is lower compared with land in developed agricultural areas where the monetary value is constantly increasing. However, for the owners of the agricultural land, the value is very important if they want to be financially compensated. The location of the land is close to the river in the lower part of the area and is mostly away from local settlements. The size of the land has high importance since this area is mountainous and it is with very limited potential for substitution. Most of the land has traditionally been with the families for many generations and the sentimental value has thus high importance. Possibility for income from agricultural activities is of high importance due to the limited size of this kind of land in the area and high level of unemployment of the population. Off-farm income possibilities are limited and agriculture may be the families' sole source of income. The sensitivity of this sub receptor is considered to be very high.

Pastures have medium importance in regard of almost all criterions while the sentimental value is considered to be high. Most of the land is traditionally within the families for many generations and from that point of view it can be said that the sentimental value has high importance. The area is characterized by insignificant and extensive stockbreeding by local people. Monetary value is of medium importance since the value of the pasture in the present situation of undeveloped farming is low; however to the owners the monetary value is very important. In the area there are rich possibilities for substitution of pastures due to the topographical characteristics and owners could be compensated with other pastures or financially, if they preferred. The possibility for additional incomes from the pastures is low mostly due to the dry grassland vegetation which is dominant especially on hill pastures so the importance is medium. Based on importance from different criterions it can be concluded that the sensitivity of this sub receptor is high.

Vineyards have medium importance with regards to monetary value due to the low market prices in this area, but for owners the sentimental value is of high importance since vineyards and production of vine for family needs is a tradition and connected with many rituals. However, due to the unfavorable climate conditions the size of vineyards in this region is very small and the productivity is low. The plants are mainly old and the incomes that families derive are of low importance. The sensitivity of this sub receptor is high.

Orchards are not typical for the area due to less favourable climate conditions. Choice of trees for fruit production is limited to trees that are resistant to low temperatures. However, the importance in respect of monetary value is high. Although the market value of the land is low, the value of orchard trees is high taking into consideration the fact that the trees are a long term investment. Most of the orchards are located in valleys which are along the river basements in close vicinity of local settlements. The size of land has medium importance due to limited possibilities for substitution. Location, sentimental value and possibilities for earning an income from the orchards are of medium importance. Sentimental value is medium, mostly for old orchards. There is very limited potential for additional income from selling fruits. Most of the families who own orchards have small parcels producing only for their own needs and cannot expect additional income from selling the fruits at market. The sensitivity of this sub receptor is considered to be high.

Forest is a typical land use for this area. Beside state owned forest there are also private owners who manage forest with prior permission from the State Forest Company. The monetary value is of medium importance due to the limited possibility for selling timber. There is no limitation for substitution of forest adequately with similar forest therefore the importance in regards with the size and location is medium. Since land including forest is inherited within families the sentimental value is of medium importance. The sensitivity of this sub receptor is considered to be high based on importance of the various criteria.

6.3.2.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts related to the acquisition of Land and Property have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction Phase

- Temporary land loss (FOR SECTIONS 1, 2 AND 3)
- Livelihoods (FROM TEMPORARY LAND LOSS)
- Effects on residents from loss of gardens and community land and effects on agricultural production/activity (FROM TEMPORARY LAND LOSS)
- Loss of housing (including physical displacement) (FOR SECTION 3)
- Permanent land loss (FOR SECTION 3)

Operational Phase

- Effects on livelihood (START AT THE CONSTRUCTION PHASE)
- Effects on residents from loss of gardens and community land and effects on agricultural production/activity (START AT THE CONSTRUCTION PHASE)

CONSTRUCTION PHASE

Temporarily Land Loss

The temporary use of land during construction works is estimated to be 19.000m^2 for Section 1, 103,200m^2 for Section 2 and 424,678m^2 for Section 3 table below shows required land take per section.

Temporary Land Take				
Estimation				
Description	**m^2 / Unit**	**Quantity**	**Land take in ha**	**Land take in m^2**
Section 1				
Haulage - / access roads	6.5	2,000	13	13,000.00
Borrow pits				2,500.00
Landfills				2,500.00
Concrete batching plants				-
Accommodation				-
Long span bridge	10,000	1	1.0	1,000.00
Stock yard for trackwork				
		14.0		
Sub-Total				**19,000.00**
Section 2				
Haulage - / access roads	6.5	33,000	21.5	21,500.00
Borrow pits				7,500.00
Landfills				7,500.00
Concrete batching plants				6,000.00
Accommodation				5,000.00
- bridge (< 35 m)	6,500	8	5.2	5,200.00
- viaduct	10,000	26	26.0	26,000.00
- long span bridge	15,000	1	1.5	1,500.00
- tunnel ≤ 200 m	10,000	8	8.0	8,000.00
- tunnel ≤ 500 m	20,000	4	8.0	8,000.00
- tunnel > 500 m	35,000	2	7.0	7,000.00
Stock yard for trackwork				
Sub-Total				**103,200.00**
Section 3				
Haulage - / access roads	6.5	23,400	15.2	15,200.00
Borrow pits				
Landfills				312,578.00
Concrete batching plant				6,000.00
Accommodation				5,000.00
- bridge (< 35 m)	6,500	6	3.9	3,900.00
- viaduct	10,000	42	42.0	42,000.00
- long span bridge	15,000		0.0	
- tunnel ≤ 200 m	10,000	15	15.0	15,000.00
- tunnel ≤ 500 m	20,000	3	6.0	6,000.00
- tunnel > 500 m	35,000	5	17.5	17,500.00
Stock yard for trackwork	15,000	1	1.5	1,500.00
Sub-Total				**424,678.00**
TOTAL				**546,878.00**

Table 6-92 Estimation of temporary land take per section

The placement of borrow pits and landfill sites have already been decided while workers compounds are yet to be decided. The placement of these will follow legal requirements and agreements to be reached with affected landowners. During construction works, in the period from 1994-2004 many of these facilities were constructed and most of them still exist along the railway route and can potentially be reutilized. The limited number and fairly short lengths of access roads to be constructed means that limited impacts are expected from increased access. Access to the line, in first two sections is already good, and the additional impacts from road construction are likely to be minimal on short-time basis. In Section 3, there are no established access roads to the line or any other necessary structures from previous railway line construction. Most of the land needed for construction purposes will be on a temporary basis while a limited amount of land for access to the line for maintenance etc will be permanent land take.

Estimation of magnitude

Most of the temporary land loss will occur during Construction Phase. In Sections 1 and 2 as described above it is expected that the impact will be negative but minimal. The required temporary land in these two sections is already established. In Section 3, the temporary land needs to be located and estimated prior to the start of construction works. It is expected to have a low level of impact on social aspects. It is expected that some changes in resource or its quality will occur but the impact is reversible. After completion of construction activities, the majority of the land will be returned into its previous condition. Due to minor loss of or alteration in a short-time period, the magnitude of this impact could be estimated as low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact will disrupt usage of land for other purposes like stock feeding, limited hunting activities
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low (construction phase)	During construction phase alteration of the receptor will occur

Table 6-93 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is ***slight negative***. The impact will result in small change in socio-economic conditions, locally limited with a short to medium-term duration. Temporary land loss is too small it is considered to result in a diminishing quality of life.

Livelihoods (FROM TEMPORARY LAND LOSS)

Temporary land take will cause removal of livestock from grazing areas during periods of blasting or heavy equipment operations and restrict hunting (recreation areas deleted) near work crews because of construction noise, dust, and visual intrusions. In forest areas, construction activities could result in long-term loss of timber production due to need of removing trees. Construction works will restrict these kinds of activities which will result in adverse impacts on the livelihoods of affected people. The area is rich in terms of forest food and local people traditionally harvest the fruit and leaves for tea and similar, and sometimes for selling. It can be expected that this activity will be affected. Movement in this area will be restricted during the construction phase.

Estimation of magnitude

People from the communities that are closest to the railway line will have limited access to areas where construction activities will occur and location where construction facilities will be located, in terms of disturbance to their stockbreeding activities, hunting, forest food harvesting or recreational activities. Because of the very limited size of land required and available land around the construction area where these activities could be relocated, a small number of individuals within the local population will be affected. Following construction, livelihood effects should be able to be restored and thus the magnitude of the impact can be estimated as low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact will cause disturbance of livelihood
Type of Impact	Indirect	It is indirect impact on receptor through impact on local communities livelihood
Reversibility	Reversible	Livelihood when impact duration will end can be reversed to previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Immediate	Impact will occur immediately following project activities
Duration	Medium-term	Impact it is expected to last during construction period (from 2 to ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Only alteration of receptor will occur

Table 6-94 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***slight negative***. The impact will result in small change in livelihood, locally limited with medium-term duration. Change of livelihood is not sufficiently large to result in a material effect through diminishing the quality of life since the replacement of temporary land loss could be made in the near vicinity in the area.

Effects on residents from loss of gardens and community land and effects on agricultural production/activity (FROM TEMPORARY LAND LOSS)

During construction phase, loss of gardens and community land will cause effects on residents and on agricultural production/activity. During the operational phase conditions will be returned to the previous situation.

In first two sections no gardens are expected to be affected. However minimal increases in local journey times as a result of the construction activities could affect agricultural production (travel time to the field). Pastures and forest that are state property are used by the local community and those people might be affected through limitation of stockbreeding activities and forest food harvesting across the whole three sections. No other type of community land is going to be affected along the alignment. Haulage routes could cause fragmentation of some agricultural land.

In Section 3, where the access road to the station in Kriva Palanka is going to be constructed, gardens from a few numbers of houses will be affected. It is tradition that local people have gardens in front of their houses where they have fruit trees, plant small quantities of vegetables for their needs and flowers for their pleasure. The third Section is through a mostly mountainous area. Temporary land take for construction facilities could occupy some agricultural land but for that purpose prior legal agreement must be reached between the owner and contractor/s and renting of that land will be financially compensated. However, it may mean minimal increases in local journey times as a result of the construction activities which could affect agricultural production (travel time to the field).

Estimation of magnitude

Temporary land loss is not expected to impact on gardens in first two sections. In third Section due to construction of the access road to the station of Kriva Palanka gardens from few houses will be affected. There will be impacts on community land (i.e. pastures and forest) but there is the possibility for other community land to be utilized. Most of the land loss will occur in unsettled and agriculturally undeveloped area. The impact will cause small changes in agricultural activities in the area in terms of travelling times, even if it could appear to look like sustained and widespread it is not considered it will be disruptive to normal socio-economic life. These effects could raise local concerns but are unlikely to be important for the decision making process for the Project and its approval. The general feedback from local people is, that they are fully aware of the impacts that construction activities have on their activities with regards to their agricultural activities. Since the stopping of the railway works in 2004, the administration of Municipalities in the region and its population has been in constant preparedness for the commencement of the works on the railway. The sensitivity of the communities along the route could be measured as low when it is question of their resilience to impacts such as restrictions on access, or loss of local community land or land used by the community. Based on the above mentioned the estimated magnitude of this impact is medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact will cause disturbance of normal activities in regards with agricultural production
Type of Impact	Indirect	It is indirect impact on receptor through impact on local communities activities
Reversibility	Reversible	When impact duration will end can be reversed to previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Immediate	Impact will occur immediately following project activities
Duration	Medium-term	Impact it is expected to last during construction period (from 2 to ten years)

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Only alteration of receptor will occur

Table 6-95 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is considered to be ***slight negative***. The impact will result in a small change in agricultural production; it will be locally limited with medium-term duration. However, the change of the receptor due to this impact is not sufficiently large to result in a material effect through diminishing the quality of life.

Loss of housing (FOR SECTION 3)

This impact will occur during the construction phase in Section 3.

Based on preliminary assessments 25 residences are going to be directly affected by the Project. The following settlements within the Municipality of Kriva Palanka (Section 3) will be affected by physical displacement by the project activities: Gradec – 1 residence, Kriva Palanka town – 19 residences and Uzem – 5 residences.

Estimation of magnitude

The families will lose their present private houses with associated auxiliary structures, such as garages, warehouses, fencing, etc. In the process of resettlement, people will be provided with full compensation and transitional costs, including transportation, legal fees, taxes and other expenses. To ensure that the affected families are duly compensated for all their belongings and expenses connected with being resettled, a Resettlement Compensation Framework has been developed (See *Chapter 13*).

The residents who will have to be resettled by the construction of the railway may experience additional impacts such as:

- Changes in type and tenure of housing;
- Disconnection with their precious memories related with their homes which has high sentimental value;
- The resident's present social relationships will be disrupted and they will have to establish new relationships in a different social environment. This may cause social and psychological impacts.

During preparation of Stakeholder Engagement Plan, local authorities representatives stated that local residents are fully aware of this impact. From 2004 when works stopped the affected people are in constant preparedness for activation of works on the railway.

The magnitude of this impact is estimated as high since it will cause loss of resources.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable since people are losing their homes

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Type of Impact	Direct	Project activities results in a direct impact upon receptor
Reversibility	Irreversible	Cannot be returned into previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Immediate	Impact will occur immediately following project activities
Duration	Medium-term	Impact it is expected to last during construction period (from 2 to ten years)
Likelihood of appearance	Certain	There is a high likelihood for this impact to occur
Magnitude	High	Loss of receptor will occur

Table 6-96 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is **large negative**. Effects from this impact result in awareness or concern among affected stakeholders and materially affect the well being of defined population. This effect is likely to be important for local administrative level in terms of regulatory objectives. Change of receptor due to loss of houses is sufficiently large to result in a material effect through diminishing the quality of life, although some replacement can be made in the locality or be compensated for.

Permanent land loss (FOR SECTION 3)

This impact will occur during the construction phase in Section 3. The planned railway line will mostly go through the open land and according to the preliminary assessments, a total of 424,379 m2 of land will have to be expropriated. The land is registered in cadastre with number of parcels where the same person can be the owner of a number of plots (more details are given in Chapter 3 Project Description).

Section 3 where the permanent land take will occur is mostly a mountainous area, thus mostly forestry land will be affected. From the 424,379m2 that needs to be expropriated this consists of: 160,616m2 of pastures, 24,095m2 of fields for crops, 81m2 of vineyard, 19,783m2 of orchards, 20,805m2 of gardens and 185,800m2 of forest.

Estimation of magnitude

While the expropriation will compensate the owners with the cash value for the land, the long term negative impacts are the permanent loss of all or a significant part of a number of peoples land used for farming activities. The owners/farmers are depriving themselves for a piece of land which could be used either for subsistence farming in difficult economic situations with no work available or for selling the crops in times with high prices on agricultural products.

Pastures in this area provide conditions for good quality of milk and meat to be produced. There are small areas with orchards but the choice of fruits which can be planted is very restricted since the climate does not allow wide range of products to be grown. Planting of grapes is very symbolic, only for household needs since the quality of grapes in this region compared with the other regions in Macedonia, like Tikves for example, is poor.

In general, farmers in the Republic of Macedonia are not happy to sell the land on which they grow crops. Moreover, if they have to, people whose livelihoods are land-based give preference to land-based resettlement strategies (land-for-land rather than cash-for-land). From experience, farmers in the Republic of Macedonia are in general not happy to sell the land on which they grow grapes. Grapes are a 20 years investment and it is not possible to subtract a piece of land from a grape field due to the structure of the trellis. A grape trellis provides support for grapevines, as the vines are not strong enough to support themselves and consist of galvanized steel wire running from one end of the field to the other. If cutting in the trellis the whole structure will be destroyed. Thus where land required for the railway line is part of grape fields, the whole field will need to be expropriated and compensated for.

Farmers are in general are much more willing to sell fields with cereals, vegetables or fodder. Planting is usually done in the month of March while harvesting takes place in September. Thus, October would be the best time in the year to make the expropriation of farming land. Land owners/farmers will be compensated duly in accordance with the Resettlement Compensation Framework (Chapter 13). Special attention should be given to orchards where investment lasts for 20 years. Within forested areas, construction activities could result in the long-term loss of timber production.

The affected area is with very limited possibility for substitution of the land. The impact will cause loss of resource and quality of resource. Based on that, it can be estimated that the magnitude of the impact is high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable since people are losing their land
Type of Impact	Direct	Project activities results in a direct impact upon receptor
Reversibility	Irreversible	Cannot be returned into previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Immediate	Impact will occur immediately following project activities
Duration	Medium-term	Impact it is expected to last during construction period (from 2 to ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of receptor will occur

Table 6-97 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact without mitigation measures, is **large negative**. Effects from this impact result in awareness or concern among affected stakeholders and materially affect the well being of the concerned population. This effect is likely to be important for local administrative level in terms of regulatory objectives. The change of the resource/receptor due to the loss of land is sufficiently large to result in a material effect through diminishing the quality of life locally (i.e. in Section 3), although some replacement can be made in the locality or be compensated for.

OPERATION PHASE

Effects on livelihood (START AT THE CONSTRUCTION PHASE)

During the Operational Phase changes that occurred during the Construction Phase will return the livelihood into previous conditions. Except those Contractor/s who will decide to leave there construction facilities like Concrete Batching Plants for the need of some future projects in the region most of the land will be abandoned and returned to its previous condition. Some haulage routes that go through community land maybe will be used as access roads possibly by local citizens or by State Forest Company. Activities like stockbreeding, hunting, recreational activities and forest food harvesting could continue after several years from the end of construction works.

For the permament land take expropriation will compensate the owners with the cash value for the land, or land for land. People who will get new land they will start with setting new gardens and new agricultural production. The operation of the railway will cause change in agricultural activities in the area in terms of travelling times and maybe also crops grown. Railway line over and underpasses may increase the travel time in some cases while in others it will shorten the travel time.

Estimation of magnitude

Due to the very limited size of railway belt area that will be occupied, a small number of individuals within the local population will be affected. The change in the receptor is insignificant, with minor los of resource. Estimation of magnitude of this impact can be estimated as *low.*

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Livelihood will be limited within the railway belt
Type of Impact	Direct	Project activities results in a direct impact upon receptor
Reversibility	Irreversible	Cannot be returned into previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Delayed	Impact will last during whole operational phase
Duration	Long-term	Impact it is expected to last during operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Distinguishable low level impact

Table 6-98 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is **neutral negative**. Effects from this impact will not create discernable change in the livelihood socio-economic conditions.

Effects on residents from loss of gardens and community land and effects on agricultural production/activity (START AT THE CONSTRUCTION PHASE)

Situation caused from loss of gardens, community land and agricultural production raised by temporary land loss during the Construction Phase will be returned into the previous state during the Operational Phase. However loss of gardens, community land and agricultural production due to permanent land loss during construction phase cannot be returned into previous condition. The owners will be compensated for lost land (with land or financially). For those who have agricultural land without practicing agricultural activities may be expected to choose financial compensation whilst those undertake farming activities will require land for land. That will mean that new gardens will be erased, agricultural activities on new land will start maybe with some different crops.

Estimation of magnitude

During the Operational Phase people who lost their gardens and agricultural production will start with setting their new gardens and new agricultural production on other locations in vicinity. The operation of the railway will cause change in agricultural activities in the area in terms of travelling times and maybe also crops grown. Railway line over and underpasses may increase the travel time in some cases while in others it will shorten the travel time. This could raise local concerns but these are unlikely to be important for the decision making process for the project and its approval. Due to very heavy economical situation population at or close to the railway line hope that construction of railway will bring new perspectives for better leaving standards and they are in preparedness for activation of works on railway. The sensitivity of the communities along the route could be measured as low regarding impacts such as loss of gardens and change of agricultural production, changes in traffic routes etc. Based on the above, the estimated magnitude of this impact is low since minor loss and alteration of receptor is expected to occur.

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	There will be changes in agricultural production (on some other location new production will start)
Type of Impact	Indirect	Project activities results in a indirect impact upon receptor
Reversibility	Irreversible	Cannot be returned into previous condition
Geographic Extent	Local	Impact will be limited to specific individuals or population groups at or close to railway
Time when the impact occurs	Delayed	Impact will occur after project activities and during lasting of whole operational phase
Duration	Long-term	Impact it is expected to last during operation of railway
Likelihood of appearance	Probable	The impact can be considered to have a medium likelihood of occur
Magnitude	Low	Minor alteration of receptor will occur

Table 6-99 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is slight negative. Effects from this impact will result in small changes in socio-economic conditions. Land loss is not sufficiently large to result in a material effect through diminishing the quality of life as replacement could be made in locality. Minimal increases in local journey times as a result of the operation of railway it is expected.

6.3.2.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Effects on residents from loss of gardens and community land and effects on agricultural production/activity (loss of resource will occur but it will not adversely affect the integrity of receptor);

- Loss of housing (change of receptor due to loss of houses is sufficiently large to result in a material effect through diminishing the quality of life, although some replacement can be made in the locality or be compensated for);
- Permanent land loss (change of receptor due to loss of land is sufficiently large to result in a material effect through diminishing the quality of life, although some replacement can be made in the locality or be compensated for).

6.3.3 POTENTIAL IMPACTS ON COMMUNITY HEALTH AND SAFETY AND SECURITY

6.3.3.1 SUMMARY OF RESOURCES/RECEPTORS

Projects activities related to the construction of the railway line may increase the potential for community exposure to health, safety and security. Health concerns includes exposure to diseases arising from temporary or permanent changes in population; exposure to hazardous materials during construction and transport of raw and finished materials. Safety concerns relate to risk for accidents related to movement of heavy vehicles during construction. During operation health concerns related to increased risks for accidents near railway crossings can not be overlooked.

While acknowledging the public authorities' role in promoting the health, safety and security of the public, the Performance Requirement (PR) 4 from EBRD Social and Environmental Policy addresses their Client's responsibility to identify and to avoid or minimize the risks and adverse impacts to community health, safety and security that may arise from project activities. This PR addresses potential risks and impacts to the affected community from project activities. Occupational health and safety standards are found in PR 2 detailed requirements on the prevention of impacts on human health (covered in chapter 7.2).

6.3.3.2 ASSESSMENT OF THE SENSITIVITY OF HEALTH AND SAFETY

During establishing of the sensitivity of this receptor following criteria were applied:

1. Location of influence
2. Intensity of influence
3. Awareness of community
4. Awareness of administration

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 2- low sensitivity (ls)

3 - 6 - medium sensitivity (ms)

7 - 9 - high sensitivity (hs)

10 - 12 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Location of influence	Intensity of influence	Community awareness	Administration awareness of	Sensitivity
Community health	3	2	3	3	11
Community safety	3	3	3	3	12
Community security	2	2	3	3	10

Table 6-100 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

TYPE OF LAND / PROPERTY RESOURCE	VALUE (SENSITIVITY)
Community health	Very high sensitivity
Community safety	Very high sensitivity
Community security	Very high sensitivity

Table 6-101 Results from sensitivity estimation matrix

Community health with regards to the location of influence has medium importance. The health of communities located at or closest to the railway line is expected to be affected. The intensity of influence can be estimated to high importance despite the fact that worker's camps will be located outside the settlements while the construction work will be carried out at and nearby the line. Awareness of community and administration (medical centres, Local self-Government, medias, NGO`s) has high importance for community health. Awareness of both community and administration of potential risks and impacts that project activities could have on community health has very high importance. Based on the very high importance of different criterions, it can be concluded that the sensitivity of this sub receptor is very high.

Community safety has high importance in respect to all four criteria. Due to the heavy mechanization on site and the presence of heavy traffic on roads which connecting the local settlements with the towns, the location and intensity of influence has high importance. Awareness of community and administration is very important. Thus, the sensitivity of this sub receptor is very high due to high importance.

Community security can be threatened if safeguard personnel engaged at the construction site or contractor's facilities are involved in past mistreatments, if they are not trained adequately in the use of force (and where applicable, firearms) and there are serious indications that they will not behave in an appropriate manner towards the local community. Community security has very high importance both regarding location and intensity of influence due to the distance of contractor's facilities from local settlements and also high importance regarding awareness of community and administration (police). The sensitivity of this sub receptor is very high.

6.3.3.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Community Health, Safety and Security have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Impacts from the influx of temporary workers;
- Impacts from increased community exposure to disease;

- Impacts from increased traffic and heavy vehicles on local roads during construction;
- Safety issues associated to the entrance of non-authorized people on the construction site.

Operational phase

- Impacts from better access to the larger towns and health services located in larger towns/cities;
- Safety issues associated with rail track.

Impacts from the influx of temporary workers

Due to technological developments and investment in labour saving equipment, the skilled workforce needed for the Project is estimated to be in the range of 600 - 700 workers and on each of the 3 sections it is estimated that around 200 -225 skilled workers will be needed. For construction of tunnel and bridges skilled workers are required to be permanent employees of the construction companies. The skilled construction workers will be imported to the area of construction and will reside in labour camps.

A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction companies' properties. Low skilled workers will be hired within 20km radius of railway and wider if necessary.

It is expected that the increased number of workers and higher concentration of residents near construction sites will have impact on local communities. Uncontrolled movement of workers will affect residents of affected settlements. Due to this a limited regime of movement of workers in the area around the construction sites and mode of movement must be well organized and defined by agreement between the Employer and the Contractor(s).

Entry of a temporary labour force into an area could cause different negative impacts to the local communities including conflicts between local community members and newly arrived people due to the socio-cultural differences and other issues. The situation when temporary workers come from other regions and they are from different social and cultural backgrounds could easily create conflicts with the local social environment. Due to this, workers must receive training and sign a labour code of conduct, in order not to create conflicts with the local environment.

Influx of temporary workers and their inadequate behavior could cause issues. Contractors will be aware of avoiding where possible these kinds of situations and any effects of such issues must be subject to fair compensation. Despite strengthened measures for impacts reduction, sometimes it is not easy to control workers. Awareness of employees about the measures proposed, as well as negative effects that could occur is essential for the safe implementation of the Project.

A potential increase in crime may be experienced during the construction period if mitigation measures are not introduced. With an increase in construction activities and the possibility of job seekers arriving, it may be more difficult to identify strangers in the area. In addition, the increase in disease associated with the entry of a temporary labour force into an area could also occur.

There may also be negative issues that need to be managed such as increases in local prices, crime, prostitution or alcohol consumption. Entry of a temporary labour force into an area could cause different negative impacts to the local communities including conflicts between local community members and newly arrived people due to the socio-cultural differences and other issues.

Estimation of magnitude

Due to the high level of unemployment in the region, it is expected during construction works that most of the employment opportunities will be for local workers who are coming from affected communities. Having this in mind, the impact from the influx of temporary workers is expected to be limited. Location of worker's camps at some distances from local settlements, managed movement in the area will decrease the negative impacts arisen from different kind of conflicts between temporary workers and local community. The impact magnitude is estimated to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact could create worsening over the current situation in community safety
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Alteration

Table 6-102 Assessment of impacts

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***slight negative***. The impact will result in a small change in community health and safety. The impact will not be sufficiently large to result in diminishing the quality of life, even if they are sustained and widespread effects they are not considered to be disruptive to the normal socio-economic conditions.

Impacts from increased community exposure to disease

The presence of a large number of workers can give rise to an increased spread of communicable diseases. Construction projects are commonly associated with social interactions amongst the construction workers and local communities. This among other factors may produce an inherent increased risk of transmission of sexually transmitted diseases, HIV/AIDS and other contagious diseases such TB, pneumonia etc.

Estimation of magnitude

Due to the high level of unemployment in the region a big percentage of unqualified construction workers will be from within the region. Still, a risk of increased community exposure to disease persists, especially to communicable diseases. This impact is expected to result in loss of quality and integrity of receptor thus the impact magnitude it is estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impact is originally on local level towards specific individuals or population communities but due to the nature of impact and possibility of spreading could have regional size
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood for this impact to occur
Magnitude	High	Loss of quality and integrity of resource

Table 6-103 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3,* the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in significant risks to community health and safety which can not be easily mitigated, they result in strong concern among stakeholders, and likely they could be important at a regional to national level.

Impacts from increased traffic and type of traffic on local roads during construction

The traffic related to construction will contribute to reduced road safety on especially the road Kumanovo – Kriva Palanka and also on local roads where some contractor's facilities are located, especially where the traffic passes through settled areas and towns located close to the road. The traffic to construction site will depart from the public roads. Residents from local settlements on these haulage roads will be exposed to increased possibilities for accidents and injuries. Traffic consisting of heavy vehicles and machinery is especially risky.

Estimation of magnitude

Significantly increased traffic especially with heavy mechanisation required for construction activities will change normal traffic which the local communities are used to. This will result in increased risks for accidents and injuries. Due to the loss of quality and integrity of receptor the impact magnitude is estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extend across the North-eastern region of Macedonia
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of quality and integrity of resource

Table 6-104 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in significant risks to community health and safety and although mitigating measures are applied, a risk will persist.

Safety issues associated with the entrance of non-authorized people in the construction site

Contractor/s and Engineer/s could counter threats to their employees, assets and service delivery. They may face different threats because of the nature of their operations, their location and/or the attractiveness of their assets. Because of their duties or work-related situations to which they are exposed, employees are not immune from oral or written threats or acts of physical violence, for example assault. Theft, fraud, vandalism "malicious activity", accidental or intentional loss or damage could be a result from non-authorized entrance of people into construction site.

Estimation of magnitude

Location of contractor's facilities is usually near worker camps certain distances from local settlements. The design, layout and site location of facilities should facilitate natural surveillance by police and the safeguards engaged by Contractor/s.

Valuable equipment and materials for construction will be located on the site. This could encourage an increased entrance of non-authorized person to the construction site. Due to the loss of integrity of the receptor the impact magnitude can be estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impact extends across the North-eastern region of Macedonia

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood of occurring
Magnitude	Medium	Effects are both distinguishable and measurable and will cause material effect to the well being of Contractor/s

Table 6-105 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***moderate negative*.** The impact will result in moderate significant risks to community health and safety which can be easily mitigated through regulatory objectives and local governance administration management.

Operational phase

Improvement of access to better health services located in larger towns/cities

The operational railway will provide the local residents with new and improved public transport besides buses and private cars. Villagers of the settlements will in general be able to move more freely e.g. visit relatives. Students, workers, other residents and older people who presently have to commute to Kumanovo and Skopje for different needs like education, health treatment, school, work, will have a cheap and fast alternative to busses.

Estimation of magnitude

New alternative and cheaper transport will largely improve the receptor quality thus it can be estimated the magnitude of this impact to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact is desirable
Type of Impact	Direct	Impact on receptor quality is going to be direct
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extend across the North-eastern region of Macedonia
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Long –term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood of occurring

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Magnitude	High	Mayor improvement of receptor quality

Table 6-106 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in large significant improvement to community health and safety.

Safety issues associated to rail track

When the railway Corridor VIII is finished and operational, the railway will function as a new means of transportation. Transport with trains that runs at a speed up to 120km/h increases the safety risk of the workers on the railway, passengers and third parties. Passengers and third parties can suffer from railroad injuries when they are traveling by train, driving or walking near railroad crossings or tracks on stations or in the open area. Railroad level crossings are the most risky in terms of accidents and are the greatest health hazard from trains for the general public. Thus all level crossings during design phase will be redesigned in over or under passes. Local community "PeroCico" in Kumanovo where the railway is passing by will be specifically imposed to safety issues associated to rail track. Ten houses with 20 families will reside at a distance of 7-8m from the railway. The concerned people remember that the railway line was operational previously and trains were passing on the track. They are also aware that the state and Macedonian Railways have plans to reactivate the rail traffic. Communities in Section 1 & 2 have been used to living next to and possibly be free to access the unused railrod route and as this may be habit it may result in safety issues when railroad is rehabilitated and opened.

Estimation of magnitude

Crossing of railway tracks could be considered as significant risk of high magnitude to community health and safety resulting in the potential for loss of community lives.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Impacts results in a direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Lost lives can not be returned
Geographic Extent	Regional	Impacts extends across the North-eastern region of Macedonia
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project actions
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood of occurring
Magnitude	High	Effect will largely change receptor quality

Table 6-107 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in severe damage to receptor.

6.3.3.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment, it could be summarized that following impacts will have potentially significant effects:

- **Impacts from increased community exposure to disease** - initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in significant risks to community health and safety which can not be easily mitigated, they result in strong concern among stakeholders, and they could likely be important at a regional and national level.
- **Impacts from increased traffic and type of traffic on local roads during construction** - initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in significant risks to community health and safety which can not be easily mitigated, they result in strong concern among stakeholders, and likely they could be important at a regional to national level.
  - **Improvement of access to better health services existing in larger towns/cities -** initial significance of this impact**,** without mitigation measures, is ***large negative***. The impact will result in large significant improvement to community health and safety.
  - **Safety issues associated to crossing of rail track -** initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in severe damage to receptor.

6.3.4 POTENTIAL IMPACTS ON COMMUNITY TENSIONS

6.3.4.1 SUMMARY OF RESOURCES/RECEPTORS

A potential risk for community tensions prevails with the presence of a number of temporary workers from outside the region in the local communities. Although the numbers of temporary workers are limited to around 200-225 people within each section, the workers may have different cultural and social background than the local people. This in combination with the disruption to normal life of the local people due to the construction activities creates a ground for increased community tension. The disruption to normal life includes: Loss of livelihood and land, changes in agricultural production, increased transportation time, heavy vehicles on local roads, restricted movement within construction area, presence of workers camps within the community etc. During operational phase communities at or close to the railway line will mainly be disturbed from and react to noise and vibration caused by train operation in addition to safety regulations related with railway operation.

6.3.4.2 ASSESSMENT OF THE SENSITIVITY OF COMMUNITY TENSIONS

A potential risk for community tensions prevails with the presence of a number of temporary workers from outside the region in the local communities. The numbers of temporary workers are limited to around 600 - 700 workers in total, on each of the 3 sections it is estimated that around 200 -225 skilled workers will be needed. The workers coming outside the region may have different cultural and social background than the local people. This in combination with the disruption to normal life of the local people due to the construction activities creates a ground for increased community tension. The disruption to normal life includes: Loss of livelihood and land, changes in agricultural production, increased transportation time, heavy vehicles on local roads, restricted movement within construction area, presence of workers camps within the community etc.

6.3.4.3 ASSESSMENT OF THE SENSITIVITY OF COMMUNITY TENSIONS

During establishing the sensitivity of this receptor the following criteria were applied:

1. Location of influence
2. Intensity of influence
3. Awareness of community
4. Awareness of administration

For each criterion a scoring value from 0 to 3 was applied with the following meaning:

0 – no importance/occurrence

1 – low importance/occurrence

2 – medium importance/occurrence

3 – high importance/ occurrence

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 2 - low sensitivity (ls)

3 - 6 - medium sensitivity (ms)

7 – 9 - high sensitivity (hs)

10 - 12 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Location of influence	Workers awareness	Community awareness	Administration awareness	Sensitivity
Verbal tensions	2	3	3	3	11
Written threats	1	1	2	2	7
Oral threats	2	2	2	2	8
Physical violence	1	1	2	2	6

Table 6-108 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

	VALUE (SENSITIVITY)
Sensitivity of Community	Very high sensitivity

Table 6-109 Results from estimation matrix

The result of all communities on tensions is very high.

6.3.4.4 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Community Tensions have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Effects from influx of workforce into local communities
- Community reactions due to the disturbance arising from the construction works

Operational phase

- Community reactions due to the disturbance arising from the operation of railway

Effects of influxes of workforce into local communities

The entry of a temporary labour force into an area could cause different negative impacts within the local communities including conflicts between local community members and newly arrived people mainly due to differences in socio-cultural background. Tensions could arise especially if there is a lack of tolerance. The reactions to this situation could go from verbal fights, to oral and written threats to physical violence. Workers must be aware that although the community supports construction of the railway, the disturbance of their normal way of living could be a source to dissatisfaction and complaints. Awareness of administration (Local self Government, medias, NGO`s) has high importance for decreasing verbal tensions. It is very important that both the community and the administration are fully aware of the potential risks and impacts that project activities could have on community tensions and to act towards their avoiding and mitigating.

Thus, workers must receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct, in order not to create conflicts with the local environment.

Estimation of magnitude

According to the major construction companies in Macedonia, qualified workers are needed for the construction of tunnel and bridges and these will in most cases be brought in by the assigned construction companies. Due to the high level of unemployment in the region, it is expected that all other jobs related to the construction of the railway will be performed by local workers who come from the affected communities. In recent years, many of citizens from this region have migrated for the purposes of work, mainly to Skopje but also abroad. Taking this into consideration it is expected that most families would be tolerant towards people who are coming from outside their region identifying themselves with their social situation. Workers who will be employed from outside of the region are estimated to be around 200 in number for each Section and will reside in camps outside of the local communities. The impact will only be small and if tensions are created it is expected to be due to the different lifestyles or cultural backgrounds. Having this in mind the impact from influx of temporary workers it is expected to be low. With location of worker’s camps at some distances of local settlements and managed movement of the workers in the area, the negative impacts on community tensions should be small and controllable. The impact will cause some adaptation of receptor thus the impact magnitude is estimated to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worse the current situation in community tension
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur
Magnitude	Low	Alteration of receptor

Table 6-110 Assessment of impact

According to the significance matrix presented in Chapter 4.6.3, the initial significance of this impact, without mitigation measures, is ***slight negative***. The impact will result in small change in community tensions, they are not considered to be disruptive to the normal socio-economic conditions.

Community reactions due to the disturbance arising from the construction works

During the construction phase, the community living at or close to the railway will be disrupted and subject to inconvenience by bypasses, closures of local roads, dust, noise, increased traffic of heavy vehicles on existing roads, changes in the level of services and interference with emergency services. Occasionally, there will also be disturbance caused by vibration from foundation works and movement by heavy traffic. All this together could cause community reactions.

Estimation of magnitude

The alignment of the railway is mainly passing through uninhabited areas and the contractor's facilities will be located at some distance to the settlements. This will significantly decrease the impacts that construction activities could have on residents. Nevertheless, the heavy traffic on local roads, the bypasses in addition to dust and noise will have a significant direct impact on communities. The impact will cause loss of resources and/or quality and integrity of receptor. Thus the impact magnitude is estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worse the current situation in community tension
Type of Impact	Direct/Indirect	Construction activities will have both direct and indirect impact upon receptor

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Regional	Impact extends across the North-eastern region of Macedonia
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	The impact can be considered to have a high likelihood of occurring
Magnitude	High	Loss of quality and integrity of resource

Table 6-111 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is ***large negative***. The impact will result in substantive changes in community tensions.

Operational phase

Community reactions due to the disturbance arising from the operation of the railway

Once the railway is operational, freight and passenger traffic will be diverted from roads to trains. The new railway line will lead to a reduction of negative externalities. The shift in the mode of transport should lead to a potential reduction in traffic accidents on the roads, in air pollution and CO_2 emissions. Communities at or close to the railway line will mainly be disturbed from and react to noise and vibration caused by train operation in addition to safety regulations at railway crossings. This is expected to be more in the beginning until they have adapted to the changed living conditions associated with the railway.

Estimation of magnitude

The railway will only go through two towns: Kumanovo, which is a big town and, Kriva Palanka, which is a small town. These two towns will be mostly affected by the operation of the railway. However, in Kumanovo there is already an operational railway link for Corridor X and people are thus familiar with railway and those impacts that are connected with its operation. Thus, community reactions are expected to be less in Kumanovo than in Kriva Palanka where the residents will be exposed to the operation of a railway for the first time. The impact will cause loss of resource and/or quality and integrity of receptor in addition to severe damage to key characteristics. Thus the impact magnitude is estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Is not desirable
Type of Impact	Direct	Operation will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Geographic Extent	Local	Impact is limited to specific individuals or population groups/communities
Time when the impact occurs	delayed	Effect delayed and occurs sometime after project activities
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	The impact can be considered to have a high likelihood of occurring
Magnitude	High	Loss of quality and integrity of resource

Table 6-112 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is ***large negative***. The impact will result in substantive changes in community tensions.

6.3.4.5 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- **Community reactions due to the disturbance arising from the construction works -** the initial significance of this impact, without mitigation measures is ***large negative***. The impact could result in substantive changes in community tensions;
- **Community reactions due to the disturbance arising from the operation of the railway** - the impact could result in substantive changes in community tensions - the initial significance of this impact, without mitigation measures is ***large negative***.

6.3.5 POTENTIAL IMPACTS ON ACCESS & SEVERANCE EFFECTS

6.3.5.1 SUMMARY OF RESOURCES/RECEPTORS

The construction and operation of the railway could affect access and have effects of severance of the general public, the community services and the business sector in communities at or close to the railway line. Local community "PeroCico" in Kumanovo where the railway is passing by will be specifically imposed to potential impacts on access and severance effects. Using some access routes which are passing cross non functional railway road will be impossible during construction and later during operational phase. Affected people must get used to new traffic solution and to utilizy new safe access to their homes, neighbourhoud and towns. In Section 3 in town of Kriva Palanka new traffic movement will be required which may cause access and severance effects of the residents, both during construction and operational phase.

6.3.5.2 ASSESSMENT OF THE SENSITIVITY OF ACCESS & TO SEVERANCE EFFECTS

During establishing of the sensitive of this receptor the following criteria were applied:

1 Location of influence
2 Intensity of influence
3 Awareness of community

4 Awareness of administration

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance/occurrence

1 – low importance/occurrence

2 – medium importance/occurrence

3 – high importance/ occurrence

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 2 - low sensitivity (ls)

3- 6 - medium sensitivity (ms)

7- 9 - high sensitivity (hs)

10 -12 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Location of influence	Intensity of influence	Community awareness	Administration awareness	Sensitivity
General public	3	3	3	3	12
Community services	1	1	3	3	8
Business sector	1	1	3	3	8

Table 6-113 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

RESOURCE	VALUE (SENSITIVITY)
General public	Very high sensitivity
Community services	High sensitivity
Business sector	High sensitivity

Table 6-114 Results from sensitivity estimation matrix

The **General public,** around 30,000 people will mainly be affected by construction and operation of railway by being limited in their mobility near the construction area. Access will be restricted for farmers, who use the pastures along the line for stockbreeding, hunters, people who harvest forest food and for those who recreate in this area. But knowing the fact that the railway line mostly passes through unsettled areas the impact on restricting accessibility will be very low. In the town of Kriva Palanka, the people who are living near the future viaducts and tunnels will have their access restricted during construction work. However, due to the character of the area there are many roads that could be used as alternative roads. This may increase the time for walking/driving but this impact will be of a temporary character (until finishing of construction works). Since the railway mostly goes through tunnels and viaducts away from the community settlement accessibility will not be significantly affected during operational phase. There will be high occurrence of access and severance effects in communities that are close to the construction sites and railway alignment with high intensity. Awareness of communities and administrations will have high importance. Based on importance from different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Community services will be affected in terms of alternative access roads and maybe longer travel times as a result of construction activities on site**.** The first two sections have already established lines and community services like schools, hospital, markets, graves, religious symbols, sites or other assets and facilities could be afected in terms of alternative access roads that will cause longer travel time. In Section 3, no construction permits have been issued for the last 20 years along the line. There are no community's services that will be directly affected since the line goes in the upper part of the town of Kriva Palanka and mostly through forest and uninhabited areas where there are no community services. But due to changes in the access roads and thus traffic, community services access and severance could be indirectly affected. There will be low occurrence of access and severance effects and the importance of the influence intensity will be low. Awareness of community and administration has high importance. Based on importance from different criteria it can be concluded that the sensitivity of this sub receptor is high.

The **business sector** will not suffer directly from severance impacts by construction and operation of railway line. Indirectly business sector will suffer from changes in traffic and changed access which could increase travel time. In the town of Kriva Palanka, the line goes mostly through a residential suburban area with no businesses. Other business activities in this region like mining will experience a significant positive impact by railway operation due to the possibility of cheaper alternative transport. There will be low occurrence of access and severance effects, and the importance of the influence intensity will be low. Community and administration awareness will have high importance. Based on importance from different criteria it can be concluded that the sensitivity of this sub receptor is high.

6.3.5.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on access, due to severance, have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Impacts on access and severance effects

Operational phase

- Impacts on access and severance effects on general public, community services and business sector in communities at or close to the railway line.

Construction phase

Impacts on access and severance effects

Estimation of magnitude

Access and severance effects will mainly occur during the construction period due to limited movement at construction sites, and changed access road increasing travel time. Some changes in receptor or its quality is estimated to occur, minor loss of/or alteration of some characteristics of receptor. Impact is estimated to have low magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worse the current situation access and severance
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur
Magnitude	Low	Alteration of receptor

Table 6-115 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is ***moderate negative***. The impact will result in loss of receptor but not adversely affecting the integrity of the receptor.

Operational phase

Impacts on access and severance effects

Access will be limited within the railway belt area once the railway is operational. This area will be railway property and access within this area will be prohibited for unauthorized persons. Overpasses and underpasses which will secure access across the railway will be provided and could mean that the access will be improved when comparing with before the construction of the railway. In Section 3 in town of Kriva Palanka operation of railway will restrict movement of people and will cause severance effects. Impact is estimated to be of a high magnitude due to loss of resource and/or quality and integrity of resource. Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worse current situation
Type of Impact	Direct	Construction activities will have direct impact upon receptor

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometimes after project activities, in this case during operational phase
Duration	Long -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur
Magnitude	High	Loss of resource/large scale of improvement

Table 6-116 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3,* the initial significance of this impact, without mitigation measures could give rise to ***large negative effects***. The impact will result in substantative changes in defined population/communities or result in a large change in socio-economic conditions.

6.3.5.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Access and severance during construction phase - the initial significance of this impact, without mitigation measures is ***moderate negative***. The impact will result in loss of receptor but not adversely affecting the integrity of the receptor;
- Impacts on access and severance effects durin operational phase - the initial significance of this impact, without mitigation measures is large negative. The impact will result in substantative changes in defined population/communities or result in a large change in socio-economic conditions.

6.3.6 POTENTIAL IMPACTS ON DISRUPTION OF UTILITIES

6.3.6.1 SUMMARY OF RESOURCES/RECEPTORS

Utilities which are located under and above ground such as water supply, sewerage, cable network and telephone at the construction site will be affected. In addition, the influx of people such as construction workers, employment seekers and service providers will increase pressure on the utilities in the area.

6.3.6.2 ASSESSMENT OF THE SENSITIVITY OF ACCESS &SEVERANCE EFFECTS

During establishing the sensitivity of this receptor following criteria were applied:

1. Location of influence
2. Intensity of influence due to influx of people
3. Awareness of community
4. Awareness of service providers/administration

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance/occurrence

1 – low importance/occurrence

2 – medium importance/occurrence

3 – high importance/ occurrence

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 2 - low sensitivity (ls)

3- 6 - medium sensitivity (ms)

7- 9 - high sensitivity (hs)

10-12 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table, on the following page:

	Location of influence	Influence due to influx of workers	Community awareness	Administration/service providers awareness	Sensitivity
Underground installations	3	3	3	3	12
Above-ground installations	1	3	1	1	6

Table 6-117 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

Utility	VALUE (SENSITIVITY)
Underground installations	Very high sensitivity
Aboveground installations	Medium sensitivity

Table 6-118 Results from sensitivity estimation matrix

Underground installations - there is a high possibility for disruptions of utilities in residential areas where the entry of a temporary workforce will be significant. The influx of people will put more pressure on the utilities in the area. However, this is not expected to disrupt the utilities. Awareness of communities and service providers/utilities will have high importance. Based on importance from different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Above-ground installations will not be affected significantly (except cases where it is necessary for the construction) since most works and operation of railway is at the ground level and would not affect installations higher up. Occurrence of disruptions to above-ground installations is of low importance regarding location, awareness of community and administration/service providers and has high importance in connection with the influence due to entry of a high number of people.

6.3.6.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on utilities have been identified for the construction and the operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Effects of utility cuts on local businesses and communities

Operational phase

- Effects of diversions of utilities on local businesses and communities

Construction phase

Effects of utility cuts on local businesses and communities

Utility cuts could be mostly affected by construction activities, especially in Kriva Palanka, and in the third section. In the first two sections where the line is already established, no disruptions are expected. In most areas of the country there is no under-ground cadastre and it can be expected that some local short-term interruptions could happen which is normal for construction activities of this kind. The overall majority of the alignment runs through uninhabited areas and thus where there should be no disruption on utilities. Before construction activities are initiated, information concerning the whereabouts of most installations can be obtained from the local citizens who are very well aware of the underground installations in their vicinity. Also service providers can provide information in this respect to avoid damages on the utilities. However, the service providers do not have full data on utilities due to illegal connections.

Estimation of magnitude

Cuts of utilities will occur mainly during construction period. It is expected that it will mainly be residential houses in Kriva Palanka that will be affected. Since there are no business activities in the vicinity of the railway this sector should not be affected by cuts of utilities, short disruptions could however be expected. Some changes in receptor or its quality is estimated to occur, i.e. minor loss of or alteration of some characteristics of receptor. Thus it can be estimated that impact will have low magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact could worse the current situation
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities/businesses that are on the closest distance to the railway in Section 3
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium –term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Magnitude	Low	Alteration of receptor

Table 6-119 Sensitivity estimation matrix

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is ***slight negative***. The impact will result in small change in social-economic conditions.

Operational phase

Effects of diversions of utilities on local businesses and communities

Once the electric railway is operational, more pressure on the electric power supply can be expected. No alterations of the utilities for local businesses or communities can be expected.

<u>*Estimation of magnitude*</u>

Due to the above the mentioned magnitude of the impact it is estimated to be negligible.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worse the current situation
Type of Impact	Direct	Operation could have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities/businesses that are on the closest distance to the railway in Section 3
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activities
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Unlikely	The impact can be considered to be unlikely to occur
Magnitude	Negligible	Does not have a measurable impact

Table 6-120 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures is expected to be ***neutral***. The effect is likely to have negligible or neutral influence, irrespective of other effects.

6.3.6.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that there are no impacts with potentially significant effects.

6.3.7 POTENTIAL ECONOMIC IMPACTS

6.3.7.1 SUMMARY OF RESOURCES/RECEPTOR

During construction phase it is expected that related construction works will have significant impact especially on local economy, North-eastern region of Macedonia economy and national economy. During operational phase, new markets will be opened; new transport alternatives will be available which will significantly impact development of local, North-eastern region of Macedonia economy, national and European region economy.

6.3.7.2 ASSESSMENT OF THE SENSITIVITY OF ECONOMIC IMPACTS

During establishing the sensitivity of these receptors the following criteria were applied:

1. Business opportunities from contracting contractors and subcontractors
2. Trading opportunities
3. Opportunities for provision of basic and other services for the contractors
4. Increased revenue and taxes (VAT) from construction activities
5. Revenue from railway operation
6. Better productivity and market access and increased competitiveness
7. Economic Attractiveness
8. Tourism boosting

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 4 - low sensitivity (ls)

5- 11 - medium sensitivity (ms)

12-18 - high sensitivity (hs)

19-24 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table in the table below:

	Business opportunities from contracting contractors and subcontractors	Trading opportunities	provision of basic and other services for the contractors	Increased revenue and taxes (VAT) from construction activities	Revenue from railway operation	Better productivity and market access and increase competitiveness	Economic Attractiveness	Tourism boosting	Sensitivity
Local economy	3	3	3	2	2	3	3	3	22
Regional economy	3	3	3	2	2	3	3	3	22

	Business opportunities from contracting contractors and subcontractors	Trading opportunities	provision of basic and other services for the contractors	Increased revenue and taxes (VAT) from construction activities	Revenue from railway operation	Better productivity and market access and increase competitiveness	Economic Attractiveness	Tourism boosting	Sensitivity
National economy	3	3	2	3	3	3	2	3	22
Global economy	3	2	1	1	3	3	2	3	18

Table 6-121 Sensitivity of estimation matrix

The results from sensitivity estimation matrix determined the following:

RESOURCE	VALUE (SENSITIVITY)
Local economy	Very high sensitivity
Regional economy	Very high sensitivity
National economy	Very high sensitivity
Global economy	High sensitivity

Table 6-122 Results of sensitivity estimation matrix

Local economy has high importance as a sub receptor when it comes to business opportunities. The sensitivity of the local economy has high importance regarding trading opportunities. Direct and indirect business opportunities will increase significantly for local contractors and especially subcontractors during construction works. Food and some construction materials will be supplied locally and thus increase local trade. The local economy will also experience opportunities for providing skilled services from e.g. like craftsmen and hammer mill operators and the sensitivity will be of high occurrence. Increased revenue and taxes that will be accumulated by construction activities will partly be diverted from the state to the local level. During construction phase it could be expected that around 0.1% of estimated investment costs could be inputed in local economy, meaning around 590,000 Euro. The sensitivity of the receptor in regards with this factor will have medium importance. During operation of railway, revenue from national level will also flow to local level with a sensitivity of medium importance. When the railway is operational, the local economy will have assumed better conditions for increased productivity and improved market access, be more economic attractive for investments and have possibilities for boosting the tourism in the area. Sensitivity of this sub receptor regarding these criteria is of high importance. Based on importance of the different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Regional economy - due to the limited capacity of local economy it is expected that demand for materials, services and subcontractors will extend to the entire North-Eastern region of Macedonia. During construction phase it could be expected that around 2% of estimated investment costs could be inputed in regional economy, meaning around 11Mil Euro. Sensitivity of this sub receptor regarding all criteria is similar to that for the local economy. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub receptor is very high.

National economy is expected to have a high importance in regards with the business opportunities from contracting contractors. Most of the larger construction companies are established at a national level. For some of the material to be used during construction, suppliers from other parts of the country will have to be utilized and thus improve opportunities for trade at national level. This is of high importance. Regarding provision of services, medium occurrence is expected. Sensitivity of national economy in respect of revenue and taxes during construction and later during operation of the railway is of high importance. Most of the taxes will end up in the state budget; part will flow to local self governments within North-east region of Macedonia. During construction phase it could be expected that around 60% of estimated investment costs could be inputed in national economy, meaning around 355Mil Euro. When the railway is operational, the Macedonian economy will have improved conditions regarding productivity, market access and competitiveness. Industrial free areas within the region and along the corridor VIII will be economically more attractive, especially the mining areas of the North-eastern region. The sensitivity of sub receptor in regards with this criterion is medium. In addition, cheaper transport modes will provide possibilities for people to travel more often. It is expected that many tourist from both within the country and from abroad will be attracted to visit places along corridor including eastern section. The sensitivity of the sub receptor regarding these criteria is expected to be of high importance. Based on importance/occurrence of different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Global economy will be mostly affected by operational railway of whole corridor VIII. During construction phase it is possible that international contractors will be engaged and huge percentage of material to be imported from neighboring contries. During construction phase it could be expected that around 37.5% of estimated investment costs could be inputed in global economy, meaning around 220Mil Euro. Sensitivity of this sub receptor in regards with these criteria has high importance. Global economy may supply some of the construction material and the importance could be estimated as medium. During construction works low importance from revenues and taxes are expected. However global economy sensitivity regarding improved productivity, market access, increased competitiveness, economic attractiveness and tourist boosting will have high importance. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub receptor is high.

6.3.7.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Economy have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Stimulation of economic growth at local levels

Operational phase

- Effects on local economy, North-Eastern Macedonia economy, National economy and European region economy

Construction phase

Stimulation of economic growth at local levels

The local economy will be directly and positively affected. The construction workers will obtain most of their food and other necessities from the surrounding area. This will create a potential market for the local agricultural producers, fishermen, craftsmen and other small businesses like hammer mills and local shops. This will increase the incomes of the local people which can be invested in other (productive) activities and be used for domestic needs like acquiring new furniture, refurbishing of houses, medical expenses etc. The project will stimulate local economic activities by contracting local entrepreneurs and sub-contractors, providing trading opportunities for local communities and other small enterprises in the province, providing opportunities for provision of basic and other services for the contractors and immediate community. Part of increased revenue and taxes will be redirected to the local communities.

Estimation of magnitude

It is expected that the impacts will result in an improved local economy. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-123 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in substantive changes in the local economy. The impact should be sufficiently large to result in an improvement in the quality of life locally.

Operational phase

Effects on local economy, North-Eastern Macedonia regional economy, National economy and Global economy

Local economy

During the operational phase, the local economy will benefit through some employment opportunities with the operator and railway Infrastructure Company, by opening of restaurants, shops at railway stations, through development of local economic activities like agriculture, forestry, mining, tourism, harvesting of forest foods which is expected to be intensified due to better access to newly opened markets nationally and regionally. All passengers will save money due to the cheaper transport. All Municipalities in the region have planned for free development zones within their general Urban Plans and with available railway transport, these free zones will be more attractive for foreign investors. Increased direct investments and green field investments can be expected.

Estimation of magnitude

It is expected the impact on the Local Economy will be of a large scale and result in improvement. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population groups/communities at or close to the Railway Corridor VIII-Eastern Section
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-124 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally, beyond SEE area.

North-Eastern Macedonia economy

The North-Eastern region is classified as the least developed planning region in the Republic of Macedonia. The region is rich with natural resources. Their explotation could be supported with development of a railway line as an alternative cheap transport solution. By having the Railway Corridor VIII constructed, the region will have access to transport facilities which can accommodate almost any transportation need of people and goods, and it is likely that this will contribute to the stimulation of economic growth within the North-Eastern region.

There is potential for increasing and intensifying the agricultural production of the region. Small and large farmers can have their agricultural products transported to Skopje and also to the rest of Europe.

The region is rich with high productive pastures, cattle breeding is also an area with great development potential. Railway will improve the connection between the farmers (producers) and meat industry.

Forestry is another area with prospects for development. Forestry is a production that requires railway transportation. Trains can carry up three times more forest products than a truck which results in lower per unit costs of inventory and shipping.

The region is one of the most significant mining areas in the Republic of Macedonia. The municipalities of Kriva Palanka and Kratovo all have substantial metal ore deposits e.g. lead, zinc, antimony, copper, silver, gold, uranium and non metal ores e.g. bentonite clays, tuffs, quartz, diatomaceous earth, alluvium, silica, marble, granite. With access to freight trains, the mining operations could become more economically feasible and thus be potentially intensified.

All municipalities within the North-Eastern region have devoted an area for industrial free development but as of now only few businesses are established. With operation of the railway these areas will become more attractive for foreign companies, due to the closeness of the sources of row materials, lower salary costs and good access to markets through the Corridor VIII.

Thus, a new railway link will improve the socio-economic situation within the municipalities of the North-Eastern region.

Region has much potential. Railway transport could help this potential to be utilized in direction of economical growth. As potential economic impacts that could arise within this impact could be considered following: Increased income, changes in wages, improved living standard. It can be estimated that around 1,500 families potentially will have positive benefits from the railway construction.

Estimation of magnitude

It is expected the impact on the North-Eastern Regional economy will be of a large scale and result in improvement. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extends across the North-Eastern region of Macedonia
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-125 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond SEE area.

National Economy

Operation of the railway will promote economic growth by building, enhancing, managing and maintaining the railway transport service to the economy. Railway transport will decrease transport costs in final market price of the products which will lead to bigger competitiveness of national economy abroad, especially in the countries along the Corridor VIII (in the first instance neighboring countries). Railway Corridor VIII will provide new transport model as integrated and interconnected transport network that will establish effective services to the users in the country (both for passenger and freight traffic). The

North-Eastern region of Macedonia as the most disadvantaged region in the country will be connected to the national economy which will lead to its economical development. The railway will provide social inclusion by connecting remote areas and increasing the accessibility to the transport network.

Estimation of magnitude

It is expected the impact on the National economy will be of a large scale and result in improvement. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	National or Transboudary	Impacts extends through much or all of Macedonia or Bulgaria/Sout east Europena (SEE) area
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-126 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond SEE area.

Regional Economy

Pan European Corridor VIII spans over the South Eastern European area where transportation infrastructure is traditionally weak. Road connections are inadequate both in Albania and in Macedonia, especially along Qafe Thane (Albania- Macedonia border) and Deve Bair passages (Macedonia-Bulgaria border). As regards railways, some crucial links are still missing, while the existing ones are insufficient in Macedonia and Bulgaria, and scarce in Albania. Pan European Corridor VIII is thus a challenging project, requiring additional resources and more international cooperation to expose potential. Corridor VIII is bound to open new, crucial connections between Macedonia and Albania, and of similar importance for the Italian regions facing the Southern Central Mediterranean basin. Thanks to the sea links between the Apulian ports and Durres in Albania, and the road-rail connections towards the Black Sea, Corridor VIII will allow a further extension to the east, so as to increasingly extend industrial and commercial cooperation the two shores. A better integration with South Eastern Europe is a fundamental need for North Eastern and South Central Italy. What is more, fostered relationships with South Eastern European countries are of the utmost importance for South Central Italy and Turkey.

Finalizing of the whole Corridor VIII will provide possibilities for increased economic and other kinds of cooperation between companies from Macedonia, Albania, Italy, Bulgaria and Turkey. This will lead to prosperity of the Balkan region. Links already established through Corridor X, it could be expected to be rerouted to Corridor VIII.

The Corridor will conect the Balkan peninsula with Turkey and provide possibilities for growth and development. Transport of goods is going to be linked between Macedonia, Turkey and the Middle East who are traditional foreign trade partners of the Republic of Macedonia.

Operation of the railway will create significant economic benefits in the region providing a significant boost in the regional economic cooperation.

During operation, the Project will provide wider regional socioeconomic benefits as result from savings in journey times for business and personal purposes. In addition, connection from east to the west will create trans-boundary possibilities, especially in trade of goods and services and traveling of the people.

Estimation of magnitude

It is expected the impact on the European Regional economy will be of a large scale and result in improvement. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Global	Effects extends globally beyond SEE area
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-127 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond SEE area.

6.3.7.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Stimulation of economic growth at local levels during construction phase - the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in substantive changes in local economy. The impact will be sufficiently large to result in improvement of the quality of life;
- Effects on local economy - the initial significance of this impact, without mitigation measures is ***large positive***. The impact will result in substantive changes in local economy. The impact will be sufficiently large to result in improvement of the quality of life;
- Effects on North-Eastern Macedonia economy - the initial significance of this impact, without mitigation measures is ***large positive***. The impact will result in substantive changes in local economy. The impact will be sufficiently large to result in improvement of the quality of life within North-eastern region of Macedonia;
- Effects on National economy - the initial significance of this impact, without mitigation measures is ***large positive***. The impact will result in substantive changes in national economy. The impact will be sufficiently large to result in improvement of the quality of life within national frames;
- Effects on Global economy - the initial significance of this impact, without mitigation measures is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally, within Noth-Eastern region of Macedonia and nationally, but the effects will extend globally beyond SEE area.

6.3.8 POTENTIAL IMPACTS ON EMPLOYMENT

6.3.8.1 SUMMARY OF RESOURCES/RECEPTOR

Employment at local, within north-east region of Macedonia, national, transboundary and regional level is an important receptor.

6.3.8.2 ASSESSMENT OF THE SENSITIVITY OF THE IMPACTS ON EMPLOYMENT

During establishing the sensitivity of these receptors the following criteria were applied:

1. Work on site
2. Skilled workers
3. Non skilled workers
4. Work in trade
5. Work in services
6. Work during operation of railway

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 3- low sensitivity (ls)

4- 8- medium sensitivity (ms)

9 - 13- high sensitivity (hs)

14-18 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table on the following page:

	Work on site	Skilled work	Non skilled work	Work in trade	Work in services	Work during operation of railwav	Sensitivity
Direct	3	3	3	0	0	3	11
Indirect	1	1	1	3	3	3	12

Table 6-128 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

	VALUE (SENSITIVITY)
Direct employment	High value (sensitivity)
Indirect employment	High value (sensitivity)

Table 6-129 Results from sensitivity estimation matrix

Direct employment will have high occurrence sensitivity during the construction and operational phase of railway, especially for the required work on site. The sensitivity of direct employment in regard with the work on site is of high occurrence/importance both for skilled and non skilled works. Operation of railway will create possibilities for opening jobs in railway infrastructure and transport companies, thus the importance in regards with this criteria is going to be high. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub receptor is high.

Indirect employment both for constructional and operational phase of railway will be created mainly in trade and with service providers (shops, some crafts services, restaurants, café, bars and similar). The sensitivity of this sub receptor regarding these criteria is going to be of high occurrence. There may be small possibilities for indirect engagement of skilled and unskilled workers on site (for example for repairing of construction equipment) but sensitivity of this sub receptor in this regard is going to be with low occurrence. Based on importance/occurrence from different criterions it can be concluded that the sensitivity of this sub receptor is high.

6.3.8.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Employment have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Creation of local employment (direct and indirect)

Operational phase

- Creation of employment (direct and indirect) at local, regional, national and transboundary (through much or all of Macedonia and Bulgaria) and global level (beyond SEE area)
- Improvement in access to employment opportunities across the region

Construction phase

Creation of local employment (direct and indirect)

The employment benefits during the construction phase are positive, since it relates to the project activities, induced by increased employee spending. Considering that a bigger proportion of the total population is economically inactive, the project will increase opportunities for a bigger percentage of the population by giving them access to employment opportunities. The employment opportunities will be created for both skilled and non skilled labour in the community. The community has the capacity to absorb the employment opportunities arising during construction phase.

During construction of the railway, employment will be generated mainly for construction workers. During previous construction work, all four biggest national construction companies worked as Contractors. Mainly using their constant employees but due to the size of the works additional workforce were engaged from local communities directly or indirectly through subcontractors.

For example one of the companies, Beton, worked on Section 1 and employed 150-200 construction workers at that time.

In the timespan elapsed since construction work stopped in 2004, the major construction companies within Macedonia have acquired new and competitive equipment requiring much less workers to do the same work. Thus, the constructing company, Beton, estimates that for the same work they did previously, they would today only need 100-120 workers.[4] The construction work will be subject to international tenders but it can be assumed that it is likely that national/local construction companies will be subcontracted and thus potentially ensure employment creation among workers in Macedonia (on national level uneuploment rate for 2010 is 32%) but also within the North-Eastern Region, which are suffering from an unemployment rate of around 43%.

It is estimated that during previous construction work on the railway, the four companies together employed around 1,200 – 1,300 workers. Due to technological developments and investment in labour saving equipment, the workforce needed when work will be assumed on the three sections of Corridor VIII is thus estimated to be in the range of 600 - 700 workers.

It is estimated that around 30% of the skilled construction workers will be reqruited locally. Meaning construction works could locally provide 200 employments. Gender distributions in various sectors of employment are markedly skewed with women making up the majority of workers in the health, social affairs, and education sectors and men predominating in construction, mining, transport, and communication. Thus it can be expected that woman could be engaged within work camps and within administration of Contractors (administrative or engineering staff) or with Supervisor (administrative or engineering staff). It can be expected that around 70 women could be engaged in different positions during construction work. For construction of tunnel and bridges skilled workers will be required who would in most cases be permanent employees of the construction companies. A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction companies' property.

[4] Interview has been carried out with the construction company, Beton. Thus, the previous and potential workforce of the other three companies during construction work on the Corridor VIII are unknown but is estimated to be similar in composition and numbers as Beton.

The remaining skilled construction workers will be imported to the area of construction and will reside in labour camps. During previous construction, Beton managed a labour camp in Beljakovce on rented private land. The camp included kitchen and dining room and provided medical services. Although those camps will provide for canteens, it is expected that both the camp management and the workers will spend money locally utilizing the local business community for ensuring supplies for the camps and entertainment and other services for the workers.

Some of the residents have been out of work for a long period of time (from the start of privatization in 90's) and not all young people from 18 are taking part in education, training or employment. Economic development will improve overall employment rate and reduce the number of people dependent on state benefits. Tackling this economic exclusion is important for improving the quality of life for the residents.

Thus, a positive spin off effect during the construction period on the local economy is expected.

Estimation of magnitude

It is expected the construction phase will create employment opportunities and will have a high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation in regards with unemployment, it is desirable
Type of Impact	Direct/Indirect	Construction activities will have both direct and indirect impact upon receptor
Reversibility	irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	National	Impact extends through much of Macedonia (national construction companies could be engaged)
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-130 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in substantive changes in employment situation. The impact should be sufficiently large to result in potential improvements in quality of life.

Operational phase

Creation of employment (direct and indirect) at local, regional, national and transboundary and global level

Following the construction period, it is estimated that a number of people who will find employment within the local communities and within region mainly with the railway operation and maintenance, at the stations and other transport related services will be significant. Activation of the whole corridor, passenger and freight transport will induce many employment positions along the railway line. Direct employment will be created, related with operation and maintenance of railway (on permanent way, on signalization, on loading and unloading and similar). It can be estimnated that around 50 employees will be needed for maintenance of railway and around 40 who will be employed within railway stations and halts. It is expected that mayority of employes for mainetetnace will be male, however for stations it can be expected that mayority of employees could be female. Additionally, the train travellers are expected to have certain needs that can be fulfilled from the local restaurants, cafeterias, markets etc. Thus, long term business opportunities at the new railway stations are likely to emerge. All in all, it is estimated that around hundred people may find employment with the railway operations, at the stations and with other services linked with transport in addition with servicing travelers' needs.

Expected development of the economy at regional, national and beyond national level will create many job positions. In the region it is expected to positively influence the development of mining, tourism and forestry. Free industrial areas are expected to have huge importance in jobs creation.

Operation of the whole Corridor VIII will improve and strengthen economic and other kinds of cooperation between Macedonia, Albania, Italy, Bulgaria and Turkey. This will lead to prosperity of the SEE and it will extend beyond. Beside creation of direct employment possibilities on railway, indirect employment possibilities will occur as a result of increased trade and increased economic activities.

Estimation of magnitude

It is expected the operational phase will create employment opportunities and will have a high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation , it is desirable
Type of Impact	Direct/Indirect	Operation of railway will have both direct and indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Global	Effects extends globally beyond SEE area
Time when the impact occurs	Delayed	Effect delayed and occurs after project activities (during operation of railway)
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-131 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in substantive changes in employment situation. The impact should be sufficiently large to result in potential improvements in the quality of life.

Improvement in access to employment opportunities across the region

The Railway Corridor VIII as a new transport mode will create a new integrated and interconnected transport network. The network will provide better mobility of workforce not only within North-Eastern region (around 40,000 in total from which around half female) but within the wider country as well (around 283,236 in total from which around half females). Between the ages of 25 and 54, roughly 80% of women are inactive (the majority of these are housewives, many by choice). Activity rates are also especially low for male and female youth, rural women, people with disabilities, and Roma. While there are dramatic gender differences in employment and activity rates, there are also striking gender differences in type of employment. 79% of those who are classified as “employer” by the Government of Macedonia are male, as are 83% of those who are classified as self-employed. 60% of those classified as unpaid family workers are female. Women are also more likely than men to work in the informal economy. Improvement in access to employment will supprt Macedonian institution in there efforts to ensure gender equality by implementing all relevant legislation which is already in place, with the exception of a national gender strategy. Although both men and women in Macedonia face grave problems locating suitable employment, there are particular barriers facing women who wish to enter the labor market and obtain jobs. Women are very disadvantaged in the labor market, and are economically active at much lower levels than men. There are many reasons for that like lack of time due to family obligation, than lack of support services such as affordable childcare that would facilitate balancing work and family responsibilities, some discriminatory policies. One important barrier for entering the labour market is connected with limited possibility for obtaining relevant training or concrete skills that are needed in the area in which they wish to work, especially for older women, than lack of education, especially for Roma or rural women.

Presently the North-Eastern region of Macedonia is the most disadvantaged region in the country. With operation of railway, region will be connected to the national economy and national market. People will be able to look for jobs outside the region and with good and affordable transport they could commute between job and home daily. Thus, the railway will accommodate social inclusion by connecting remote areas, female and religious minorities and increasing the accessibility to the transport network.

Estimation of magnitude

It is expected this impact to create large scale or high improvement of access to employment opportunities. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation , it is desirable
Type of Impact	Direct	Operation of railway will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	National	Effects extends through Macedonia
Time when the impact occurs	Delayed	Effect delayed and occurs after project activities (during operation of railway)
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

Table 6-132 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in substantive changes in access to employment opportunities. The impact should be sufficiently large to result in potential improvements in the quality of life.

6.3.8.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Creation of local employment (direct and indirect) - the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in substantive changes in the employment situation. The impact will be sufficiently large as to result potential improvements to quality of life;
- Creation of employment (direct and indirect) at local, regional, national and Trans - boundary and global level - the initial significance of this impact, without mitigation measures, is large positive. The impact should result in substantive changes in the employment situation. The impact should be sufficiently large to result in potential improvements in the quality of life;
- Improvement in access to employment opportunities across the region - the initial significance of this impact, without mitigation measures, is large positive. The impact should result in substantive changes in access to employment opportunities. The impact should be sufficiently large to result in potential improvements in the quality of life.

6.3.9 POTENTIAL IMPACTS ON EDUCATION AND TRAINING

6.3.9.1 SUMMARY OF RESOURCES/RECEPTOR

Education and training of residents in communities at or close to the railway is an important receptor.

6.3.9.2 ASSESSMENT OF THE SENSITIVITY OF THE IMPACTS ON EDUCATION AND TRAINING

During establishing the sensitivity of this receptor the following criteria were applied:

1 Possibility for capacity building during construction phase
2 Ability of local students to commute more easily
3 Increase of employment opportunities
4 Creation of new educational and training centers as a consequence of the economic growth of the area

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance
1 – low importance
2 – medium importance
3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 2 - low sensitivity (ls)

3- 6 - medium sensitivity (ms)

7- 10 - high sensitivity (hs)

11-12 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Possibility for strengthening of capacities during	Ability of local students to commute	Increase of employment	Creation of new educational and training centers as a	Sensitivity
Education &Training	3	3	3	2	11

Table 6-133 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

Resource/Receptor	VALUE (SENSITIVITY)
Education &Training	Very high sensitivity

Table 6-134 Results of sensitivity estimation matrix

Sensitivity of education and training in respect of the possibility for strengthening of capacities during construction phase has high importance due to the exposure of local people to new technologies and management methods. Operation of railway will provide possibilities for students to commute more easily and to increase their possibilities for positioning at the job market. Sensitivity of the receptor in regards with these two criteria is of high importance. With regards to the creation of new educational and training centers as a consequence of the economical growth it is expected that overall development and improvement of quality of life will lead to increased demand for new education centers in the region. Due to this, the sensitivity of education and training in this regard is of high importance. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this receptor is very high.

6.3.9.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Education & Training have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Capacity building through training

Operational phase

- Education & training benefits from employment opportunities; and
- Education & training benefits from improved access to education and employment opportunities.

Construction phase

Capacity building through training

It is expected that during the construction phase some level of capacity building will be provided (organized and un-organized) through transfer of new technologies and new skills. This will happen mainly as on-the-job training but also as exposure to modern management and logistics procedures and by working with people having international expertise.

Joint venture co-operation between a major international contractors (who has the financial capacity to put up the required performance bonds) and local sub-contractors could result in transfer of skills which should result in strengthening of local capacities.

Estimation of magnitude

It is expected this impact to create minor benefits on education and training including strengthening of some features or elements education and training. Thus it is estimated that the impact will have low magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extends across North-eastern region of Macedonia
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	The impacts can be considered to have a medium likelihood of occurring
Magnitude	Low	Minor improvement

Table 6-135 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***slight positive***. The impact will result in minimal strengthening of capacities.

Operational phase

Education & training benefits from employment opportunities

It is expected that the railway operation will stimulate a large and competitive economy in the North--Eastern region of Macedonia which could provide jobs for every working-age resident and a highly qualified local workforce. Operation of railway as well will create possibilities for direct and indirect employment. At the moment, the area has high levels of unemployment and dependency on state benefits. According to the data obtained from the State Statistical Office, the number of registered students in the year 2007, coming from the Northeastern region per 1,000 inhabitants, reads 142, with 54.45% thereof being females. For the majority of Macedonians, enrollment in education is not currently an area in which there are many gender inequalities. Primary and secondary school are now mandatory in the country and during the 2005/2006 school year, 95% of primary school age children were attending school with little difference between the rates for boys and girls. The numbers of males and females who graduated from primary/lower secondary and upper secondary education were roughly the same in 2005/2006. Although somewhat more males progressed from primary/lower secondary education to upper secondary education, a slightly higher percentage of females progressed from upper secondary to tertiary education. In 2006, 54% of MS degrees were awarded to women as were 57% of PhDs. Many students in upper secondary education appear to choose typical gender-linked courses of study. For example, significantly more males than females completed upper secondary education with qualifications in agriculture, wood processing, mining, engineering, and transport whereas more females than males completed their education in personal services, secretarial and office work, health, and ballet. Interestingly, more girls than boys graduated with qualifications in economics and law. With better accesability to universities in the country it can be expected that the percentage both for males and females with secondary education who will continue their education will increase. Around 25,000 thousand pupils finishes secondary education yearly in North-Eastern region of Macedonia, from which it can be expected that around 80% could contunie their education. With recent activities undertaken by national authorities towards informing upcoming students for the profiles that are required on the labour market it can be expected that there will be no typical gender linked studies. Despite all above mentioned it can be stated that the society is still quite patriarchal especially in rural and undeveloped areas where most citizens still believe that women are primarily responsible for maintaining the home and raising the children and men are expected to be the breadwinners of the household.

Estimation of magnitude

It is expected that there will be large scale or high improvement in the education and training due to employment opportunities. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extends across North-eastern region of Macedonia
Time when the impact occurs	Delayed	Effects delayed and occurs sometime after project activities
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	The impacts can be considered to have a high likelihood of occurring
Magnitude	High	Large improvement of quality of life

Table 6-136 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3,* the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in improvements potentially on quality of life.

Education & training benefits from improved access to education and employment opportunities

Operation of the railway will improve access to education and employment opportunities not only within North-Eastern region but nationally. New transport model which is cheaper than existing one will provide possibility to many people who are interested to upgrade their skills in some areas to travel on dailiy base to Skopje where as capital city most of the educational and training centers are located. Accomodation in the town for most of the citizens that comes from other regions is not very acceptable solution due to very high price which they can not affort. How to reach to Skopje and how to attend to some of the training and educational programmes is at the moment problem for many peoples who are thinking how they could reach their educational and employment potential. Most of them they are aware that access to learning allows individuals to take up work options that provide personal fulfilment, financial independence and enhanced community participation. Under Agency of employment there are many programs ongoing towards change of qualification for some profiles, in order to provide them with required skill for labour market. Thus participation in skills and training can be expected to increase; children and young people, male and female will have access to a wider range of academic and vocational courses to raise overall achievement and increase career choices. Local people on that way should become more employable, so that they can share in the employment opportunities in the region.

Skopje as the biggest labour market at the moment offers many possibilities for employment. However due to very high running costs in the city many of unemployed people who have chance to work in city they are forced to refuse job due to this reason. Existing operational railway to Kumanovo and Veles shows the attractiveness of this transport. People from these towns who work in Skopje to avoid high expensis for rent and other running costs they travel on daily base to Skopje, in the morning they are coming to work and at the evening they go back. It is rough estimation that from around 800,000 citisens during working days in the town half are coming from other towns. Except from nearest towns who travel on daily base others who have good financial incomes are staying in the town. It can be expected that better accessibility will promote vocational learning and other opportunities to ensure people, including young people, have access to employment, further education and training opportunities. It can be expected that around 30% from unempolyment persons from Nort-Eastern region of Macedonia (around 12,000) people could decide to upgrade their skills or to work in Skopje when they would have cheap transport possibilities to travel on daily base. With functioning of whole Corridor VIII, expected economical development and attractivenss of the region due to raw materials sources will attract companies with specific requirements (mining engineers and similar) which will reflect labour market and will impose need for additional training and education. On that way in order to get and remain in the job market certain required skills should be fulfilled. Thus people (including females, older people, careers, parents returning to work, and those facing other barriers to employment, such as disability, or ill health) will recognize importance for having better education/skills and will use possibilities to upgrade them selves towards being competative on the labour market, which will most probably increase opportunity for people to get and remain in the job market. Changes in employment and educational area will change the existing tendency for females to focus on traditional "women's work" which often pays less or is less likely to result with high earning potential, and will change attitudinal issues related to a lack of confidence in one's ability to open a business and general hopelessness about personal economic prospects.

Estimation of magnitude

It is expected that there will be large scale or high improvement in the education and training due to improved access. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	National	Impacts extends through much or all of Macedonia
Time when the impact occurs	Delayed	Effects delayed and occurs sometime after project activities
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Probable	The impacts can be considered to have a medium likelihood of occurring
Magnitude	High	Large scale of improvement of quality of life

Table 6-137 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in potential improvements on quality of life.

6.3.9.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Education & training benefits from employment opportunities - the initial significance of this impact, without mitigation measures is ***large positive***. The impact should result in improvements potentially in quality of life;
- Education & training benefits from improved access to education and employment opportunities - the initial significance of this impact, without mitigation measures is large positive. The impact should result in improvements potentially in quality of life.

6.3.10 POTENTIAL IMPACTS ON VULNERABLE GROUPS

6.3.10.1 SUMMARY OF RESOURCES/RECEPTOR

Vulnerable groups which are likely to suffer more in economic and social terms from project activities than the general population have been identified in Section 1 (settlement “Pero Cico”) and Section 3.

6.3.10.2 ASSESSMENT OF THE SENSITIVITY OF THE IMPACTS ON VULNERABLE GROUPS

During establishing the sensitivity of this receptor the following criteria were applied:

1. Ability of vulnerable groups to cope with impact
2. Ability of vulnerable groups to resist impact
3. Ability of vulnerable groups to recover from impact

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 1- low sensitivity (ls)

2- 3 - medium sensitivity (ms)

4-6 - high sensitivity (hs)

7-9 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	Ability of vulnerable groups to cope with impact	Ability of vulnerable groups to resist impact	Ability of vulnerable groups to recover from impact	Sensitivity
Section 1 - Settlement “Pero Cico”	3	3	3	9
Section 3 – Kriva Palanka	3	3	3	9

Table 6-138 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

Vulnerable groups	VALUE (SENSITIVITY)
Section 1 - Settlement “Pero Cico”	very high sensitivity
Section 3 – Kriva Palanka	very high sensitivity

Table 6-139 Results of sensitivity estimation matrix

Section 1 - The railway passes by the local Roma community “Pero Cico” in Kumanovo. Ten houses with 20 families are residing at a distance of 7-8 m from the railway. They are very vulnerable due to their social and economic exclusion in the society. They are mostly unskilled labours working in cleaning, black market trading, collection and selling used plastic bottles, playing music etc. They are living in substandard housing conditions. Due to the economic crisis in Macedonia and transition related factors most of them rely on social welfare for survival. These families are at the bottom of the social hierarchy and their ability to cope, resist and recover from impacts is very low. From the sensitivity estimation matrix it can be concluded that the sensitivity 'to change' of this receptor is very high.

Section 3 - In Section 3, 25 families will lose their homes during construction of railway. A big number of other families will lose their land, forestry, pastures, fields and/or orchards. Some families may lose both their homes and part of their land. More details are provided in *Chapters 3, 5.2 and 14* comprising project description, social baseline and resettlement framework. As a result of the project and prior to the construction phase it is currently estimated that 25 families will lose their homes in Section 3. Until the detailed survey has been undertaken it is not possible to determine whether there are vulnerable groups or individuals within these 25. Some will lose their land, forestry, pastures, fields, orchards, whilst others may lose both their homes and part of their land. Therefore applying the precautionary principle it can be concluded that the sensitivity of this receptor should it contain vulnerable groups/individual is very high.

6.3.10.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

The following potential impacts on Vulnerable Groups have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Section 1 "Pero Cico" settlement losing of space in front of their houses
- Section 3, loss of land and properties to communities where vulnerable groups/individual may be affected

Operational phase

- Section 1 "Pero Cico" settlement residing along the track

Construction phase

Section 1 "Pero Cico" settlement losing of space in front of their houses

Within around 10 meters of the existing railway line, structures of a temporary nature have been raised by the people who are living in the nearby houses. These are three cottages (sheds) made from lightweight materials, used as storage for plastic bottles and various boxes which will be sold as recycle material by the owners. Direct adverse impacts of project activities are that some of the space in front of their houses will be lost for the purpose of the railway line. The space is used both for storing plastic bottles and for playing by 48 children under the age of 18. Selling of the empty plastic bottles is for some of the families the main source of income in addition to the social welfare. These families are very vulnerable due to their economic and social status.

The concerned people remember that the railway line was operational previously and trains were passing on the track they use as playground and for storing empty bottles. They are also aware that the state and Macedonian Railways have plans to reactivate the rail traffic and that they are occupying the line illegally. During initial reconstruction works in previous years, Macedonian railways built a protection wall at a height of 1.5 to 2m at a distance of 3m from the railway line. This existing wall during construction works can be kept and could be used as basement of the protection/anti noise wall. Between the protection wall and the houses there will be an open area/path to be used as access road to the houses. The total distance from rail axis to the nearest houses is 7 to 8m.

Estimation of magnitude

It is expected that this impact will cause minor loss of or alteration to the receptor ("Pero Cico"). Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population group at railway corridor
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Long-term	Impact is permanent
Likelihood of appearance	Certain	The impacts can be considered to have a high likelihood of occurring
Magnitude	Low	Minor loss

Table 6-140 Sensitivity estimation matrix

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will have a negative material affect on the vulnerable group.

Section 3, loss of land and properties to communities where vulnerable groups/individual may be affected

During the construction phase 25 families will lose their homes in Section 3. Some will lose their land, forestry, pastures, fields, orchards. Some families may lose both their homes and part of their land. People will need to leave their memories, to change their livelihood and to establish new social relations within a new environment. New agricultural activities will result from the loss of land. Until the detailed survey has been undertaken it is not possible to determine whether there are vulnerable groups or individuals within these 25 families.

Estimation of magnitude

It is expected that this impact could potentially cause a loss of resource and quality and integrity of the vulnerable group/individuals. Severe damage to key characteristics of group will occur. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population group at railway corridor
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Impact is expected to last between two and ten years
Likelihood of appearance	Certain	The impacts can be considered to have a high likelihood of occurring
Magnitude	High	Loss of resource

Table 6-141 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact may result in loss of quality and integrity of receptor.

Operational phase

Section 1 "Pero Cico" settlement residing along the track

Operation of railway will affect settlement "Pero Cico", partcularaly 20 familes who will reside along the track, on a distance from 7-8m. From one side there are negative impacts caused by noise and vibrations from trains on which they will be disposed, safety issues which could arise in regards with railway operations, changes in access and severance effects, changes in mobility in the area and changes in livelihoods (there will be no possibilities children to continue with playing near the railway).

Estimation of magnitude

It is expected that this impact could potentially cause a loss of resource and quality and integrity of the vulnerable group/individuals. Severe damage to key characteristics of group will occur. Thus it is estimated that the impact will have high magnitude.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable/imopact could improve some aspects of the current situation
Type of Impact	Direct	Operation of railway activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population group at railway corridor
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity/action
Duration	Long-term	Impact extends throughout operation of railway and/or beyond 10 years

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Likelihood of appearance	Certain	The impacts can be considered to have a high likelihood of occurring
Magnitude	High	Loss of resource

Table 6-142 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact may result in loss of quality and integrity of receptor and improvement of some aspects of the receptor.

6.3.10.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects:

- Impact on vulnerable groups in Section 1 "Pero Cico" settlement losing of space in front of their houses - the initial significance of this impact, without mitigation measures, ***is large negative***. The impact will have a negative material affect on the vulnerable group/individuals;
- Section 3, loss of land and properties to communities where vulnerable groups/individual may be affected- the initial significance of this impact, without mitigation measures***, is large negative***. The impact may result in loss of quality and integrity of receptor;
- Section 1 "Pero Cico" settlement residing along the track - the initial significance of this impact, without mitigation measures, ***is large negative***. The impact may result in loss of quality and integrity of receptor and improvement of some aspects of the receptor.

6.3.11 POTENTIAL IMPACTS ON WORKFORCE

6.3.11.1 SUMMARY OF RESOURCES/RECEPTOR

Impact issues related to the workforce comprise on-site accommodation, off-site accommodation, reactivation of old facilities, activation of new facilities, security of workers accommodation, accommodation standards, occupational health and safety, worker's right, rules and obligations and employment standards

Impacts arising from the influx of a workforce in the communities include community tensions, community health, safety and security which are already dealt with within the above assessment.

6.3.11.2 ASSESSMENT OF THE SENSITIVITY OF WORKFORCE

During establishing of the sensitivity of the workforce to impacts the following criteria were applied:

1. On-site accommodation
2. Off-site accommodation
3. Reactivation of old facilities
4. Activation of new facilities
5. Security of workers accommodation
6. Accommodation standards
7. Occupational health and safety

8. Worker's right, rules and obligations
9. Employment standards
10. Consultation and grievance mechanism
11. Management of community relations

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance/occurrence

1 – low importance/ occurrence

2 – medium importance/ occurrence

3 – high importance/ occurrence

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 8 - low sensitivity (ls)

9- 17 - medium sensitivity (ms)

18-25 - high sensitivity (hs)

26-33 - very high sensitivity (vhs)

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

	On site accommodation	Off - site accommodation	Reactivation of old facilities	Activation of new facilities	Security of workers accommodation	Accommodation standards	Occupational health &safety	Worker's right, rules and obligations	Employment standards	Consultation and grievance mechanism	Management of community relations	Sensitivity
Workers	3	1	3	2	3	3	3	3	3	3	3	30

Table 6-143 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

RECEPTOR	VALUE (SENSITIVITY)
Workers	Very high sensitivity

Table 6-144 Result from sensitivity estimation matrix

It is expected that a substantial part of the workforce will be recruited locally by subcontractors. For the workforce coming from outside the region, workers accommodation camps will be constructed. Smaller camps for temporary accommodation of specialist workers may also be required. There is a high occurrence that these camps will be located on-site, i.e. outside the communities. In order to avoid and prevent potential adverse impact on the local community caused by workforce influx, there will be low occurrence of off–site accommodation, i.e. within the communities.Some of the previously constructed workers camps would most likely be reactivated. There is a high probability that this will happen; in order that temporary land acquisition is kept at a minimum. The railway line already requires temporary land acquisition and further temporary land take should be avoided. There will be a high occurrence of reactivation of old facilities due to the savings related with reuse of already established facilities.

Security of workers accommodation is of high importance. Specifically that it is better to keep the existing wall. It will constitute the basement of the protection / anti-noise "wall". to avoid negative impacts that could occur related to migrant workers, the security measures must be at a high level.

Sensitivity regarding Accommodation Standards, Occupational Health & Safety, Worker's Right, Rules and Obligations, Worker's Right, Rules and Obligations, Consultation and Grievance Mechanism and Management of Community Relations of worker is high. Based on importance/occurrence from different criteria it can be concluded that the overall sensitivity of the workforce is very high.

6.3.11.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

Impacts related to the influx and behaviour of the workforce have been identified within Impacts on Community Health and safety, Impacts on Community Tensions and Disruption to utilities. The following potential impacts on the Workforce as a recepetor have been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section:

Construction phase

- Accidents on work

Operational Phase

- Railway workers safety during operation of railway

Construction phase

Accidents on work

On a daily basis, construction workers face some of the most perilous employment conditions. Even though construction workers are trained and know basic safety measures, accidents can still happen. The risks taken every day during regular construction work make it difficult for job sites to remain accident-free.

Accidents on site could be caused by defective or collapsing scaffold, electrocutions, falls, falls from ladders, and defective machinery such as forklifts, conveyors, hoists, cranes, malfunctioning tools and other equipment. Accidents can result in serious injuries or death.

Estimation of magnitude

It is expected that this impact could potentially result in effects on workers of a potentially high magnitude when they occur.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Project results in a direct impact upon receptor/resource
Reversibility	Reversible/ Irreversible	The effect caused by impact is irreversible and reversible. For some cases situation can not be returned into previous condition for some effect could be permanent
Geographic Extent	Local	Impact is limited to workforce engaged on construction site
Time when the impact occurs	Immediate/Delayed	Effect will occur immediately following project activities and sometime after project activities depending from the kind of injury

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	The impact can be considered to have a medium likelihood of occurring
Magnitude	High	Impact will cause loss of resource and/or quality of resource

Table 6-145 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact could potentially result in significant risks to workers safety.

Operational Phase

Railway workers safety during operation of railway

With the commencement of operation of railway Corridor VIII -Eastern section, failing to provide safe working conditions can cause on-the-job injuries or exposure to hazardous chemicals that can leave railway workers at risk potentially resulting in injuries and/or being unable to work.

Estimation of magnitude

It is expected that this impact could potentially result in effects on the safety of railway workers of a potentially high magnitude when they occur.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Project results in a direct impact upon receptor/resource
Reversibility	Reversible/ Irreversible	The effect caused by impact is irreversible and reversible. For some cases situation can not be returned into previous condition for some effect is permanent
Geographic Extent	Local	Impact is limited to railway workers
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activities
Duration	Long term	Impact extends throughout operation of railway
Likelihood of appearance	Probable	The impact can be considered to have a medium likelihood of occurring
Magnitude	High	Impact will cause loss of resource and/or quality of resource

Table 6-146 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact unmitigated could potentially result in significant risks to workers safety.

6.3.11.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above mentioned assessment it could be summarized that following impacts will have potentially significant effects if unmitigated:

- Accidents on work - the initial significance of this impact, without mitigation measures, are ***large negative***. The impact could potentially result in significant risks to workers safety;
- Railway workers safety during operation of railway - the initial significance of this impact, without mitigation measures, is large negative. The impact unmitigated could potentially result in significant risks to workers safety.

6.3.12 POTENTIAL IMPACTS ON COMMUNITIES QUALITY OF LIFE

6.3.12.1 SUMMARY OF RESOURCES/RECEPTORS

Communities which are located at or close to the railway are an important receptor. The quality of the inhabitants' lives will potentially be seriously affected both during construction of the railway due to dust, noise, vibrations, safety issues and alteration of the landscape as well as during the operational phase of the railway which will expose the inhabitants to noise and vibrations in addition to electromagnetic fields. The communities close to the railway will also be potentially affected by safety hazards and an altered landscape while most other communities in the region will potentially experience improvement in their quality of live following the construction of the railway.

6.3.12.2 ASSESSMENT OF THE SENSITIVITY OF COMMUNITIES QUALITY OF LIFE

During establishing of the sensitivity of the community to impacts on their quality of life the following criteria were applied:

1. Location of influence
2. Awareness of contractor/s
3. Awareness of rail operator/infrastructure company
4. Awareness of community
5. Awareness of administration

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0 – no importance

1 – low importance

2 – medium importance

3 – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 3 - low sensitivity (ls)

4- 7 - medium sensitivity (ms)

8- 12 - high sensitivity (hs)

13-15 - very high sensitivity (vhs)

The sensitivity of the receptor was assessed according to the described methodology. The results are presented in table:

	Location of influence	Awareness of contractor/s	Awareness of rail operator/infrastructure company	Awareness of community	Awareness of administration	Sensitivity
Quality of life	3	3	3	3	3	15

Table 6-147 Sensitivity estimation matrix

The results from sensitivity estimation matrix determined the following:

RECEPTOR	VALUE (SENSITIVITY)
Quality of life	Very high sensitivity

Table 6-148 Assessment of impact

Quality of life sensitivity regarding the location of influence has high importance. It can be expected that the quality of life could be seriously impaired for the communities located at or close to the railway during construction and operation of railway. However during operation the quality of life within whole North-Eastern region of Macedonian will be improved. Awareness of contractor/s during construction, railway operator/infrastructure during operation and awareness of administration both in the construction and operational phases has high importance. It's very important that communities, contractor/s, operator/s and administration are fully aware of potential risks and impacts that project activities could have on quality of life. Based on importance from different criteria it can be concluded that the sensitivity of this receptor is very high.

6.3.12.3 POTENTIAL IMPACTS AND LIKELY SIGNIFICANCE

Potential impacts on communities "Quality of Life" have been also been identified for the construction and operational phases of Project Railway Corridor VIII-Eastern Section in the previous impacts assessment. The following impacts have been identified and assessed under Quality of Life:

Construction phase

- Deterioration of quality of life due to the overall presence of annoying construction works and activities: dust emissions, high noise level, vibrations, changes in accesses, disruption of utility services, altered landscape

Operational phase

- Deterioration of quality of life due to the presence of annoying railway operations: high noise, vibration and electromagnetic levels in houses close to the tracks, severance effects, altered landscape, etc.
- Improvement in quality of life due to better access to the larger towns and their health services, education and training centers, recreational facilities, etc.; improved economic conditions, higher levels of employment, etc.

A number of these factors have already been assessed separately within the assessment above. Thus, the remaining issues will be assessed in the following, i.e. air quality, noise, vibrations, electro magnetic fields, safety and alteration of landscape.

Construction phase

Impairment of quality of life due to the overall presence of annoying construction works and activities: dust emissions, high noise level, vibrations, safety risks and altered landscape

Construction work will include activities related to site preparation, earthworks, preparation of haulage routes, erection of buildings and structures, application of architectural coatings, track laying etc. Most of the work will be undertaken outside inhabited areas, except in Section 3 where the line will go through the town of Kriva Palanka where construction related activities are expected to impact on the community's quality of life and in Kumanovo, Section 1, where rehabilitation and some construction work will take place. Movement of heavy vehicles on local roads, transport of raw materials will impair quality of life of the closest communities due to dust emissions, and potentially high levels of noise and vibration. The local communities close to the construction site will also potentially be negatively affected by safety risks and alteration of the landscape. Access and severance effects which will occur due to the limited movement at construction sites and changed access road arrangements which will increase travel time have already been assessed.

Dust

Construction operations are a potentially significant source of dust emissions that hold the potential to have a substantial temporary impact on local air quality. Dust emissions during the construction of buildings or roads are associated with land clearing, drilling and blasting, ground excavation, and cut and fill operations (i.e., earth moving). Dust emissions can vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A significant amount of the dust emissions result from construction vehicle traffic over haulage routes at construction sites. When a vehicle is driving on an unpaved road then the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Dust emissions also depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic.

Estimation of magnitude

Potential air quality impacts including dust, particle emissions and fuel combustion emissions will be minimized through mitigation measures and controls and the implementation of a dust management plan. Most of construction activities as a source of air pollution will be located outside the settlements. Due to this the impact should overally cause only small alteration of Quality of life thus the impact magnitude is estimated to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur
Magnitude	Low	Alteration

Table 6-149 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***moderate negative***. The impact will potentially result in small changes in quality of life. The impact will not be sufficiently large to result in diminishing the quality of life, even if they are sustained and widespread effects they are not considered to be disruptive to quality of life.

<u>Noise</u>

The majority of construction activities along the railway will not produce noticeable levels of noise disturbance due to the distance from most residences. However, some activities such as excavation, rock breaking, rolling and compacting may produce levels of noise that are audible when construction activities are located within 50 meters of residences. Blasting during construction may also be required due to the presence of hard rock within the construction corridor.

During construction works, the primary cause of noise will be the foundation of piles and catenaries masts. Nuisance connected with foundation works will be greater in populated areas and less in the open land where most of the work is going to be performed. However, the duration of the noise related work can be restricted to approximately one day for each residence.

Other typical noisy activities during construction will be connected to the haulage of material, loading and unloading of gravel, establishing the rail track ballast, using railroad track laying machine, supplying broken stone and gravel etc.

<u>Estimation of magnitude</u>

Most of the constructions activities as a source of noise will be located outside the settlements but they will be present on regional and local roads. Due to this, the impact will cause partial loss in Quality of life but it will not adversely affect the integrity. Thus the impact magnitude is estimated to be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Partial loss of resource

Table 6-150 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will potentially be sufficiently large to result in diminishing the quality of life in unmitigated.

Vibrations

Measurement of the magnitude of vibrations is difficult. The extent and magnitude of vibrations from construction works depends to a degree on the composition and conditions locally underground. Nuisance from vibrations experienced inside buildings will in addition depend on building material and foundation.

The guiding maximum levels of vibrations are:

- Residences 24 hours, mixed residences and business 6pm – 7 am, day care centres etc: Law = 75 dB
- Mixed residences and business 7am – 6 pm, office building, training rooms etc: Law = 80 dB
- Business area: Law = 85 dB

The above maximum levels of vibrations only concerns nuisance from vibrations for people. Normally, buildings at a distance of 20-30 meters from the area where the foundation of piles and catenaries masts take place will not be exposed to damaging vibrations.

Estimation of magnitude

Most of the constructions activities as a source of vibrations will be located outside the settlements, except in the town of Kriva Palanka, where houses at a distance within 20 to 30 meters from the access roads and construction site will potentially be affected by vibrations. Due to this, the impact will cause partial loss in Quality of life but it will not adversely affect the integrity. Thus the impact magnitude is estimated to be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Minor loss of receptor quality or alteration will occur

Table 6-151 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will be not be sufficiently large to result in diminishing the quality of life.

Safety

The majority of construction activities along the railway will not produce safety risks to the residence due to the distance of construction site to most of the residences. Construction works on or adjacent to the railway can affect the safety of personnel, passengers or the general public, if not managed effectively. Especially dangerous are areas with moving heavy machinery, excavation sites and construction sites**.** It is a requirement that such work is managed with a level of competence which ensures safety at all times and compliance with all relevant safety legislation.

Construction traffic will have temporary impacts on the traffic network of the area, generating increased traffic risks and accidents. Current road users include local residents, passengers to Bulgaria and those accessing the area for recreation. To ensure public safety special traffic regime must be applied.

Estimation of magnitude

Most of constructions activities as sources of safety risks will be located outside the settlements. However construction traffic will be present on regional and local roads. Due to this, the impact will cause partial loss in quality of life but it will not adversely affect the integrity. Thus the impact magnitude is estimated to be medium.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Duration	Medium -term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Partial loss of resource

Table 6-152 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact may be sufficiently large to result in diminishing the quality of life.

<u>Alteration of landscape</u>

Construction activities, presence of heavy machinery on site, movement of that machinery, contractor's accommodation facilities will change the landscape of the area.

<u>Estimation of magnitude</u>

It is estimated that the impact will create some measurable change in the views of communities and result in a minor loss or alteration to one or maybe more key characteristics of the communities. Thus the impact magnitude is estimated to be low.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Partly can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Medium-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and ten years)
Likelihood of appearance	Certain	There is a high likelihood for this impact to occur
Magnitude	Medium	Partial loss of resource

Table 6-153 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact mayl be sufficiently large to result in diminishing the quality of life.

Operational phase

Impairment of quality of life due to the presence of annoying railway operations: High noise, vibration and electromagnetic levels in houses close to the tracks and altered landscape.

Noise

Noise is defined as unwanted sound, and peoples sensitivity towards sounds vary. Thus, what is perceived as noise to one person, i.e. music, is not necessary noise to another person. The lowest possible sound level which can be heard is 0 dB while the pain tolerance level is 120 dB. An increase in sound level of 6-10 dB will be perceived as an increase of the sound level to the double to some.

The project activities in the whole life cycle of the railway project will cause adverse impacts due to the generation of the noise. The most significant is the noise and vibration generate during the operational phase of the railway project especially important for the high sensitive areas (residential areas and areas with health institutions, school, national parks) due to the long-term noise disturbance during the day (7 am – 7 pm), evening (7 pm – 11 pm) and during the night (11 pm – 7 am). The railway alignment is passing through several settlements (City of Kumanovo and Kriva Palanka and several villages) mainly into the residential area with II and mixed area with III degree of noise protection (residential area and area with industrial facilities) according the national and EU standards on noise indicators (more details are presented in Chapter 5.1). Noise during operation of diesel traction in Section 1 will be higher then electric traction.

The Macedonian Law establish the permitted noise level for residential areas as 55 dB during daytime (7 am – 7 pm), 55 bB during evening (7 – 11 pm) and 45 dB during night time (11 pm – 7 am).

Adverse levels of noise have psychological and physiological effects such as fatigue due to sleep deprivation. It is generally considered that noise may interfere with sleep, which can affect mood and performance the next day and may have longer-term effects. This is particularly the case for sensitive groups such as young children where it is thought possibly it can decrease their ability to learn and influence long-term health. Exposure to noise over a longer period can cause stress and enhance psychological deceases.

The impact of noise from rail infrastructure can vary considerably depending on site characteristics and layout, as well as surrounding geography and land use. The impact depends on a range of factors including train type and speed, operational practices, wheel maintenance, line maintenance, the extent of shielding or noise barriers, the location of certain rail infrastructure such as over crossings and steel bridges and proximity and design of adjoining development. The noise level also depends on the actual weather conditions and noise which is windborne is louder than noise which is heard against the wind.

Noise from railways is experienced differently than noise from e.g. highways and motorways. While noise coming from heavily trafficked roads is perceived as a constant high background noise, noise from a train is most often short-lived. In the moment, the train is passing by; the noise is at a higher level than that from the motorway, but as soon as the train has passed, the noise level will drop to a minimum. Surveys have shown that the constant background noise from roads is perceived as the most annoying.

Estimation of magnitude

With intensifying of railway operation the impact of the noise will be increasing constantly as a result of increased numbers of trains. It is estimated that the impacts will cause loss of resource and/or quality and integrity of resource, severe damage to key characteristics, features and elements. Thus the impact magnitude is estimated to be high and very high for the residents living close to the railway.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of resource and its integrity will occur

Table 6-154 Assessment of impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. Impacts will potentially cause significant risks to community quality of life which cannot be easily mitigated.

Vibrations

Vibrations extends structural sound when the inside walls of a building is wavering. The structural sound is perceived as a rumbling sound with a low frequency, and it is not possible to hear from where it comes. It is normally heard in areas where the train is running through tunnels.

Vibrations are deemed to be a problem for a residence if the level of vibration is > 75 dB. Contrary to the measurements of noise, there is not a recognized method for measurements of vibrations. However, experience shows that a freight train with a speed of 100 km/h causes a vibration level which is 1 dB higher than a passenger train with a speed of 160 km/h.

Estimation of magnitude

Most of the railway runs in open space. Only in Kumanovo and in Kriva Palanka effects from vibrations will occur and should have an affect on the quality of life. It is estimated that the impacts will cause loss of resource and/or quality and integrity of resource, severe damage to key characteristics, features and elements. Thus the impact magnitude is estimated to be high.

Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is reversible. Situation can be returned into previous condition

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of resource and its integrity will occur

Table 6-155 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. Impacts will cause impairment to community quality of life which cannot be easily mitigated.

Safety

The pperational railway will significantly change old society patterns in regards with transport culture. Communities along the railway will be exposed to safety risk related with train operation especially if they do not obey the traffic rules. Railroad crossing accidents are the greatest health hazard from trains for the general public. In some cases despite well marked crossings, accidents do happen due to the carelessness of passengers and railway workers. People are killed and injured because they are trespassing or vandalizing the railway. The railway is not a safe place for children and young people to play and it is not safe for adults to take short cuts across the rails.

During diesel traction risks could arise due to fires that could happen due to inappropriate handling with fuel (near train or storage) both by railway workers and passengers.

During electric traction, trains powered by electricity cannot be ever switched off. Electricity on overhead power lines can jump and arc, so person do not have to necessarily touch them to be injured or even killed. The “third rail” is really an electricity line and so strong that if touched by a person he/she will stick to it like glue and not be able to get off.

The new railway line will attract some freight and passenger traffic diverted from the road M2 (E 870). The shift of road traffic to rail should lead to a reduction of traffic accidents along the road M2.

Estimation of magnitude

Operation of the railway will create many potential risks to community safety which could affect quality of life. It is estimated that the impact will have high magnitude due to significant risks to community safety and impairment of Quality of life. Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Indirect	Indirect effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of receptor and/or quality and integrity of receptor

Table 6-156 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will present significant risks to community safety.

Electromagnetic fields

Electricity is transmitted over long distances via high voltage power lines. Transmission and distribution of electricity in addition to residential wiring and appliances account for the background level of electric and magnetic fields in the homes which may be up to 0.2 uT. Directly beneath power lines the fields are much stronger.

People living in the vicinity of railway lines may encounter magnetic fields from the overhead supply which may be comparable to the fields produced by high-voltage power lines. Close to the lines, the magnetic fields can be in the range of 2-5 uT, while at a distance of 10 meters from the railway line, the people living here should not be exposed to more than 0.4 uT which the maximum level according to WHO. In the zone near Pero Čičo Stop, people live 6 meters as the nearest to the line.

Estimation of magnitude

It is estimated that the magnitude of the impact will be high for residents living in vicinity of railway. It is estimated that the impact will have high magnitude because will cause loss of resource and/or quality and integrity of receptor. Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Direct effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Loss of receptor and/or quality and integrity of receptor

Table 6-157 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***moderate negative***. The impact will potentially affect the wellbeing of population living at a close distance to railway.

Altered landscape

The construction phase will lead to an altered landscape in regards to the constructed infrastructure objects like viaducts, bridges, over and under passes. However the most important visual changes will be those related probably to the running of the trains. In Sections 1 and 2 most of the infrastructure objects are built but they are not functional.

Estimation of magnitude

It is estimated that the magnitude of the impact will be low, causing only alteration of receptor. Once the magnitude of this impact has been estimated, the other criteria to assess this impact are as follows:

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impact is desirable
Type of Impact	Indirect	Indirect effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Minor loss or alteration of receptor

Table 6-158 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***neutral.*** The effect is likely to have negligible or neutral influence, irrespective of other effects.

Improvement of quality of life due to changes in economic well-being as a result of the Project, better access to the larger towns and their health services, education and training centers, recreational facilities, from employment opportunities, etc.

Operation of the railway will significantly improve quality of life of many aspects. The railway will not just create jobs in the railway company; it will also create jobs in the mining industry which is one of characteristics of the region of North-Eastern Macedonia. Transport costs for moving goods from one place to another will be reduced. This in turn means that the people who made these goods could sell them cheaper. Once goods become cheaper more people can afford to buy them and more can be produced which will create more jobs. Quality of life will be improved through increased financial income, possibility to have better access to the larger towns and their health services, to educational and training centers, to recreational facilities and etc.

In providing new opportunities for people to travel, railway will help to break down old cultural divisions and expand social exchange for ordinary people. The railway station can develop as the place where people meet and mingle the starting and arrival point for journeys to work, the country, the city and the wider world. The station could be treated as a gateway through which individuals could expand their network of social exchange beyond their town and village to the wider world. Railway brings diverse communities and regions together. In this process, it will help to diminish regional differences and, at the same time, they advanced the process of urbanization by breaking down the distinction between town and country. Operation of railway will help for social inclusion of North-eastern region of Macedonia which at the moment is most undeveloped region in the country.

Detailed assessment of all these aspects is given above within this chapter.

Estimation of magnitude

It is estimated that improvement of economic wellbeing as a result of operational railway will impact the quality of life with high magnitude, causing large scale or high improvement of receptor quality.

Criteria	Assessment Thresholds	
	Threshold	Descriptions
Characterization of Impact	Positive	Impact is desirable
Type of Impact	Indirect	Indirect effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation can not be returned into previous condition
Geographic Extent	Regional	Impacts extends across North-eastern region of Macedonia
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Large scale or high improvement of receptor quality

Table 6-159 Assessment of Impact

According to the significance matrix presented in *Chapter 4.6.3*, the initial significance of this impact, without mitigation measures, is ***large positive***. The effect is likely to be important at a regional to national level contributing in achieving national objectives by improving quality of life.

6.3.12.4 SUMMARY OF POTENTIALLY SIGNIFICANT EFFECTS

Based on the above assessment it can be summarized that the following impacts if unmitigated could result in potentially significant effects:

- Noise during operational phase - the initial significance of this impact, without mitigation measures, is ***large negative***. Impacts will potentially cause significant risks to community quality of life which cannot be easily mitigated;
- Vibrations during operational phase - the initial significance of this impact, without mitigation measures, is large negative. Impacts will potentially cause impairment to community quality of life which can not be easily mitigated;
- Safety during operational phase - the initial significance of this impact, without mitigation measures, is large negative. The impact will potentially create significant risks to community safety;

- Improvement of quality of life due to changes in economic well-being as a result of the Project, better access to the larger towns and their health services, education and training centers, recreational facilities, from employment opportunities, etc) - the initial significance of this impact, without mitigation measures, is ***large positive***. The effect is likely to be important at a regional to national level contributing in achieving national objectives by improving quality of life.

6.3.12.5 SUMMARY OF MAGNITUDE OF IMPACTS ON “QUALITY OF LIFE”

The following table presents the summary of impacts on most the affected local communities**:**

Quality of Life Indicators (Impacts)		Description of Impact on Local Community	Summary of Magnitude of Impact (on local community)
Sections 1, 2 & 3			
Direct Loss of Property/Land	**Section 1 & Section 2**	Expropriation of permanent land/property required for the project is completed	Negligible
		Temporary land take for construction activities will be required, most of the haulage routes and contractor's facilities are still usable, so it is expected that in Section 1 there will be minimal temporary land take	Low Negative – minor loss or alteration could occur
Physical Displacement		There will be no need for physical displacement	Negligible
Direct Loss of Property/Land	**Section 3**	Expropriation of permanent land/property required for the project needs to be done	The affected area has very limited possibility for substitution of the land. The impact will cause loss of resource and quality of resource. Based on that it can be estimated that the magnitude of the impact is **high negative**.
		Temporary land take for construction activities will be required	It is expected that some changes in resource or it`s quality will occur but the impact is reversible. After completion of construction activities, bigger part of the land will be returned into previous conditions. Due to minor loss of or alteration in a short time period, the magnitude of this impact could be estimated as **low negative**.
Physical Displacement		There will be need for physical displacement of 25 families	The magnitude of this impact is estimated as high negative since it will cause loss of resource/receptor.
Effects of Livelihood		• Removal of livestock from grazing areas during periods of blasting or heavy equipment operations, • Curtailing hunting near work crews • Temporary effects to the character of a recreation area because of construction noise, dust, and visual intrusions. • Within forested areas, construction activities could result in the long-term loss of timber production. • Temporally restrict approach to some recreational sites. • The area is reach with forest foods and local people traditionally harvest the fruit, leaves for tee and similar for their needs and sometimes for selling. It can be expected this activity to be affected by the impact.	Due to the possibility after duration of the impact, livelihood to be restored the magnitude of the impact can be estimated as **low negative.**
Noise & Vibration Effects		Noise and vibration during construction phase cause by construction machinery, construction activities like concrete mixing, some activities such as excavation, rock breaking, rolling and compacting may produce levels of noise that are audible when construction activities are located within 50 meters of residences.	The impact will cause partial loss in Quality of life but it will not adversely affect the integrity. Thus the impact magnitude both for noise and vibration during construction phase is estimated to

Quality of Life Indicators (Impacts)	Description of Impact on Local Community	Summary of Magnitude of Impact (on local community)
		be **medium negative**.
	Noise and vibration during operational phase caused by train operation	It is estimate that the impact will cause loss of resource and/or quality and integrity of resource, severe damage to key characteristics, features and elements. Thus the impact magnitude is estimated to be **high negative.**
Changes in Air Quality (including Dust emissions)	Construction operations are significant sources of dust emissions that may have a substantial temporary impact on local air quality. Dust emissions during the construction of buildings or roads are associated with land clearing, drilling and blasting, ground excavation, and cut and fill operations (i.e. earth moving).	Most of the construction activities which are potential sources of air pollution will be located outside the settlements. Due to this the impact will cause only alteration of Quality of life thus the impact magnitude is estimated to be **low negative.**
Effects from Electromagnetic Fields	Transmission and distribution of electricity in addition to residential wiring and appliances account for the background level of electric and magnetic fields in the homes which may be up to 0.2 uT. Directly beneath power lines the fields are much stronger. People living in the vicinity of railway lines may encounter magnetic fields from the overhead supply which may be comparable to the fields produced by high-voltage power lines. Close to the lines, the magnetic fields can be in the range of 2-5 uT, while at a distance of 10 meters from the railway line, the people living here should not be exposed to more than 0.4 uT which the maximum level according to WHO. In the zone near Pero Čičo Stop, people live 6 meters as the nearest to the line.	It is estimated that the magnitude of the impact will be high for residents living in vicinity of railway, in this Section part of town Kumanovo and settlement Pero Čičo It is estimated that the impact will have **high negative** magnitude because will cause loss of resource and/or quality and integrity of receptor.
Community Tension (due to influx of temporary workforce, disturbance from the Project etc)	Presence of temporary workers from outside the region with different cultural and social background, changes in way of life due to the construction activities (longer time for transport, heavy transport, worker camps, lost of land, changes in agricultural production, limited movement within construction area and similar), operation of railway could be a suitable base for increasing community tensions.	The impact will be insignificant and if occurs it will be due to the different lifestyles or cultural backgrounds. Having this in mind the impact from influx of temporary workers it is expected to be **low negative.**.
Community Health & Safety	Projects activities related to the construction of the railway line may increase the potential for community exposure to health, safety and security. Health concerns includes exposure to diseases arising from temporary or permanent changes in population; exposure to hazardous materials during construction and transport of raw and finished materials. Safety concerns relate to risk for accidents related to movement of heavy vehicles during construction. During operation health concerns related to increased risks for accidents near railway crossings can not be overlooked. Following main impacts were assessed: **Construction phase**	Due to the high level of unemployment in the region, it is expected during construction works most of the employment will be

Quality of Life Indicators (Impacts)	Description of Impact on Local Community	Summary of Magnitude of Impact (on local community)
	• Impacts from the influx of temporary workers	local workers who are coming from the affected communities. Having this in mind the impact from influx of temporary workers is expected to be limited. Location of worker's camps at some distances of local settlements, limited and managed movement in the area will decrease the negative impacts arisen from different kind of conflicts between temporary workers and local community. The impact will cause only alteration of receptor thus the impact magnitude is estimated to be **low negative.**
	• Impacts from increased community exposure to disease	Due to the high level of unemployment in the region a big percentage of unqualified construction workers will be from within the region. Still, a risk of increased community exposure to disease persists, especially to communicable diseases. This impact is expected to result in loss of quality and integrity of receptor thus the impact magnitude it is estimated to be **high negative**.
	• Impacts from increased traffic and type of traffic on local roads during construction	Significantly increased traffic especially with heavy mechanisation required for construction activities will change normal traffic which the local communities are used to. This will result in increased risks for accidents and injuries. Due to the loss of quality and integrity of receptor the impact magnitude is estimated to be **high negative**.
	• Safety issues associated to the entrance of non-authorized people in the construction site	Valuable equipment and material for construction will be located on site. This will result in potential for encouraging the entrance of non-authorized person to the construction site. Due to the loss of integrity of the receptor the impact magnitude can be estimated to be **high negative**.
	Operational phase	
	• Improvement of access to better health services located in larger towns/cities	New alternative and cheaper transport will largely improve the receptor quality thus it can be estimated the magnitude of this impact to be **high positive.**
	• Safety issues associated to crossing of rail track	Crossing of railway tracks could be considered as significant risk to community health and safety

Quality of Life Indicators (Impacts)	Description of Impact on Local Community	Summary of Magnitude of Impact (on local community)
		resulting in loss of community lives. Effect will have **high negative** magnitude and will largely change receptor quality.
Access & Severance Effects	The construction and operation of the railway could affect access and have effects of severance of the general public, the community services and the business sector in communities at or close to the railway line. **Construction phase** • Impacts on access and severance effects **Operational phase** • Impacts on access and severance effects of general public, community services and business sector in communities at or close to the railway line.	Some changes in receptor or its quality is estimated to occur, minor loss of/or alteration of some characteristics of receptor. Impact is estimated to have **low negative** magnitude. Operation of railway will provide better accessibility to neighbouring communities and bigger towns within the region. Impact is estimated to be of a low magnitude due to some changes in receptor, its quality or alteration of some characteristics of receptor. Impact is estimated to have **high negative** magnitude.
Disruption to Utilities (e.g. water supply, electricity etc.)	Utilities which are located under and above ground such as water supply, sewerage, cable network and telephone at the construction site will be affected. In addition, the influx of people such as construction workers, employment seekers and service providers will increase pressure on the utilities in the area. **Construction phase** • Effects of utility cuts on local businesses and communities **Operational phase** • Effects of diversions of utilities on local businesses and communities	Short disruptions could be expected. Some changes in receptor or its quality is estimated to occur, i.e. minor loss of or alteration of some characteristics of receptor. Thus it can be estimated that impact will have **low negative** magnitude. Once the electric railway is operational, more pressure on the electric power supply can be expected. No alterations of the utilities for local businesses or communities can be expected. Magnitude of the impact it is estimated to be **negligible**.

Table 6-160 Summary of impacts

Chapter 7 Environmental & Social Mitigation Measures and Residual Environmental & Social Effects

Presents the environmental and social mitigation measures proposed to avoid, prevent, mitigate and/or compensate the adverse impacts and enhance the beneficial impacts of the railway Project. Describes the potential residual environmental and social effects remaining from the Project following the implementation of mitigation measures and presents the likely significance of these residual effects along with a summary of the likely significant residual environmental and social effects.

7 POTENTIAL ENVIRONMENTAL & SOCIO-ECONOMIC IMPACTS

Chapter 7 covers detailed appropriate mitigation measures to address predicted negative effects and enhancement measures to maximise anticipated benefits, determine significance of residual effects (including any residual cumulative, synergistic and transboundary effects) after consideration of the effectiveness of the design and committed mitigation measures. Therefore this stage of the assessment determines the likely significance of any residual effects following the application of mitigation measures (i.e. Significance of Effects (with mitigation)) by considering the Significance of Effects (without mitigation) along with the probable success of mitigation measures.

7.1 ENVIRONMENTAL MITIGATION MEASURES AND ASSESSMENT OF RESIDUAL EFFECTS

7.1.1 SOILS, SURFACE WATER AND GROUNDWATER

7.1.1.1 MITIGATIONS MEASURES FOR SOILS

CONSTRUCTION PHASE

Because chemicals and suspended particles in the soil may be transported by runoff, leaching and erosion processes, mitigation measures aimed at the protection of soil quality and erosion, will also be effective to prevent surface and groundwater contamination. They are, therefore, presented together.

The main mitigation measures during the construction phase to prevent soil erosion and contamination, and also surface water and groundwater contamination would be contained in the following management plans:

- A Sedimentation and Erosion control Plan;
- A Plan for the safe management of hazardous materials and spill prevention program, including emergency response measures in case of accidental spills; and
- A Waste Management Plan.

The **Sedimentation and Erosion control Plan** should be developed in order to identify specific erosion control techniques for use at all the construction sites along the railway alignment. The Plan should be based on several principles:

- Provide the approach by which each site characteristics (topography, soils, drainage patterns, and covers) will be considered when implementing the plan. Wherever possible areas which are prone to erosion should be left undisturbed and undeveloped. Entrance and exits points for runoff should be protected from erosion and equipped with sediment control devices;
- Minimizing the extent of the disturbed area and the duration of exposure and stabilize disturbed areas as soon as possible. Typically, if an area is not going to be worked on in more than 45 days, it should be protected by erosion control mats;
- Minimizing the use of heavy equipment and techniques that will result in excessive soil disturbances or compaction of soils, especially on unstable slopes;
- Establishing the drainage and runoff controls before starting the site clearance and earthworks. The existing vegetation should be retaining as much as possible;
- Where water would need to be removed from excavations, it should be transferred at the minimum practical distance to be discharged;

- Keeping runoff velocity as low as possible. For drainage ways such as ditches, high velocity can be reduced by a series of rock check dams which break the flow velocity. Overland flow velocity can be reduced by minimizing slope length and steepness;
- Diverting concentrated flows wherever possible away from sensitive areas;
- Using sediment control devices such as sediment control ponds to retain sediments from leaving the site;
- Selecting and implementing the most effective erosion control devices: i)temporary seedings; ii)temporary mulching; iii) permanent sodding; iv)temporary or permanent erosion control blankets; v) permanent vegetative buffer strips;
- Selecting and implementing sediment control devices such as: i) site fencing; ii) straw bales; iii) sediment basins or traps; iv) storm inlet traps; vi) rock check dams and vii) interception berms/swales;
- Decompacting and restoring disturbed areas once construction is completed at a site, all areas that are not going to be occupied by permanent structures by tilling the land before proceeding to the vegetation reinstatement.

The **hazardous materials management and spill prevention plan** should address issues such as:

- Keep all roads and hard standings clean and tidy to prevent the build-up of oil and dirt that may be washed into a watercourse or drain during heavy rainfall;
- Keep spill kits close to the construction sites in case there is an incidental spill off, so that it can be immediately cleaned up;
- Do not permit any refueling, storage, servicing or maintenance of the equipment within 100 m of drainages, water courses, alluvial plains or other sensitive environmental resources. If these activities have to be done at the construction site, all precautionary measures shall be taken to prevent leaks or spills from reaching the soil or nearby water courses;
- Wherever possible these activities (refueling, storage, servicing or maintenance) should take place in construction camps adequately prepared for these purposes (adequately lined for preventing any soil and groundwater contamination, and equipped with culverts along the perimeters to collect water runoff that will be directed to wastewater treatment facilities);
- Do not allow ready-mix concrete trucks containing alkaline cement or residues of cement to enter any watercourse. Washout of the concrete trucks shall be performed at the concrete batching plant camp, where appropriate facilities will be provided. If the washout of concrete trucks were necessary at or near the construction site, this shall be done at distance greater than 200 m of any watercourse and never in a very high or high habitat sensitivity area. The washout area will be clearly signposted and drivers shall be aware of the designated locations for washout;
- Avoid setting up camps on alluvial terrains because of the high levels of the underground water table and the risk of pollution;
- Organize proper handling and storage of lubricants, solvents as well proper usage of construction equipment;
- Minimize the storage of substances that are harmful to soils and waters (e.g. fuels for construction machinery) on the construction site. All hazardous substances either products to be used or waste, shall be stored in adequate places, far from sensitive areas (e.g. water courses, habitats with a rich biodiversity) and adequately equipped to prevent any soil, surface water or groundwater contamination);
- Temporary storage areas near the construction site for the storage of the wooden sleepers removed from the railway track in section 1, will be lined and provided with runoff collectors. Removed sleepers will be taken to a safe storage place or handled to a hazardous waste contractor as soon as possible;
- Undertake regular preventive maintenance of ehicles and construction machinery so as to reduce leakages of lubricants, motor oil and fuel.

The **Waste Management Plan** shall include the following tasks:

- Identification and classification of the different waste types that could be generated at the construction site (due to the materials used and waste generated in different sections) according to the national List of Waste (Official Gazette no.100/05) on hazardous and non-hazardous waste streams;
- Completely separate hazardous from non-hazardous waste streams at the construction site should be done;
- Immediate removal of waste material (concrete, iron, rocks, etc.) accidentally deposited, from highly sensitive habitats;
- Collection and treatment of municipal solid alike waste generated in the construction site and camps (food, beverages, packaging waste such as paper, bottles, glass, etc., glass bottles, batteries) according to national legislation (separation of recycling waste materials from the waste stream that will be disposed of in the solid waste municipal landfill). Recyclable waste should be given to an authorized recycling company;
- Fulfill the Annual Report for non-hazardous waste management before the municipalities of Kumanovo, Rankovce, Kratovo and KrivaPalanka and reported to the Ministry of Environment and Physical Planning;
- Signing a contract with the company for waste collection and transportation for the collection and transport of the waste generated at the construction site to the nearest municipality landfill;
- Construction of inert waste landfills according to specifications set in the national and EU requirements;
- Establishing and implementing the Closure Plan for the closure of the inert landfills taking into account the need for cultivation of the landfills area;
- Ensuring that the contracts signed with the companies dealing with waste recycling and recovery will take delivery and acceptance of the waste streams is performed on a frequent basis so that the construction sites remain clean at any time;
- Reusing excavated soil and construction waste as much as possible;
- The separate collection of possible hazardous waste (motor oils, vehicle fuels) and sub-contracting an authorized collector and transporter to transport , recovery or finally dispose the hazardous waste;
- Establishing the Temporary Hazardous Waste Storage Points according the national legislation on handling, labelling, storage and management with hazardous waste;
- Establishing and following the hazardous waste management procedure;
- Ensuring that the hazardous waste is packaged and labelled showing the R and S phrases (risk and safety statements of the hazardous waste) and it is temporary stored on safety storage facility equipped with adequate ventilation, fire resistant conditions especially if there are VOC emissions, mercury containing lamps, asbestos materials form demolition works;
- Ensuring that the access to these temporary hazardous waste storage points be only allowed for trained and equipped staff, and entrance prohibited for untrained workers and public;
- Promptly cleaning up All waste spills;
- Making available for inspections full records of the type of waste stream generated, quantity composition, origin, disposal destination and method of transport for all different waste streams;
- The reporting on waste management on a regular basis to the particular municipality and the legal obligation is for further reporting by the municipality to the MoEPP through the Annual Reports;
- Immediately removing any waste material (concrete, iron, rocks etc.) accidentally deposited in highly sensitive habitats;
- Undertaking the selective removal and storage of top soil;
- The removal of topsoil from the soil surface so as to serve for reuse in the restoration of disturbed areas not occupied by the railway;
- The reuse of topsoil to restore cuttings, embankments, wildlife crossings, construction and workers camps, landfills, and borrow pits;

- Locating the temporary storage areas along the strip of land along the alignment, near the sites where the soil was removed from, so that it can be reused in those same areas;
- Placing the layers of the excavated top soil on to the established storage areas in the same order as the original soil levels. The topsoil removed will be collected on ridges to be built in flat areas so as to avoid the loss of the organic and biotic properties of the soil, and protected it from weather agents, mainly wind and rain, which cause the erosion of the soil ridge. The ridges shall be signaled and maintained in proper condition until the reutilization of the topsoil.

Construction workers will be given training sessions, prior and during construction works, to make them aware of the importance of soil, surface water and groundwater as valuable resources for humans and nature, and the need for protecting them.

OPERATIONAL PHASE

A **Chemical Accident and Spills Management Program** shall be developed for all railway operations to prevent and mitigate the negative impacts to soil, surface water and groundwater that could arise from potential railway accidents and spills involving hazardous substances. This program will include an **Emergency Response Plan** as well. The program shall be prepared in close cooperation with the Crisis Management Center and the local offices of Kumanovo, KrivaPalanka and Kratovo. The Chemical Accident and Spills Program should provide information that at a minimum will accomplish the following:

- Discuss the measure that will be taken to minimize the risks associated with chemical, fuel, oil spills and accidents. These measures should include: monitoring purchasing requirements, product substitutions, design features for containment, operational controls, work practices, labeling and storage requirements;
- Specify the document-control procedures for maintaining material inventories and MSDS (Material Safety Data Sheets);
- Assign an emergency response team involved in assessing the risk of hazardous material releases and working to avoid any harmful effects if any accidents happened. Their role will include evaluating the concentrations of the chemicals, where and how population might be exposed and the potential toxic effects on the exposed people, soil and waters. They will plan and implement rapid clean up measures depending of the extent of the spills (bioremediation, floating booms and adsorbents, solid materials that capture the soil, chemical oxidation in order to break the chemicals down);
- The emergency calls and coordination with the national authorities relevant for Crisis Management will be essential. The relevant national institution is the Crisis Management Center with its regional branch offices across the country. The local Crisis Management offices in the North-Eastern region are in Kumanovo, KrivaPalanka and Kratovo;
- Chemicals used for everyday trains operation(fuel, lubricant oils, solvents, greases) will be appropriately stored in areas specifically designed for such purpose (either in stations along the railway or in the train);
- Train maintenance shall be done on a regular basis in order to avoid leaks and spill of hazardous materials.

7.1.1.2 MITIGATION MEASURES FOR SURFACE WATER

CONSTRUCTION PHASE

The construction of drainage pipes and bridges in water courses will be carried out during the dry season.

The areal extent of the construction area next to water courses will be only as large as that which is strictly necessary to adequately perform the construction works. The perimeter of the area will be marked with signaling ribbons that neither vehicles and machinery, nor workers, will trespass. No occupation of the stream bed or the banks will be allowed, unless there is no other reasonable alternative to carry out the construction work. Bridges will be designed and constructed so to limit effects. **River & Stream Crossing Plans** will be prepared for the management of works at any crossings.

The following guidelines will be taken into account in the construction of bridges:

- Single span bridges are the preferred structure for crossing streams as they cause the least disturbance to the waterway both hydraulically and environmentally;
- Multiple span bridges are acceptable on wide streams. Acceptable arrangements include:
    - Piers located outside the normal low flow stream width. In this regard, a three span bridge would be preferable to a two span bridge. The spans do not need to be of equal length;
    - Piers aligned parallel to the direction of flow;
    - Riprap provided around the piers to mitigate local scouring;
    - If piers/piles have to be constructed inside the normal low flow stream width, they should occupy less than 5% of the cross sectional area so as not to cause a significant change to the available waterway.
- The bridge abutments should be located so they do not significantly encroach into the waterway and thereby reduce the available waterway area. Abutments should also be located so as to avoid obstruction of movement of terrestrial fauna along the riparian zone (i.e. allow free movement of animals along the river banks);
- Rock beaching will be used on the batters to protect against abutment scour, as this area will generally not revegetate due to inadequate light and lack of rainfall. Beaching should generally extend 3 metres upstream and downstream of the bridge abutments;
- The batter is to be excavated to the depth of the beaching to maintain the waterway area. The slope of the batters should be in the range of 1V:1H to 1V:2H. In general, the beaching should extend at least 600 mm below the toe of the bank to mitigate undermining. Where the stream banks are stable, rock beaching may not be required.

The railway drainage shall be directed to retention basins or grassed filter zones to trap sediments and other contaminants, rather than discharging directly to the water courses. These sediment and contaminant retention structures shall be constructed in the areas where habitats of very high or high sensitivity are located along the alignment or in a close location downstream of the effluent discharge point.

Domestic type wastewater generated in the construction camps will not be allowed to be discharged untreated into natural water courses. The camps will be provided a wastewater treatment system to treat effluents to admissible levels for discharge in the water body. The construction sites will be provided with chemical portable toilets and the waste adequately managed.

OPERATIONAL PHASE

Regular control and maintenance of drainage structures and retention basins shall be conducted to check they do not become clogged with debris or sediments

Domestic type wastewater generated at the stations will be treated according to the relevant national legislation and EU standards[1]. Untreated wastewater will not be allowed to be discharged into natural water courses. In the event the connection of the sewage system of the station to the municipal collector were unfeasible, the station shall be provided with a wastewater treatment system to treat effluents to admissible levels for discharge in the water body.

The cleaning water generated by the washing of the trains should be treated as well unless it can be discharge under permit to a municipal collection system.

[1] Law on Waters (Official Gazette No. 87/08, 6 / 09, 161/09, 83/10, 51/11);
Regulation on categorization of water streams, lakes, accumulations and groundwater (Official Gazette No. 18/99, 71/99);
Decree on classification of waters (Official Gazette No. 18/99);
Urban Wastewater Treatment Directive (91/271/EEC);

See also mitigation measures for flora regarding herbicide pollution prevention.

7.1.1.3 MITIGATION MEASURES FOR GROUNDWATER

CONSTRUCTION PHASE

In the eventual case of hitting the groundwater table during the excavation, cutting or tunneling works, the intercepted area will be sealed as soon as possible so as to avoid any major alterations to the natural groundwater levels and flow in the area.

The **hazardous materials management** and **spill prevention plan** to be developed (see mitigation measures for soil) should address the potential for indirect and direct groundwater contamination. Direct impacts could occur where the groundwater is encounter e.g. during the construction of pillars near a water course.

OPERATIONAL PHASE

The implementation of the mitigation measures defined above for soils and surface water (sections 7.1.1.1 and 7.1.1.2) will serve to protect groundwater during the operational phase.

7.1.1.4 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations measures described above in sections 7.1.1.1, 7.1.1.2, and 7.1.1.3 are intended to avoid or minimize the impacts on soil, surface water, and groundwater. They also contribute to mitigate indirect effects on flora, fauna, habitats, and protected and designated areas that occur from contamination of soil, surface water and groundwater, as well as from erosion and sedimentation processes. The mitigation for each identified impact is as follows:

<u>Construction phase</u>

Soils

Impairment of soil quality (soil contamination) due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be low and the probable success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Soil erosion due to clearance of vegetation and earth movements

- The magnitude of this impact without mitigation measures was estimated to be medium and the probable success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Destruction of fertile top soil

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probable success of the mitigation measures is considered to be low. The magnitude of the impact with the implementation of mitigation measures is medium. The significance of the residual effect is considered to be Moderate.

Surface water

Impairment of water quality due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be medium and the probability of success of the mitigation measures is considered to be high. Therefore the magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Groundwater

Impairment of groundwater quality due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be medium and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Alteration of groundwater flow patterns during tunneling and cutting operations

- The magnitude of this impact without mitigation measures was estimated to be negligible and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Neutral.

<u>Operation phase</u>

Soils

Impairment of soil quality (soil contamination) due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Soil erosion in earth banks devoid of vegetation

- The magnitude of this impact without mitigation measures was estimated to be low, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Surface water

Impairment of water quality due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be low, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Alteration of flow patterns and sediment deposition during flooding periods

- The magnitude of this impact without mitigation measures was estimated to be low and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Groundwater

Operation phase - Impairment of groundwater quality due to the introduction of pollutants

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

7.1.2 AIR QUALITY

7.1.2.1 MITIGATIONS MEASURES FOR AIR

CONSTRUCTION PHASE

The measures which will be undertaken to minimize dust emissions include:

- Hoardings will be constructed around the construction sites to minimize the spread of dust;
- Accesses and construction sites will be kept moist to reduce dust formation. Water sprays should be implemented during drilling and excavation activities;
- In the dry season, hygroscopic additives will be used in water to increase its presence in the ground;
- Dust-generating activities will be slowed down in days of strong wind;
- In windy and dry conditions, earth stockpiles will be moistened to prevent the lifting of dust particles;
- Ground will be moistened during loading and unloading of aggregates in trucks;
- Truck dumpers carrying spoil or other dusty materials will be covered with tarps;
- Loaded trucks should be washed down prior to exit from the working site to ensure that loose material is not tracked onto the roads;
- During tunnel construction, movement and handling of excavated spoil will be performed within enclosed work sheds constructed prior to the start of tunneling;
- Work sheds should be large enough to allow stockpiling of the excavated tunnel material, access of trucks and truck loading operations;
- Tunnels should be ventilated during the excavation works using particulate filters, which need to be regularly maintained.

Measures which will be taken to minimize emissions of combustion gases:

- Vehicles and construction machinery will be required to be properly maintained and to comply with relevant emission standards;
- No unnecessary idling of construction vehicles at the construction sites will be allowed;
- Construction truck traffic will be optimized so as to get a minimum number of trucks carrying the maximum volume of materials. This will be addressed in the Construction Traffic Management Plan;
- The truck routes will be planned to avoid peak traffic hours or routes with heavy traffic.

Measures which will be taken to avoid asbestos emissions during demolition of buildings will include:

- Development of an asbestos operational control procedure during demolition works according to national legislation on hazardous waste, Directive 91/689/EEC on hazardous waste, Council Directive 87/217/EEC on the prevention and reduction of environmental pollution by asbestos and EU Directive 2009/148/EC on the protection of workers from the risks related to exposure to asbestos at work;
- The storage and transport of demolition materials will be removed, packed, labeled and processed in according the national and EU legislation on management of hazardous waste and asbestos (Directives 87/217/EEC and 91/689/EEC);
- Undertaking a risk assessment before beginning an activity involving exposure to asbestos dust or to materials containing asbestos.

OPERATIONAL PHASE

Stage 1

During this stage, the railway will initially operate with diesel locomotives between the middle of year 2014 to the end of year 2018. As a consequence diesel air emissions will be generated during this period. The mitigation measures identified for this stage include:

- Regular maintenance of the diesel locomotives to keep them in optimal working conditions, including the achievement of minimal air emissions set by the manufacturer.
- Making every effort to use the cleanest fuels (e.g. on-road grade diesel) within technically feasible possibilities.
- Subjecting the heating systems in train stations which are based on fossil fuels to a regular maintenance program, so that combustion is complete and emission of combustion gases are kept below regulatory thresholds.

Stage 2

The railway will be operated under electric traction, therefore there will be a reduction in air emission (other than those associated with the train stations), and no major air emissions are expected in this stage.

7.1.2.2 ASSESSMENT OF RESIDUAL EFFECTS

CONSTRUCTION PHASE

Impairment of air quality due to emission of construction-borne air pollutants

- The magnitude of this impact without mitigation measures was estimated to be medium and the probability of success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

OPERATIONAL PHASE

Stage 1

Impairment of air quality due to emission of air pollutants from combustion gases of diesel locomotives and stations

- The magnitude of this impact without mitigation measures was estimated to be low, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

7.1.3 NOISE AND VIBRATIONS

7.1.3.1 MITIGATIONS MEASURES FOR NOISE

CONSTRUCTION PHASE

The main mitigation measures to reduce noise as well as vibration levels during construction will be as follows:

- Wherever possible all construction equipment will comply with the requirements of EU Directive 2000/14/EC on noise emission in the environment by equipment for use outdoors (there is a lack of national legislation on outdoor equipment emission noise levels). All the equipment shall bear the CE marking and the indication of the guaranteed sound power level and shall be accompanied by an EC declaration of conformity;
- The equipment will be fitted with appropriate noise muffling devices that will reduce sound levels;
- As the project activities are performed in several noise level areas (I, II, III and IV, according to the national legislation), every effort shall be carried out to comply with the correspondent noise limits for each area;
- Construction works will not be permitted during the night; the operations on site shall be restricted to the period 07.00 -19.00 h;
- All vehicles and machinery used at the construction sites will be subject to regular maintenance. The vehicles and machines that are excessively noisy due to poor engine adjustment or damage noise control devices shall not be operated until corrective measures have been taken;
- The construction traffic plan will establish speed limits for construction vehicles and machinery at the construction site and the haulage roads used, and organize traffic so as to avoid as much as possible populated areas;
- Affected local residents will to the best of the project's efforts be kept informed on due time of the planned works and the vibration and noise levels and periods during which they will occur;
- The location of noisy equipment will be chosen as far as possible from sensitive receptors (houses, workplaces, schools and hospitals). When near sensitive receptors, construction works will be scheduled and provided with the necessary resources so that the time of exposure is as short as possible;
- Good management practice will be used to distribute heavy noise equipment along the route so as to avoid the cumulative effects of noise;
- In the case where noisy works would need to be performed at night or during a longer period than one day at a given site, a noise shield will be erected around the working area;
- Monitoring of vibrations during the performance of critical work processes (e.g. foundation of piles and catenary masts) will be undertaken in buildings which are within a distance of 20-30 meters from the area where the these works take place. Should buildings result damaged as a result of vibrations generated by the construction works, the damaged buildings will be repaired or compensation paid;
- Earth moving equipment operating on the construction site will be as far away from vibration-sensitive receptors as possible;
- Activities such as demolition, earthmoving and ground-impacting operations will be scheduled so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately;
- Decrease dynamic loads from construction sources such as:
    - Blasting. Explosive type and weight, delay-timing variations, size and number of holes, distance between holes and rows, method and direction of blast initiation;
    - Dynamic compaction. A smaller falling weight will produce smaller vibrations;
    - Pile driving. Pre-drilling, pre-jetting, replacement of displacement piles with non-displacement ones, switch impact hammer to vibratory one, replacement of driven piles with augered cast in-place piles or drilled shafts;
    - Select demolition methods not involving impact, where possible;
    - Avoid vibratory rollers and packers near sensitive receptors.

OPERATIONAL PHASE

The proposed noise mitigation measures leading to the decrease of noise exposure include measures implemented at the source of noise and measures that intercept the noise between the source and the receptor. These include:

- At the source:
  - o Retrofitting international and regional trains with composite brake blocks with noise reduction potential of 8-10 dB(A).
  - o Using wheel and track absorbers with potential of reduction noise of 1-4 dB(A).
- Between source and receptor:
  - o Installing noise barriers (protective walls) with noise reduction potential of 5-15 dB(A).
  - o Insulation of house windows and facade with noise reduction potential of 10-30 dB(A).

A noise study has been carried out for this ESIA, showing that existing noise levels in various settlements along the railway will be exceeded during both stage 1 and stage 2 and in sections 1, 2 and 3.

A **Detailed Railway Noise and Vibration Study** will be completed during the development of the detailed design of the railway project to refine the results of this ESIA noise and study and with the main aim of determining the specific and optimum noise abatement measures to be taken, according with national and EU/WHO standards. These measures may consist of one of the measures indicated above or a combination of two or more.

Taken into account the results of the ESIA noise study, noise mitigation measures should be taken into consideration at the following locations at each stage:

Stage 1

For section 1, during stage 1, noise abatement measures will need to be installed at locations in Chereskoselo, Lopate, Rezanovce, Sredorek, PeroCico, Proevce, Kumanovo spa, ShupliKamen, and Dovezance. The total preliminary length of the railway passing in front of these locations is 3,064 meters on the left side and 2,760 meters on the right side of the railway line.

Stage 2

During stage 2, in addition to the noise abatement measures installed in section 1, abatement measures will be need in the locations of Krilatica/Ketenovo, Odreno, Petralica and T'liminci in section 2, and KrivaPalanka and Zidilovo in section 3.

7.1.3.2 MITIGATION MEASURES FOR VIBRATIONS

OPERATIONAL PHASE

The mitigation measures which will be employed in the operational phase to deal with vibration include:

- Selecting vehicle characteristics for reduced vibration generation and improved maintenance of wheels.
- Using maintenance strategies for track and rolling stock with the aim of low vibration emission.
- Considering the use of track support systems such as Resilient track fasteners, Ballast mats, resiliently supported ties, Floating slabs, construction of trenches.

A preliminary vibration assessment has been carried out for this ESIA, showing that vibration levels will affect various houses and buildings along the railway, during both stage 1 and stage 2 and in sections 1, 2 and 3.

A **Detailed Railway Noise and Vibration Study** will be completed during the development of the detailed design of the railway project to identify and assess predicted vibration levels with the main aim of determining the specific and optimum vibration abatement measures to be taken. These measures may consist of one of the measures indicated above or a combination of two or more.

Taken into account the preliminary results of the ESIA vibration assessement, vibration mitigation measures should be taken into consideration at the following locations:

- For section 1, vibration abatement measures will need to be installed at locations in Chereskoselo, Lopate, Rezanovce, Sredorek, PeroCico, Proevce, Kumanovo spa, ShupliKamen, and Dovezance. The total preliminary length of the railway passing in front of these locations are 3,064 meters on the left side and 2,760 meters on the right side of the railway line.
- For section 2, vibration abatement measures will be needed in the locations of Krilatica/Ketenovo, Odreno, Petralica and T'liminci.
- For section 3, vibration abatement measures will be needed in the locations ofKrivaPalanka and Zidilovo.

7.1.3.3 ASSESSMENT OF RESIDUAL EFFECTS

CONSTRUCTION PHASE

Noise

Impairment of acoustic quality due to noise emissions from construction vehicles and machinery

- The magnitude of this impact without mitigation measures was estimated to be high, and the Probability of success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is medium. Therefore the significance of the residual effect is considered to be Moderate.

OPERATIONAL PHASE

Noise

Stage 1

Impairment of acoustic quality due to train traffic noise emission (diesel traction)

- The magnitude of this impact without mitigation measures was estimated to be medium and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Stage 2

Impairment of acoustic quality due to train traffic noise emission (electrical traction)

- The magnitude of this impact without mitigation measures was estimated to be high, and the probability success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Vibration

Annoyance to residents and damages to buildings due to vibrations from train traffic

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probable success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

7.1.4 LANDSCAPE

7.1.4.1 MITIGATIONS MEASURES FOR LANDSCAPE

CONSTRUCTION PHASE

During construction operations, the landscape impact can be mitigated by utilising techniques to screen the operations from observers the construction site, the camp and ancillary areas. For this, hard or soft screens can be installed around the perimeter of these sites.

OPERATIONAL PHASE

The effects of the constructed railway on the landscape can be corrected in part through measures, such as landscape planting and the integration of the design of the railway structures in the surrounding landscape, as follows:

- Shaping of the terrain around altered impacted areas so as to recreate the surrounding land morphology;
- Planting vegetation with autochthonous species present in area such as:
  - Slopes of the cuttings and embankments. Vegetation measures are generally recommended for 2H:1V slopes;
  - Areas around the tunnel mouths;
  - Water courses and banks underneath constructed bridges, as well as in the abutment areas;
  - Affected areas underneath the viaducts as well as above, in abutment zones;
  - Aesthetic integration of the structural parts of viaducts and bridges (e.g. deck, pillars) and tunnel mouths, using construction materials with colors and textures that blend well with those of the surrounding landscape (e.g. dark concrete for pillars in a black pine forest);
- Designing the landfill waste disposal patterns so that the final contours are integrated with those of the unaffected part of the waste receiving valley;
- Vegetating the sealed landfills with autochthonous species adapted to the resulting valley conditions;
- Any borrow pits opened for the construction of the railway project, will be reinstated at the end of the construction works and replanted;
- Use of local architectonic features in harmony with surrounding traditional buildings in the construction of the station buildings.

7.1.4.2 ASSESSMENT OF RESIDUAL EFFECTS

CONSTRUCTION PHASE

Alteration of landscape scenery by the presence of construction works, construction camps and other auxiliary facilities

- The magnitude of this impact without mitigation measures was estimated to be low and the probability of success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

OPERATIONAL PHASE

Alteration of landscape scenery by the presence of the railway objects (tunnel openings, cuttings, bridges, stations)

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probable success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is medium. Therefore the significance of the residual effect is considered to be Moderate.

7.1.5 HABITATS, FAUNA AND FLORA AND PROTECTED& DESIGNATED AREAS

The mitigation measures for flora, fauna, habitats, and protected/designated area are presented together since most of the measures, although aimed at the protection of a particular receptor (e.g. flora), are beneficial to all four resources. For example the measures that protect flora and fauna, will also protect habitats and protected and designated areas, and vice versa. In fact, for some of the receptors like protected and designated areas specific mitigation measures have not been identified because it has been considered that those identified for flora, fauna and habitats should be sufficient for effectively protecting this resource.

Moreover, mitigation measures identified for other resources like landscape or soil and water, also contribute to protect these receptors. This will be indicated in the assessment after the application of the mitigation measures of the individual impacts identified for each resource, as shown below.

7.1.5.1 MITIGATIONS MEASURES FOR FLORA

CONSTRUCTION PHASE

The main impacts on vegetation during construction arise from clearance operations of the railway corridor, stations, haulage roads, camps and other auxiliary facilities. Measures to minimize the impacts will be as follows:

- In sections 2 and 3 of the railway alignment, the surface for carrying out the clearance of vegetation will be limited to the strip of land needed for the occupation of the permanent way and the right of way of the future railway corridor and the adjacent working width, if needed;
- Likewise, for the construction of railway station building, platforms, access roads, warehouses, parking places and utility service areas, clearance of vegetation will the limited to the surface occupied by these infrastructures;
- Haulage roads to get access to bridge working areas and long tunnels portals (particularly in section 3), will be constructed with a width of 3.5 meters only where strictly necessary along with the necessary spots for passing and maneuvering. As far as possible, the path of the haulage route shall avoid areas of highly sensitive vegetation, including Thermophilous oak forests; Mesophilous oak forests; Submontane beech forest; Hill pastures on stony sites; unmanaged mesic grasslands; Rivers and streams - epipotamal and hiporhitral streams; Montane streams - Metarhitral streams; Meadows – mesophilous; Wet meadows, or very highly sensitive vegetation, including Riparian willow-poplar woodland; Hill pastures;
- For sections 1 and 2 already established haulage roads shall be reused as much as possible;
- The same will apply to construction camps for workers and other facilities like concrete batching plants and aggregate crushing plants. As far as possible, the workers camps constructed during the previous construction period of the railway (1994-2004) shall be reutilized. Should new camps and auxiliary facilities needed, these will be constructed in areas of vegetation with negligible sensitivity vegetation (only on abandoned fields, ruderal and trampled sites) or low sensitivity (only on Black locust stands and plantations and Black Pine plantations);

- In areas of high and very high sensitive vegetation, the working sites will be marked by means of ribbons or other type of landmark so that workers and construction vehicles and machinery do not trespass on non-working areas;
- In forested areas, and especially those where the value of vegetation is high or very high (Thermophilous oak forests; Mesophilous oak forests; Submontane beech forest; and Riparian willow-poplar woodland), each tree lying in the border of the construction site will be protected by covering its trunk with wood planks held in place with wires or similar which do not impinge on the trunck;
- Should permits be required for the cutting of trees, applicable regulations will be complied with and all the necessary permits will be obtained prior to the clearance of vegetation;
- Any area affected by the construction works that is not going to be permanently occupied by the railway structures should be restored to a state as close to the original conditions as possible through reinstatement activities, using native plant species from the surrounding areas;
- Training will be delivered to constructions workers before construction works start and during construction to increase their awareness and responsibilities with regards to the surrounding natural values, including those of vegetation.

OPERATIONAL PHASE

The main impacts on vegetation during operation will arise from maintenance activities of the railway line, specifically from herbicide spraying. The measures to minimize the unwanted growth inhibition of plant individuals outside the target treatment areas shall be contained in an integrated vegetation control and management program that, with respect to the use of herbicides, defines: a) type of herbicides to be used, b) application doses, c) time and frequency of application, d) areas where the use of herbicide is prohibited (e.g. in areas of sensitive vegetation, in some buffer zones near the rivers or shallow groundwater), e) alternative methods to the use of chemical methods. This program will be prepared in coordination with responsible experts from the Faculty of Agriculture (Plant Protection), the Drugs Agency and the Ministry of Health.

In general, the program will take into consideration the following guidelines based on good environmental practices and the International Finance Corporation (IFC) Environmental, Health, and Safety Guidelines (Railways) recommended measures to prevent and control impacts from right-of-way vegetation maintenance:

- The track area should be kept completely clear of vegetation.
- From the edge of the track area to the boundary of the right-of-way, vegetation should be structured with smaller plants near the line and larger trees further away from the line to provide habitats for a wide variety of plants and animals. This means that:
    - Mowing can be used to control growth of ground covers, minimize propagation of plants in the track area, and prevent the establishment of trees and shrubs in the right-of-way;
    - Herbicides in combination with mowing can control fast growing weedy species that have a potential to mature to heights over those permitted within the right-of-way;
    - Trimming and pruning can be utilized at the boundaries of rights-of-way to maintain corridor breath and prevent the encroachment of tree branches;
    - Hand removal or removal of vegetation, while labor intensive, can be used in the vicinity of structures, streams, fences and other obstructions making the use of machinery difficult or dangerous.);
- Native species should be planted and invasive plant species removed. This has the advantage that:
    - Dense, thorny native shrubs can be used to help deter trespassers;
    - Native plants can also help to stabilize clay soils, reducing the need for ballast maintenance;

  - As leaves of some tree species with invasive root systems can cause traction problems for rail wheels, to minimize disruption and potential for accidents, such trees should be removed, even if native to the area;
  - Waste from removal of invasive species should be disposed of (e.g. by incineration of at a landfill) to avoid accidental spreading of the weeds to the sites.);
- Railways should be designed and maintained to discourage plant growth in the track area (e.g. providing lateral barriers to plant migration and ensuring rapid drainage of the track area.);
- Biological, mechanical and thermal vegetation control measures should be used where practical, and use of chemical herbicides on the bank beyond the transition area should be avoided (avoided approx. 5 meters from the track);
- Maintenance clearing in riparian areas should be avoided or if unavoidable minimized;
- Should the integrated approach to vegetation management may indicate the use of herbicides as a preferred approach to control fast growing vegetation within railway rights-of-way, the recommended precautions include:
  - The herbicides used for vegetation management shall be checked to ensure that PERI uses approved pesticides and avoids using herbicides included in the “forbidden” list issued by international organizations such as WHO (Stockholm Convention) and national legislation (Law on Plant Protection – Official Gazette of RM No. 110/2007, amended 16.02.2009);
  - Atrazine diuron and other organic long lasting herbicides should not be used along extensive stretches of tracks. They should be replaced by more environmentally friendly glyphosphate or imazapyr containing substances;
  - The use of persistent soil acting herbicides shall be avoided;
  - Spraying should be conducted with non-residual herbicides (i.e. use of residual herbicides avoided).
  - Application of soil herbicides should be avoided and foliar herbicides used instead (the active ingredient is taken up by the foliage rather than by the roots of plants);
  - The herbicides used should have a half-life of no more than 2-6 months and be totally degradable within a year of application;
  - Personnel should be trained in herbicide application, including applicable certification or equivalent training where such certifications are not required;
  - The users should review manufactures’ directions on maximum recommended dosage, as well as published reports on reduced rates of herbicide application without loss of effect, and apply the minimum effective dose;
  - An optimal dosage and accurate spraying only when and where needed should be practiced, even with the less toxic herbicides;
  - Herbicide application equipment should be maintained and calibrated in accordance with manufacturers’ recommendations;
  - The herbicide application should be based on criteria such as field observations, weather data, time of treatment, and dosage, and using a pesticide logbook to record data;
  - Application practices should be designed to reduce unintentional drift or runoff. Herbicide application shall be restricted during adverse weather conditions (e.g. avoiding extensive spraying in rain, inefficient due to dilution, or wind, inefficient due to drift. Larger quantities are needed to get same results);
  - Untreated buffer zones or strips should be established along water sources, rivers, and streams to help protect water sources;
  - Generally, spraying of environmentally sensitive areas should be avoided (e.g. those defined in this ESIA as having very high and high sensitivity). Alternative weed removal measures should be sought for these areas (e.g. use of sealing layers, for example made of cloth, to prevent weeds from growing on embankments, or mechanical clearance where possible);

  - Contamination of soils, groundwater, or surface water resources due to the accidental spills during transfer, mixing and storage of herbicides should be prevented by following the Chemical Accident and Spills Management Program.

7.1.5.2 MITIGATIONS MEASURES FOR FAUNA

CONSTRUCTION PHASE

During the construction phase a reduction in animal populations could be expected due to killing of animals by vehicles and machinery (crushing or collisions) or from illegal hunting by construction workers; destruction of nests, burrows, and other animal sheltering/breeding structures, or the displacing individuals due to the presence of humans and running vehicles and machinery. Among the species affected there may be sensitive species that might be present in the surroundings of the construction works.

In order to minimize this impact during construction, the following measures shall be implemented:

- Construction activities shall be scheduled so as to avoid the breeding season and other sensitive seasons or times of day, especially in areas where high sensitive species are concerned associated to sensitive habitats:
  - High sensitivity species for this project include those identified in chapter 6.2.9 (Potential Impacts on Fauna);
  - High sensitive habitats for this ESIA include areas of Mesophilous oak forests, Submontane beech forest, Riparian willow-poplar woodland, Hill pastures, Rivers and streams (epipotamal and hiporhitral streams), Montane streams (metarhitral streams), Meadows (mesophilous), and Wet meadows;
  - A highly sensitive area that needs to be specifically taken into account in the scheduling of construction activities, regardless of the habitats it hosts, is the eastern part of the alignment, particularly the stretch of section 3 between K.P. 64 and the end of the planned railway alignment, where the railway passes near or crosses Emerald sites Pchinja-German (MK0000029) and Osogovo (MK0000026), ecological corridors Osogovo-BilinaPlanina and Osogovo-German, proposed protected areas KiselickaReka and Osogovo Mountains, and the two overlapping Natura 2000 sites across the Bulgarian border, which are a continuation of the Macedonian Emerald sites (SPAOsogovo (BG0002079) and SAC OsogovskaPlanina (BG0001011)).
- Prior to the commencement of any construction work activity on a site, a fauna survey of the area and its surroundings shall be carried out by a qualified biodiversity expert:
  - In case active breeding sites of sensitive species of fishes, amphibians, reptiles, bird, or mammals, including bats, are found, they will be transported by specialized technicians to another appropriate location away from the railway construction area, unless the biodiversity expert decides on other precautionary measures to take;
  - Also, if the eventual presence of a female bear with cubs were detected in the vicinity of the construction work site, the works shall stop until the female and her offspring have left the area. The same goes for wolf, otter, wildcat and marbled polecat;
- All equipment and personnel movements will occur within the established construction works site and hauling roads;
- Traffic of construction vehicles and machinery will be reduced as much as it is possible to perform construction works adequately;
- The speed of vehicles in the area of construction works and hauling roads will be limited to a specific maximum speed (30 km/h) and drivers reminded through signage and installation of speed bumps, where necessary;
- Any animal crushing or collision of animals will be recorded in a logbook;
- Hunting of wildlife in the area of the construction works by workers will be prohibited;

- Before the start of works, construction workers will be trained on the natural values of the area and the need to be proactive in implementing the measures for the protection of wildlife.

The mitigation measures designed to protect soil and surface water during the construction phase will also contribute to minimize killings or injuries to wild animal associated to riparian habitats. These are addressed in subsections 7.1.1.1 and 7.1.1.2.

OPERATIONAL PHASE

During the operational phase of the railway, a decrease in the animal populations living in the area of the railway corridor could occur due to killings/injuries to animals by crushing or collision by passing trains or electrocution in the railway overhead power lines. Also, a busy train traffic generating frequent noise and light emissions could drive wildlife from the area. The mitigation measures to minimize this impact include:

- Regular removal of any significant food and organic waste from the railway;
- Immediate removal of visible animal carcasses from the railway;
- Fences will be installed in the parts of the permanent way not corresponding to tunnels or bridges in forested areas and in non-populated open terrains. These fences should deter animals from crossing the railway and lead them towards adequate railway crossing sites. Escaping devices will be provided to allow animals, which accidentally enter in the railway corridor, leaving the area;
- During winter, small clearings of snow along the railway will be carried out every 50-100 m in the areas of bio-corridors Osogovo-BilinaPlanina and Osogovo-German;
- Overhead power lines and catenary shall be made more visible to birdlife. There are a number of devices used to signal ground wires and conductors in transmission lines of electricity, which could be used in the railway, including balls of aluminum, colored spheres, colored plastic spirals, colored plastic bands, luminous markers, colored polyethylene pipes, silhouettes of birds of prey, signaling metal plates, X shaped strips of neoprene, black plastic hanging clamps;
- Isolation of those stretches of the overhead power line where the catenary is double to avoid the death of birds by electrocution upon contact with the catenary;
- Avoid the use of rigid insulators in the towers supporting the catenary since this arrangement of the insulators increases the risk of electrocution. It is advisable to change the arrangement of these insulators to minimize this risk (e.g. with suspended insulators).

The mitigation measures designed to protect soil and surface water during the operational phase will also contribute to minimize killings or injuries to wild animal associated to riparian habitats. These are addressed in subsections 7.1.1.1 and 7.1.1.2.

7.1.5.3 MITIGATIONS MEASURES FOR HABITATS

CONSTRUCTION PHASE

The construction of the railway tracks involves the destruction of the habitats along the railway through the elimination of the vegetation cover and earth movements to prepare the railway corridor for the laying down of the track and stations. It also involves the temporary occupation of natural biocorridors formed by the streams and stream banks that are intersected by the alignment and those watersheds to be used as landfills in section 3, which creates a temporary severance of these riparian biocorridors

As the loss of habitats implies the loss of vegetation, the mitigation measures for this impact are those that have been described in subchapter 7.1.5.1. These measures, where relevant, are also applicable for the mitigation of the temporary severance of riparian corridors together with those described for fauna in chapter 7.1.5.2, soil and water in subsection 7.1.1.1, and landscape in subsection 7.1.4.1 (in all cases, when relevant for the mitigation of this impact).

OPERATIONAL PHASE

The cleared land strip along the railway line will be permanently occupied by the track and the free-vegetation right of way buffer at both sides of the track throughout the operational life of the railway. This will cause the fragmentation of habitats, where the plant and animal populations become divided.

The mitigation measures to minimize this effect mainly consist of the establishment of enough wildlife crossings to increase the permeability of the railway line as follows:

- Drainage pipes along the railway alignment will be adapted to facilitate the passage of small animals.
- The undersides of bridges crossing water courses will be vegetated so as to create vegetal screens that hide the railway structure (e.g. shrubs and small trees in the area of the abutments).
- Fenced areas will be vegetated with native plant species that are attractive to local fauna and with plantation patterns designed to lead the animals towards the wildlife crossings.
- Specific wildlife over-crossing for the passage of large animals may need to be constructed in the most highly sensitive areas of the railway alignment, namely biocorridors in the railway stretches that intersect the the Osogovo-German corridor (km 64.5 to 68.5) and the Osogovo-BilinaPlanina corridor (km 77 to 89). These sections have a high number of bridges and tunnels (especially Osogovo-BilinaPlanina corridor) and therefore, a potential good permeability to animals. However, there are some stretches of more than 500 meters without tunnels or bridges, where a more detailed study needs to be carried out in order to determine whether additional wildlife crossings will be necessary to warrantee the greatest permeability needed for this part of the railway line. This study shall be extended to section 2 of the railway alignment, where there are several high sensitivity habitats with a very rich biodiversity and where there are several stretches of more than 2 km without bridges or tunnels.

7.1.5.4 MITIGATIONS MEASURES FOR PROTECTED AND DESIGNATED SITES

The mitigation measures identified for flora, fauna and habitats, as well as those identified for soils, water and groundwater, and landscape shall be enough to preserve the integrity of the protected and designated areas in the railway corridor area.

Nonetheless, because of the high sensitivity of Section 3 of the railway alignment, where the Macedonian Emerald sites Pchinja-German (MK0000029) and Osogovo (MK0000026) and the contiguous Bulgarian Natura 2000 sites Special Protection Area (SPA) for birds Osogovo (BG0002079) and Special Area for Conservation (SAC) Osogovska Planina (BG0001011) could potentially be affected by the construction and operation of the railway, a Biodiversity Management Plan will be prepared and implemented.

This plan will address the implementation of the measures identified in this ESIA and whatever additional measures are deemed necessary. The plan will contain an appropriate assessment in accordance to the requirements of Article 6 of the Habitats Directive (Directive 92/43/CEE).

7.1.5.5 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations described above in sections 7.1.1.1, 7.1.1.2, and 7.1.1.3 are intended to avoid or minimize the impacts on flora, fauna, habitats and protected and designated spaces as follows:

<u>Construction phase</u>

Fauna

Decrease in animal populations

- The magnitude of this impact without mitigation measures was estimated to be low and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Habitats

Loss of Habitats

- The magnitude of this impact without mitigation measures was estimated to be low and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is even lower. Therefore the significance of the residual effect is considered to be Slight.

Temporary severance of riparian biocorridors

- The magnitude of this impact without mitigation measures was estimated to be medium and the probable success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

<u>Operation phase</u>

Flora

Impact on plant diversity by herbicides used in maintenance operations

- The magnitude of this impact without mitigation measures was estimated to be medium and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Slight.

Fauna

Decrease in animal populations

- The magnitude of this impact without mitigation measures was estimated to be high, and the probable success of the mitigation measures is considered to be moderate. The magnitude of the impact with the implementation of mitigation measures is medium. Therefore the significance of the residual effect is considered to be Moderate.

Habitats

Habitats fragmentation

- The magnitude of this impact without mitigation measures was estimated to be medium, and the probability of success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures is low. Therefore the significance of the residual effect is considered to be Moderate.

Protected and Designated Areas

Loss of conservation values

- The magnitude of this impact without mitigation measures was estimated to be high, and the the probable success of the mitigation measures is considered to be high. The magnitude of the impact with the implementation of mitigation measures becomes low. Therefore the significance of the residual effect is considered to be Slight.

7.1.6 CULTURAL HERITAGE

7.1.6.1 MITIGATION MEASURES

CONSTRUCTION PHASE

During the construction phase, accidental destruction of non-identified buried archaeological sites may occur as the clearance of vegetation, buildings, and fences proceed followed by earth movement operations, which might expose previously unknown buried archaeological (also paleontological) sites. In order to prevent unwanted destruction of archaeological sites, the following measures will be taken before and during construction:

- During the construction works, and more specifically during each earth work to be performed in undisturbed terrain, an archaeological monitoring survey will be conducted on a permanent basis to check that no archaeological remains are unburied without control. This monitoring shall be conducted by a team of expert archaeologists;
- The construction works should not begin until all relevant permits are not provided by the responsible institution, the Administration for protection of the cultural heritage of the Ministry of Culture. The archaeologists appointed to the monitoring survey, shall hold a valid archaeological research license;
- In accordance with Macedonian Law on Protection of Cultural Heritage, in the event of the unexpected discovery of archaeological objects the Contractor shall immediately inform PERI and the Ministry of Culture and follow their instructions. The construction works will be temporary stopped while the authorities decide if any research are needed or any protection measures should be applied. The Contractor shall follow the instructions provided by the authorities responsible for the protection of cultural heritage;
- In any case, a comprehensive Cultural heritage Management Plan shall be developed for the project before construction works start, that will address, among other issues, the provisions of the Law on Protection of Cultural Heritage and international treaties;
- Training shall be provided to construction workers before the start of earth works to foster their awareness on the importance of protecting Macedonian cultural heritage, including existing cultural monuments and archaeological sites and to be discovered sites.

OPERATIONAL PHASE

The easier access to the area brought by the train may facilitate the access of individuals dedicated to the poaching of archaeological sites causing the plundering of archaeological sites.

In the event of the discovery of archaeological sites, as indicated above, the authorities of the Ministry of Culture shall decide how to proceed. The actions to undertake to protect the site will depend on the importance of the finding. It is expected the authorities responsible for the protection of cultural heritage will provide with the most appropriate measures to prevent plundering of any archaeological site discovered along the railway alignment.

7.1.6.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations described above are intended to avoid or minimize the following impacts:

<u>During construction</u>

Destruction of non-identified buried archaeological sites

- Cultural heritage and archaeological sites, either known to exist or to be discovered are resources of a high sensitivity. The magnitude of this impact without mitigation measures is estimated to be high. The probable success of the mitigation measures is considered to be high; i.e. the unwanted destruction of archaeological (and/or paleontological) sites is effectively avoided. The magnitude of the impact with the implementation of mitigation measures becomes low. Therefore the significance of the residual effect is considered to be Slight.

<u>During operation</u>

Plundering of archaeological sites

- The magnitude of this impact without mitigation measures was estimated to be medium, and the the probable success of the mitigation measures is considered to be moderate; the success would depend on the specific circumstances of the sites. Upon the application of mitigation measures prescribed by the Administration on cultural heritage protection, the magnitude of the impact should be low. Therefore the significance of the residual effect is considered to be Slight.

7.1.7 ASSESSMENT SUMMARY TABLE

The findings of the assessment are summarised in the following table for each impact identified and assessed in each phase namely; Construction Phase and Operational Phase. For the operational phase, the operational phases are distinguished since for some impacts, the magnitude and significance may be different during stage 1 (operation of section 1 with diesel traction from middle of 2015 to 2018) and stage 2 (operation of the entire railway line with electrical traction, from 2019 on).

Environmental aspects	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	eographic Extent	Time when the Impact Occurs	uration	ikelihood of ppearance	agnitude of Impact vithout mitigation)	ignificance of Effec Without mitigation)	robable Success of Aitigation	ignificance of Residua ffect (with mitigation)
CONSTRUCTION PHASE												
Soils												
Impairment of soil quality		N	D/C	R	L	I	MT	P	Low	Slight negative	High	Slight negative
Soil erosion		N	D	I	L	I	ST	P	Medium	Moderate negative	Moderate	Slight negative
Destruction of fertile top soil		N	D	I	L	I	LT	C	Medium	Moderate negative	Low	Moderate negative
Surface water												
Impairment of water quality		N	D/C	R	L	I	ST	P	Medium	Moderate negative	High	Slight negative
Groundwater												
Impairment of water quality		N	D/C	R	L	D	MT	U	Medium	Moderate negative	High	Slight negative
Alteration of flow patterns during tunnelling and cutting		N	D	R	L	I	ST	U	Negligible	Neutral negative	High	Neutral negative
Air												
Impairment of air quality due to emissions of construction		N	D/C	R	L	I	ST	C	Medium	Moderate negative	Moderate	Slight negative
Noise and vibrations												
Impairment of acoustic quality due to noise emissions from construction vehicles and machinery		N	D	R	L	I	ST	C	High	Moderate negative	Moderate	Moderate negative

Environmental aspects	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	ieographic Extent	Time when the Impact Occurs	uration	ikelihood of ppearance	lagnitude of Impact vithout mitigation)	ignificance of Effec Without mitigation)	robable Success of Aitigation	ignificance of Residua ffect (with mitigation)
Landscape												
Alteration of landscape scenery by the presence of construction works, construction camps and other auxiliary facilities		N	D	R	L	I	ST	C	Low	Slight negative	Moderate	Slight negative
Habitats												
Loss of habitats		N	D	I	L	I	LT	C	Low	Slight to Moderate negative	High	Slight negative
Temporary severance of riparian biocorridors		N	D	R	L	I	ST	C	Medium	Moderate negative		
Fauna												
Decrease in animal populations		N	D/C	R	L	I	ST	P	Low	Slight negative	High	Slight negative
Cultural Heritage												
Destruction of archaeological sites		N	I/C	I	L	I	LT	P	High	Large negative	High	Slight negative
OPERATIONAL PHASE (Stage 1) Operation of Section 1 Kumanovo to Beljakovce Only with Diesel Traction												
Air												
Impairment of air quality due to emissions of combustion gases of diesel locomotives and stations		N	D	R	L	I	MT	C	Low	Moderate negative	High	Slight negative
Noise and Vibrations												
Impairment of acoustic quality due to train traffic noise emission (diesel traction)		N	D	R	L	I	LT	C	Medium	Moderate to Large negative	High	Slight negative
Annoyance to residents and damages to buildings due to vibrations from train traffic		N	D	I	L	I	LT	C	Medium	Moderate negative	Moderate	Slight negative
OPERATIONAL PHASE (Stages 2/3) Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 Kumanovo to Bulgarian border (Deve Bair) using Electric Traction												
Soils												
Impairment of soil quality (		N	D/C	R	L	D	LT	P	Medium	Moderate	High	Slight

Environmental aspects	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
										negative		negative
Soil erosion in earth banks devoid of vegetation		N	D	I	L	D	MT	P	Low	Slight negative	High	Slight negative
Surface water												
Impairment of water quality		N	D/C	R	L	D	LT	P	Low	Slight negative	High	Slight negative
Alteration of flow patterns and sediment deposition		N	D	R	L	I	LT	P	Low	Slight negative	High	Slight negative
Groundwater												
Impairment of groundwater quality		N	I/C	R	L	D	LT	P	Medium	Moderate negative	High	Slight negative
Air												
Impairment of air quality due to emissions of stations		N	D	R	L	I	MT	C	Negligible	Neutral	High	Neutral
Noise and Vibration												
Impairment of acoustic quality due to train traffic noise emission (electrical traction)		N	D	R	L	I	LT	C	High	Large negative	High	Slight negative
Annoyance to residents and damages to buildings due to vibrations from train traffic		N	D	I	L	I	LT	C	Medium	Moderate negative	Moderate	Slight negative
Landscape												
Alteration of landscape scenery by the presence of the railway objects (tunnel openings, cuttings, bridges, stations)		N	D	I	L	I	LT	C	Medium	Moderate negative	Moderate	Moderate negative
Habitats												
Habitat fragmentation		N	D	I	R	D	LT	P	Medium	Large negative	High	Moderate negative
Flora												
Affection to plant formations by herbicides		N	D	R	L	I	LT	P	Medium	Moderate negative	High	Slight negative
Fauna												

Environmental aspects	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Decrease in animal populations		N	D/C	I	R	I	LT	P	High	Moderate to Large negative	Moderate	Moderate negative
Protected & Designated Sites												
Loss of conservation values of the sites		N	D/C	I	L	I	LT	P	High	Moderate to Large negative	High	Slight negative
Cultural Heritage												
Plundering of archaeological sites		N	I/C	I	L	I	LT	P	Med	Moderate negative	Moderate	Slight negative

LEGEND

Characterization the impact: Positive (P), Negative (N)

Type of Impact: Direct (D), Indirect (I), Cumulative (C)

Reversibility: Reversible (R) Irreversible (I)

Geographic extent: Local (L), Regional (R), National (N), Transboundary (T), Global (G)

Time when the impact occurs: Immediate (I), Delayed (D)

Duration: Short-term (ST), Medium-term (MT), Long-term (LT)

Likelihood of appearance: Unlikely (U), Probable (P), Certain (C)

Magnitude: Negligible/No change, Low, Medium, High

Significance: Very Large, Large, Moderate, Slight, Neutral

Table 7-1 Summarised assessment for each environmental impact identified

7.2 SOCIAL MITIGATION MEASURES AND ASSESSMENT OF RESIDUAL EFFECTS

7.2.1 LAND AND PROPERTY

7.2.1.1 MITIGATION MEASURES

CONSTRUCTION PHASE

For the construction of the new railway line a permanent land take of 11 meters on both sides of the railway line is needed. During construction works, most land to be utilized will be of a temporary nature and is a result of requirements for construction of compounds and working sites along or close to the line in addition to space for storage of plants, materials and site offices etc. Contractors may temporarily also require land for Borrow Pits & Landfills. Temporary land take will cause removal of livestock from grazing areas during periods of blasting or heavy equipment operations restrict hunting near work crews, restricted harvesting of forest food and will have temporary effects on use of recreational areas because of construction noise, dust, and visual intrusions, in forest areas, construction activities could result in long-term loss of timber production due to need of removing trees. Construction works will restrict these kinds of activities which will result in potential adverse impacts on the livelihoods of affected persons. Effects on residents from loss of gardens and community land and effect on agricultural production caused by temporary land loss will occur during the construction phase.

In order to minimize the negative impacts, the following measures will be taken before and during construction:

- The designer will take into consideration the Expropriation Study for Section 3 (prepared in 2010). Study is prepared in accordance with Law for Expropriation which recognises only affected people who have formal legal rights;
- **Detailed survey** needs to be undertaken in order to understand the detailed situation with regard to land take on Section 3, taking into consideration those without legal rights over properties and belongings;
- **Census** will be conducted in line with PR 5 requirements in order to facility the process and successful outcomes of resettlement and/or livelihood restoration;
- **Resettlement Action Plans** are to be prepared, separately for each section;
- PERI (Project Proponent) shall ensure that the affected families are duly compensated for all their belongings and expenses connected with being resettled in accordance with the Resettlement Compensation Framework *(Chapter 13)*. It is estimated that permanent land take will directly affect around 465 owners (families). 25 Families will be affected due to property loss.
- Additional assistance to be provided to the people who will be resettled for restoring their standards of living and further improve them where possible;
- With regards to the loss of gardens and agricultural production due to temporary land loss owners will be compensated (any material damage proved to have been caused to local houses, buildings and other infrastructure (including access roads) by the works will be compensated for and subject to repair on a timely basis) according to the Resettlement Compensation Framework. When available and preferred by owners other land (state owned) will be utilized for continuation of agricultural production;
- Land also needs to be reinstated/restored through intentional activities to help restore it its pre-construction conditions. Measures should correspond to the level of scale disturbances. It will include erosion control measures, re-contouring the land, replacing the topsoil, re-vegetation, restoration of habitats, regaining its previous use. Review and assessment of the additional impacts and identification of the appropriate mitigation measures will be done by PERI and will be implemented by the Contractor;

- Temporary land take from sensitive land uses will be avoided as far as possible. Any land take which goes beyond that assessed in the ESIA or results in additional impacts which could be of a significant nature will be reviewed and appropriate mitigation measures identified and implemented.

OPERATIONAL PHASE

During the operational phase some of the changes that occur during construction phase should return the livelihoods of temporarily affected people to their previous condition. Except those Contractor/s who will decide to leave their construction facilities, like Concrete Batching Plants for the needs of some future projects in the region, most of the land will be abandoned and returned to previous condition. Some haulage routes that go through community land maybe will be used as access roads by local citizens or by State Forest Company. With construction of the railway line movement of the residents from communities at or close to the railway line will be forbidden within the area of railway belt. Access to this area will be treated as moving on private property and will be illegal and life threatening. Residents will not be able to undertake their activities related with stockbreeding, hunting, harvesting of forest food and recreational activities within this area.

In order to minimize the negative impacts, the following measures will be taken before commencement and/or during operation:

- Public Information notices - PERI through different kind of media should assure that residents from communities along the railway are duly informed for operation of railway and changes in movement in the area caused by its operations like forbidden crossing of railway belt, forbidden movement and undertaking different activities within railway area;
- Public awareness initiatives - PERI and Operator should undertake different initiatives together with Local Self Government for increasing the public awareness (through school visits, safety centres, diversionary activities and communications programmes);
- Safety barriers and signage to prevent access to railway belt which could endanger residents from the communities at or close to the railway line.

7.2.1.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigation described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

- Temporary land loss(FOR SECTIONS 1, 2 AND 3)
- Livelihoods (FROM TEMPORARY LAND LOSS)
- Effects on residents from loss of gardens and community land and effects on agricultural production/activity (FROM TEMPORARY LAND LOSS)
- Loss of housing (including physical displacement) (FOR SECTION 3)
- Permanent land loss (FOR SECTION 3)

Temporary land loss (FOR SECTIONS 1, 2 AND 3) & Livelihoods (FROM TEMPORARY LAND LOSS)

Land, especially agricultural land as a receptor is considered to have very high sensitivity/value. Magnitude of this impact without mitigation measures was estimated to be low negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes negligible. The significance of the residual effect is considered therefore to be ***neutral/slight negative***.

Effects on residents from loss of gardens and community land and effects on agricultural production/activity (FROM TEMPORARY LAND LOSS)

Magnitude of this impact without mitigation measures was estimated to be medium negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***neutral/slight negative***.

Loss of housing (including physical displacement) (FOR SECTION 3) & Permanent land loss (FOR SECTION 3)

Housing as a sub receptor has very high sensitivity. Magnitude of the impact “loss of housing” without mitigation measures was estimated to be high negative. Land has very high and high sensitivity, depending on the type of land. The magnitude of the impact of permanent land loss without mitigation measure was estimated to be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation has been successful in the same circumstances with the sae type of aim. The magnitude of the impact with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is then ***moderate negative***.

OPERATIONAL PHASE (FOR STAGE 2, SECTION 3)

- Effects on livelihood (START AT THE CONSTRUCTION PHASE)
- Effects on residents from loss of gardens and community land and effects on agricultural production/activity (START AT THE CONSTRUCTION PHASE)

Effects on livelihood (START AT THE CONSTRUCTION PHASE)

Magnitude of the impact without mitigation measures was estimated to be low negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation has been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains low negative. The significance of the residual effect remains neutral/slight negative.

Effects on residents from loss of gardens and community land and effects on agricultural production/activity (START AT THE CONSTRUCTION PHASE)

Magnitude of the impact without mitigation measures was estimated to be low negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation has been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains low. The significance of the residual effect becomes neutral/slight negative.

7.2.2 COMMUNITY HEALTH, SAFETY AND SECURITY

7.2.2.1 MITIGATION MEASURES

CONSTRUCTION PHASE

During the construction phase, impacts will occur as a result of exposure to diseases arising from temporary or permanent changes in population, exposure to hazardous materials during construction and transport of raw and finished materials, safety concerns related to risk of accidents related to movement of heavy vehicles during construction. Security can be threatened if safeguard personnel engaged at construction site or contractor's facilities are involved in past mistreatments and if they are not trained adequately in the use of force (and where applicable, firearms).

In order to minimize negative impacts, the following measures will be taken before and during construction:

- Construction work shall commence on site only when the **Health & Safety (H&S Plan** has been adequately developed by the Contractor and accepted by PERI's Representative;
- **Emergency Preparedness and Response Plan** will be developed prior to construction works starting;
- **Traffic Management Plan** will be developed for safe access to construction sites with minimum negative impact on the existing roads and in parallel to ensure community safety and easy access to their properties (homes, land, gardens);
- For traffic control and safety, the information about the project activities will be announced through the local radio/TV for carefully driving (low speed) near the working areas. PERI and the Contractor/s will openly and transparently inform residents of the affected places and villages for planned activities that follow quarterly;
- The traffic flow through the site and within the urban areas will be coordinated with the responsible traffic engineers in the municipalities;
- An **Emergency Plan** will be developed, including to cover for the management of cases of incidents during the transportation of raw materials/hazardous substances;
- **Main Design** studies for construction of the railway alignment will be developed and revised by supervisor/s according the national legislation on construction and best construction practice as well environmental requirements and pollution prevention principles;
- **Separate study** on pedestrian/vehicle crossings (over/under crossings) will be developed based on the site visits and consultations with local community, and any additional measures implemented within the design;
- The structural elements (tunnels, bridges including the reconstruction of the bridge over river Pcinja in Section 1, over/underpasses and viaducts) are to be design in accordance with national and international standards on safety and functionality;
- **Community health and safety educational programme** will be developed to inform and build capacity of the local community and drivers on potential adverse impacts during the. Residents will be informed that they will be not able to undertake their activities related with stockbreeding, hunting, harvesting of forest food and recreational activities within the railway belt area;
- Workers will receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct, in order to avoid creating conflicts with the local environment;
- Avoidance of unauthorized entry into contractor's facilities will be considered in their design and siting. The design, layout and site location of facilities should facilitate natural surveillance by police and the safeguards engaged by Contractor/s;
- Adequate selection of qualified security guards with appropriate training;
- Contractor will have to commit to investors that any material damage made by workers on local houses, buildings and other infrastructure will be subject to fair compensation;
- All necessary permits will be obtained prior to the start of construction phase from responsible institutions responsible for urban planning, communal works, forestry management, water protection, electricity and telecommunication, natural gas supply network and cultural heritage protection;
- The designer and Contractor/s will take into consideration all proposed preventive, mitigation and compensation measures included within the ESIA.

OPERATIONAL PHASE

During operation, community safety will be mainly endangered from the increased risks for accidents from unauthorized crossing of railway and electrification.

In order to minimize negative impacts, the following measures will be taken before and during the operational phase:

- Designing of railroad level crossings for all three Sections will be with overpasses and underpasses. In Section 1 level crossings will be replaced with under and over passes;
- Adequate warning devices will be installed to warn pedestrians that a train is approaching; special attention will be given to stations
- Community health and safety educational programme will be developed and implemented.;
- Macedonian railways – Infrastructure together with Macedonian railways - Transport will undertake a series of public relation activities in order to inform local citizens, passenger and workers about the dangers of railway operation and related activities with passing the railway, **diesel and electric traction**, trespass and vandalism and to emphasize necessity traffic rules and regulations to be obeyed by everybody;
- Macedonian Railway – Infrastructure and Macedonian Railways- Transport will run and support community activities, including school visits, safety centres, diversionary activities and communications programmes;
- Information on safety performance (relating to both accident investigations and overall statistics) will be made publicly available. Safety performance and other safety related data will be developed.
- Methodology for risk assessment to be developed;
- Making information on the railway publically accessible - for example by release to a website or newspapers.

7.2.2.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

- Impacts from the influx of temporary workers
- Impacts from increased community exposure to disease
- Impacts from increased traffic and heavy vehicles on local roads during construction
- Safety issues associated to the entrance of non-authorized people on the construction site

Communities have been determined previously in the assessment to have a very high sensitivity to impacts on their community health, safety and security. Magnitude of the impact from the influx of temporary workers without mitigation measures was estimated to be low negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains low negative. The significance of the residual effect is then ***neutral/slight negative***.

Magnitude of the impact “increased community exposure to disease” without mitigation measures was estimated to be high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***moderate negative***.

Magnitude of the impact from increased traffic and heavy vehicles on local roads during construction without mitigation measures was estimated to be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***slight negative***.

Magnitude of the impact related with safety issues associated to the entrance of non-authorized people on the construction site without mitigation measures was estimated to be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***neutral.***

OPERATIONAL PHASE (FOR STAGE 2, SECTION 3)

- Impacts from better access to the larger towns and health services located in larger towns/cities

The operational railway could be considered as a potentially significant possibility for providing better accessibility to the larger towns and health services located in larger towns/cities. Thus the magnitude of this impact without enhancement measures is estimated to be high positive.

The probable success of the enhancement measures to maximize anticipated benefits is considered to be moderate; the proposed measures have been successful in different circumstance with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

- Safety issues associated with crossing of rail track

Crossing of railway tracks could be considered as a potentially significant risk to community health and safety resulting in loss of community lives thus the magnitude of this impact without mitigation measures is estimated to be high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is therefore considered to be **slight negative**.

7.2.3 COMMUNITY TENSIONS

7.2.3.1 MITIGATION MEASURES

CONSTRUCTION PHASE

During the construction phase the presence of a number of temporary workers from outside of the region in the local communities could increase community tensions. Different cultural and social background of the workers compared with the local people could be a reason for potential issues to occur (e.g. verbal conflicts, written and oral threats and even physical violence). This in combination with the disruption to normal life of the local people due to the construction activities creates a ground for increased community tension. The potential disruption to normal life includes: loss of livelihood and land, changes in agricultural production, increased transportation time, heavy vehicles on local roads, restricted movement within construction area, presence of workers camps within the community etc.

In order to minimize negative impacts, the following measures will be taken before and during construction:

- Workers will receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct, in order not to create conflicts with the local environment;
- Worker camps will be located outside the communities;
- **Local Workforce Recruitment Plan** will be developed in order to assure employment of as much as possible local workforce;
- Limited regime of movement of workers in the area around the construction sites. Mode of movement must be well organized and defined by agreement between PERI and Contractor/s;
- Strengthening of public/administration awareness (Local Self Government, medias, NGO`s) has high importance for decreasing community tensions. Local authorities must be capable for handling increased grievances from the residents towards disturbance of their normal way of leaving. Public to be acknowledging for disruptions that the construction works may cause to the typical way of leaving in the area.

OPERATIONAL PHASE

During the operational phase there will be some reaction of the community related to the increased risks for accidents on railway crossings and electrification. Communities at or close to the railway line will mainly be disturbed by noise and vibration caused by train operation. This is expected to be more in the beginning until they have adapted to the changed living conditions associated with railway. Mitigation measures proposed for Community Health, Safety and Security and mitigation measures elaborated under quality of life cover impacts related to the community reaction to the operation of railway.

7.2.3.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

Communities are generally considered to have very high to high sensitivity to effects which result in an increase in tension caused by influx of workforce into local communities, disruption caused by construction works during construction phase and due to the disturbance arising from the operation of railway.

- Effects from influx of workforce into local communities

The entry of a temporary labour force into an area could cause different negative impacts within the local communities including conflicts between local community members and newly arrived people mainly due to differences in socio-cultural background. The magnitude of this impact without mitigation measures was estimated to be low negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains low negative. The significance of the residual effect is therefore considered to be ***slight negative/neutral***.

- Community reactions due to the disturbance arising from the construction works

Magnitude of the impact from community reactions due to disturbance arising from the construction works, without mitigation measures was estimated as high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures is considered to be reduced to medium negative. The significance of the residual effect is then determined to be ***moderate negative***.

OPERATIONAL PHASE

- Community reactions due to the disturbance arising from the operation of railway

The magnitude of this impact without mitigation measures was estimated to be high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is therefore considered to be ***moderate negative***.

7.2.4 ACCESS & SEVERANCE

7.2.4.1 MITIGATION MEASURES

CONSTRUCTION PHASE

The construction of the railway could affect access and result in severance effects on communities at or close to the railway line. In order to minimize negative impacts, the following measures will be taken before and during construction:

- **Traffic Management Plan** will be developed and implemented;
- Risk assessment which clearly identifies all risks from the construction work to the travelers, drivers, workers will be developed and provisions implemented;
- Identification of all public roads and paths that will be affected and proposal for the travel routes during the construction period (i.e. which sections will be closed and till when, where the traffic will be diverted);
- Minimization of the traffic disturbance;
- The signing of the construction area, new directions, ring roads, access roads;
- Public notification of any traffic-related concerns, such as road/streets closings.

OPERATIONAL PHASE

The operational phase of the railway could impact access and result in severance effects on the general public, community services and business sector in communities at or close to the railway line.

7.2.4.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigation described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

- Impacts on access and severance effects

Access and severance effects will occur during the construction period due to limited movement at construction sites, and changed access road increasing travel time. It is estimated that the general public has very high sensitivity to effects on access and severance, with Community services and Business sector having high sensitivity. The magnitude of this impact without mitigation measures was estimated as low negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains low. The significance of the residual effect is then ***neutral/slight negative.***

OPERATIONAL PHASE

- Impacts on access and severance effects of general public, community services and business sector in communities at or close to the railway line.

During operation access will be limited within the railway belt area and access to this area will be prohibited for unauthorized persons. Magnitude of this impact without mitigation measures was estimated as high negative/positive. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium. The significance of the residual effect is then ***moderate positive/negative.***

7.2.5 ECONOMY

7.2.5.1 ENHANCEMENT MEASURES

CONSTRUCTION PHASE

During construction phase it is expected that related construction works will have significant positive impacts on Local Economy, North-eastern region of Macedonia economy , national economy and Europena regional economy.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Inform people in a timely manner about the possible impacts on economic activity in surrounding areas and expected timings of impacts, which will enable them to plan and prepare. The perception of competition is one driver of local economic development activity and its influence, while observable, may be exaggerated. Increased demand on the market will lead to creation of competition especially on local market. Legislation in force ensures open market and free competition among all subjects which will enhance positive impacts from construction activities especially on local economy.

OPERATIONAL PHASE

During operational phase, new markets will be opened; new transport alternatives will be available which will significantly impact development of Local, North-eastern region of Macedonia economy, National and European regional economy.

- Local and State governments must undertake activities for attracting direct foreign investments (activation of industrial free development areas, green field investments or reactivation of closed capacities related with mining, agriculture or tourism). In this direction country has enacted legislation that not only ensures a generally equal footing for foreign investors with their domestic counterparts, but also provides numerous incentives to attract such investment. Macedonia consistently provided national treatment to foreign investors. The country has concluded a number of bilateral investment protection treaties and adopted other multilateral conventions that impose stricter standards of protection for foreign investors. In its bid to attract foreign investment, the government has enacted a number of incentives and continued an extensive promotional campaign through international media outlets. Country offers incentives to foreign investors. Foreign investors are eligible for profit tax exemptions for: profits generated during the first three years of operation, in proportion to the amount of foreign investment; all profits reinvested in the company; profits invested in environmental protection; and profits invested in "underdeveloped" regions of the country. Companies with at least 20 percent foreign capital are exempt from customs duties for the first three years after registration. Moreover, a flat tax for corporate and personal income stands at 10 percent, a fact that the government has highlighted in public campaigns to attract foreign direct investment. Foreign investors are not required to purchase from local sources or to export all of their production. There are also no requirements for the government to be a partner in an enterprise. Commercial agreements determine which entity retains control over the investment revenue. Furthermore, there are no requirements for reducing foreign equity over time or for transferring technology.

- Macedonia is on the cusp of NATO membership and the European Commission recommended setting a date to begin accession talks with the EU. However, further movement on integration is stalled due to the protracted dispute with Greece over Macedonia's name. Association of Macedonia within these associations will significantly contribute towards integration of Macedonian economy into European economy and wider which will lead to overall development of economy not only within Macedonia but within SEE and globally.

7.2.5.2 ASSESSMENT OF RESIDUAL EFFECTS

Sensitivity of local economy, North-Eastern Macedonia economy and national economy have very high and European region economy has high sensitivity to the impacts from construction and operation of railway. The enhancement measures described above are intended to maximize the following impacts:

CONSTRUCTION PHASE

- Stimulation of economic growth at local levels

It is expected that the impact will result in an improved local economy. The magnitude of this impact without enhancement measures was estimated to be high positive. The probable success of the enhancement measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures remains low positive. The significance of the residual effect is therefore considered to be ***large positive***.

OPERATIONAL PHASE

- Effects on Local Economy, effects on North-Eastern Macedonia economy, effects on National economy and effects on European regional economy

It is expected that the impact on the Local Economy, on North-Eastern Macedonian economy, National and European regional economy will be of large scale and result in improvement. The magnitude of this impact without enhancement measures was estimated to be high positive. The probable success of the enhancement measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

7.2.6 EMPLOYMENT

7.2.6.1 ENHANCEMENT MEASURES

CONSTRUCTION PHASE

The employment benefits during the construction phase are positive since they relate to the project activities and not only due to created employment opportunities but as well due to increased employee spending.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Local recruitment plan to be prepared and implemented, when possible and when required skilled workforce is locally available, employment of local workforce to be preferred
- Engagement of woman workforce to be preferred where appropriate

OPERATIONAL PHASE

During operational phase possibilities for direct employment related with the railway operation will be created. Auxiliary services connected with the railway operation will create indirect possibilities for employment. Expected overall economy development will create new labour demand, not only locally but within North-eastern region of Macedonia, nationally, transboundary and globally. Development of some economic sectors will bring changes on labour markets such as employment substitution by some profiles and an increase in the demand for other profiles.

In order to maximize the positive impacts, the following measures should be undertaken during operational phase:

- Labour market needs to increase its flexibility and adjust to new demand on the market through restructuring;
- Improving the overall employment rate and having fewer people dependent on state benefits;
- Active labour mobility to be supported, rigidity of labour market to start to change;
- Good quality, accessible and affordable childcare to be available assuring on that way active participation of female in employment opportunities;
- Individuals, companies, Local Self Government and the government should work actively for the enhancement of labour's knowledge and skill in contributing to the good performance of economy;
- Macedonian should begin to attach importance to policies designed to enhance the quality of employment;
- Association of Macedonia within EU market will intensify competition brought about by the progress in globalization, technological innovation and deregulation, nationally and within SEE.

7.2.6.2 ASSESSMENT OF RESIDUAL EFFECTS

Employment (direct and indirect), locally, within North-Eastern region of Macedonia, nationally and within European regional economy have high sensitivity on impacts that will be caused by construction and operation of railway. The enhancement measures described above are intended to maximize the following impacts:

CONSTRUCTION PHASE

- Creation of local employment (direct and indirect)

It is expected that the impact will cause creation of local employment. The magnitude of this impact without mitigation measures was estimated to be high positive. The probable success of the enhancement measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

OPERATIONAL PHASE

- Creation of employment (direct and indirect) at local, regional, national and transboundary (through much or all of Macedonia and Bulgaria) and global level (beyond SEE area)
- Improvement in access to employment opportunities across the region

It is expected that the impact on creation of employment (direct and indirect) at local, regional, national and transboundary (through much or all of Macedonia and Bulgaria) and global level (beyond SEE area) and improvement in access to employment opportunities across the regions will be of large scale and result in improvement. The magnitude of this impact without enhancement measures was estimated to be high positive. The probable success of the enhancement measures mitigation measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

7.2.7 EDUCATION & TRAINING

7.2.7.1 ENHANCEMENT MEASURES

CONSTRUCTION PHASE

It is expected that during the construction phase some level of capacity building will be provided (organized and un-organized) through transfer of new technologies and new skills. This will happen mainly as on-the-job training but also as exposure to modern management and logistics procedures and by working with people having international expertise. Joint venture could contribute in transfer of skills which should result in strengthening of local capacities.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

OPERATIONAL PHASE

- Supervisors and managers will be responsible to utilize available resources to train, qualify, and develop their employees.
- On-the-job training (OJT) is one of the best training methods because it is planned, organized, and conducted at the employee's worksite. OJT to be generally primary method used for broadening employee skills and increasing productivity. It is particularly appropriate for developing proficiency skills unique to an employee's job - especially jobs that are relatively easy to learn and require locally-owned equipment and facilities.

OPERATIONAL PHASE

It is expected that the railway operation will stimulate a large and competitive economy in the North--Eastern region of Macedonia which could provide jobs for every working-age resident and a highly qualified local workforce. Operation of railway as well will create possibilities for direct and indirect employment. With better accessibility to universities in the country it can be expected that the percentage both for males and females with secondary education who will continue their education will increase.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Increasing participation in skills and training amongst priority groups including those receiving social benefit and lone parents, and vulnerable groups;
- Increasing the percentage of secondary educated students who will continue with faculty education;
- Encouraging female to choose untypical profiles - to change the existing tendency for females to focus on traditional “women’s work” which often pays less or is less likely to result with high earning

potential, and will change attitudinal issues related to a lack of confidence in one's ability to open a business and general hopelessness about personal economic prospects.

7.2.7.2 ASSESSMENT OF RESIDUAL EFFECTS

Sensitivity of education and training on impacts that will be created during construction and operational phase is very high. The enhancement measures described above are intended to maximize the following impacts:

CONSTRUCTION PHASE

- Capacity building through training

It is expected that the impact from construction activities will participate into capacity building through training. The magnitude of this impact without enhancement measures was estimated to be low positive. The probable success of the enhancement measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of enhancement measures will be medium positive. The significance of the residual effect is therefore considered to be ***moderate positive***.

OPERATIONAL PHASE

- Education & training benefits from employment opportunities; and
- Education & training benefits from improved access to education and employment opportunities

It is expected that the impact caused from operation of railway will contribute significantly in improvement of employment opportunities and in education & training from improved access to education and employment opportunities. The magnitude of these impacts without enhancement measures was estimated to be high positive. The probable success of the enhancement measures mitigation measures is considered to be moderate; the proposed enhancement measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

7.2.8 UTILITIES

7.2.8.1 MITIGATION MEASURES

CONSTRUCTION PHASE

During the construction phase utilities, which are located under and above ground, such as water supply, sewerage, cable network and telephone at the construction site could be affected. In addition, it can be expected that the influx of people, such as construction workers, employment seekers and service providers will increase pressure on the utilities in the area.

In order to minimize negative impacts, the following measures will be taken before and during construction:

- Prior to construction works during designing phase, designer will obtain available underground cadastre from relevant service providers;
- Prior to excavation works, Contractor/s must inform service providers in writing of planned construction activities which could affect some utilities and to require presence of their representatives on site;
- Consultation with local citizens regarding possible illegal connections;

- Manage consumption of water and electricity in order to decrease pressure on the utilities in the area.

OPERATIONAL PHASE

During the operational phase electrification of trains will put more pressure on the electric power supply and diversions of utilities on local businesses and communities. In order to minimize negative impacts, the following measures will be taken before and during operation:

- Adequate electrification of railway to be done in order to avoid lack of electricity in the area

7.2.8.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigations described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

Effects of utility cuts on local businesses and communities

Underground installation will have high sensitivity to impacts should they occur. Due to the nature of works, which are mainly above ground, magnitude of this impact without mitigation measures was estimated as low negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes negligible. The significance of the residual effect is then considered to be neutral.

OPERATIONAL PHASE

Effects of diversions of utilities on local businesses and communities

Magnitude of this impact without mitigation measures was estimated as negligible. Thus there is no need for mitigation measures to be undertaken.

7.2.9 VULNERABLE GROUPS

7.2.9.1 MITIGATION MEASURES

CONSTRUCTION AND OPERATIONAL PHASES

The construction phase will affect communities at or close to the railway, however in Section 1, in settlement Pero Cico and in Section 3 there are vulnerable groups which are likely to suffer more in economic and social terms from project activities than the general population.

In order to minimize negative impacts, the following measures will be taken before and during construction:

Section 1 – Pero Cico Settlement

- A safe access solution for this settlement will be designed and constructed in order to provide safe and regular access of the inhabitants to their houses (i.e. an over pass);
- **Safety of people who live near railway should be insured with adequate, marking and signage, for** both the construction and operational phase;
- Illiteracy of some of the affected people should be taken into consideration with regard to the method of Project communications with this community;

- To mitigate negative impacts from vibration and given some of the unstable residential/house structures in close proximity to the route, strengthening of the houses during the construction phase may need to be undertaken;
- The anti-noise walls/barriers will be construction which are required to protect inhabitants during the operational phase. This will significantly reduce the adverse impact of the noise and will also improve the safety of residents;
- Lost space in front of the houses, which is used by the community currently for the storage of plastic bottles and as space for playing, needs to be compensated for. In cooperation with the Municipality of Kumanovo, PERi must identify a location in the vicinity of the settlement where children could play. An access road to this alternative area will also be provided. Another location will also be identified out for the storage of the plastic bottles in close cooperation with the Municipality. The Municipality of Kumanovo already has plans for placing containers where the affected people could continue with these activities. PERI will cooperate closely with the Municipality with regards to this. Loss of potential incomes and businesses for the affected people will be duly compensated;
- Anti-noise walls/barriers, house insulation and triple glazing to the windows would be implemented as mitigation measures for the settlement of Pero Čičo where practicable.

Section 3 - loss of land and properties
Compensation will be done in accordance with the Resettlement Compensation Framework. Mitigation will be reviewed in light of findings of Census to be undertaken during the next stage of project preparation.

7.2.9.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigation measures described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

Section 1 "Pero Cico" settlement losing of space in front of their houses

Vulnerable groups identified in the Pero Cico settlement and any identified in Section 3 are considered to have a very high sensitivity to change. Impacts in the Pero Cico settlement will cause minor loss of and alteration to the settlement. Thus it is estimated that the impact without mitigation measures will have high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium. The significance of the residual effect is then ***moderate negative.***

Section 3, loss of land and properties

It is estimated that this impact without mitigation measures will have a high negative magnitude. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium. The significance of the residual effect is then ***moderate negative***.

Operational phase

Section 1 "Pero Cico" settlement residing along the track

It is estimated that this impact without mitigation measures will have a high negative magnitude. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium. The significance of the residual effect is then ***moderate negative***.

7.2.10 WORKFORCE RELATED IMPACTS AND ISSUES

7.2.10.1 MITIGATION MEASURES

CONSTRUCTION PHASE

Mitigation and management measures to reduce and avoid impacts on workers comprise employer safeguards against discrimination, workers construction compounds, accommodation consultation and grievance mechanisms, security of workers accommodation, accommodation standards, occupational health and safety, worker's right, rules and obligations and employment standards.

In order to minimize negative impacts on the workforce, the following measures will be taken before and during construction:

Working conditions and terms of employment

- PERI will adopt and/or maintain appropriate **Human Resources Policies**. These policies will be clear, understandable and accessible to workers.

These policies will ensure that the following will be implemented:

- *According to the Labour Relations Act (MACEDONIA LABOUR RELATIONS Act*, dated 27 December 1993. Published in the Official Gazette of the Republic of *Macedonia* No.80/93-2007) *the workers commences employment voluntarily, in the manner and under conditions determined by law and a collective agreement. Employment may terminate solely in procedures and under conditions determined by law. The worker is obliged to fulfil obligations derived from employment. The worker assumes personal responsibility for violations of working obligations and caused damages in compliance with the provisions of law and the collective agreement.*
- *According to the provisions of the Labour Relations Act and the collective agreement, the managing body or legal representative of the employer, acquires employment rights and obligations with the employer, during the appointment and performance of representative duties.*
- *The Project will comply with all relevant national laws provisions related to the employment and will not employ children below the national minimum age of employment. PERI have procedures in place to verify the age of all young workers (those between the minimum age of employment and the age of 18). Young people below the age of 18 years will not be employed in hazardous work and all work of persons under the age of 18 shall be subject to an appropriate risk assessment as it is regulated in the Labour relations act.*
- *Project's contractors and subcontractors will be committed to ensuring that all of the workers that have entered into employment do that freely and voluntarily, without coercion or penalty and that do not use any form of forced, bonded or involuntary prison labour.*
- *PERI will not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.*

Employer safeguards against discrimination

- PERI will:

- o Develop policies to promote non-discrimination and equal treatment and opportunities and to prevent harassment (including sexual harassment) and bullying in the workplace, and make sure that they are clearly communicated and accessible to management, supervisors and workers;
- o Ensure that managers and supervisors are trained in the application of the policies;
- o Ensure that job advertisements, job descriptions and applications do not refer to applicants/workers race, gender etc (except rare cases where legal exceptions apply);
- o Ensure that decisions on hiring, working conditions, pay, benefits, training, promotion, termination, redundancy are not made on the basis of discriminatory grounds or on the basis of criteria which disproportionately impact on one group more than another or is question of employment of child;
- o Ensure that women and men are paid the same wages for work of the same value, i.e. remuneration is based on the employee's skills, experience, responsibilities and other objective, non gender- related factors;
- o Monitor the workplace for any form of harassment and, where it is found, act quickly to address it;
- o Ensure that workers are not asked about or required to undergo health or pregnancy testing, except where there is a genuine health and safety need;
- o Take steps to enable workers with disabilities to retain their jobs and make accommodations required by national law for physically disabled persons.

<u>Worker's construction compounds</u>

- Workers camps to be constructed outside the communities.
- For Sections 1 and 2 already worker camps . from the previous works shall be reused as far as possible. Any new camps will not be constructed in protected/sensitive areas and any auxillary facilities as far as possible would not be located in areas containing sensitive habitats/vegetation. Any such facilities to be located within sensitive area would need to be fully justified. In the vicinity of sensitive habitats construction sites will be clearly delineated so as to avoid damage in non-working areas and appropriate protection measures implemented. Restoration and reinstatement of temporary affected areas to a state as close to the original conditions as possible and using native plant species from the surrounding areas.
- Macedonian Railways Infrastructure - PERI will undertake an audit of design and implementation of the worker's compound against the checklist in the EBRD & IFC guidance document:
    - o prior to construction of the accommodation (i.e. an audit of the design);
    - o prior to its opening;
    - o on an annual basis (each year after opening).
- Audits will be undertaken by an independent third party. Any defects or issues (where relevant) identified in the audits to be addressed and will be reassessed for compliance within one month of the audit.
- **Social Facilities and Services Plan** for workers will be prepared which regulates the following:
    - – *Housing standards must include special attention to minimum space allocated per person, supply of safe water in the workers' dwelling in such quantities, adequate sewage and garbage disposal systems and appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects;*
    - – *For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems must be provided. Both natural and artificial lighting must be provided and maintained in living facilities;*

- *A separate bed for each worker must be provided. The practice of "hot bedding" should be avoided. The minimum space between beds should be 1 metre. Double deck bunks are not advisable for fire safety;*
- *Canteen, cooking and laundry facilities must be built in adequate and easy to clean materials. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition. If workers wish to cook their own meals, kitchen space will be provided separate from sleeping areas;*
- *There must be* ***management plans and policies*** *especially in the areas of overall operation of the facility, health and safety (with emergency responses), local community and security;*
- *A* ***security plan*** *including clear measures to protect workers against theft and attack is implemented. Security staff must be checked tonsure that they have not been implicated in any previous crimes or abuses;*
- ***Processes and grievance mechanisms*** *for workers' to articulate their grievances must be provided and clearly explained to workers. Such mechanisms must be in accordance with EBRD's PR2;*
- *Community representatives must be provided with an easy means to voice their opinions and to lodge complaints to the management. There must be a transparent and efficient process for dealing with community grievances.*

Accommodation consultation and grievance mechanisms

- Workers' accommodation arrangements will not restrict workers' rights and freedoms Workers' must enjoy their fundamental human rights and freedom of association in particular;
- All workers will be made aware of any rules governing the accommodation and the consequences of breaking such rules. Processes that allow for consultation between site management and the resident workers will assist in the smooth running of an accommodation site. These may include a dormitory or camp committee as well as formal processes that allow workers to lodge any grievances about their accommodation;
- Mechanisms for **workers' consultation** will be designed and implemented. As is best practice a review committee which includes representatives elected by workers will be established. Processes and mechanisms for workers to articulate their grievances will be provided to workers. Such mechanisms to be in accordance with PR2;
- Workers subjected to disciplinary proceedings arising from behaviour in the accommodation will have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities;
- In case of conflicts between workers themselves or between workers and staff break out, workers will have the possibility of easily accessing a fair conflict resolution mechanism;
- In cases where more serious offences occur, including serious physical or mental abuse, there will be mechanisms to ensure full cooperation with the police authority (where adequate).

Worker accidents

- Emergency Preparedness Plan for accidents response for the construction stage will be developed by Contractor/s and approved by PERI;
- Occupational Health and Safety Plan will be developed by Contractor/s and accepted by PERI;
- Implementing strict and enforceable safety practices. The general contractor and all subcontractors on the site will be required to provide a reasonably safe work environment and to warn employees of hazards there. They must hire responsible personnel to coordinate job safety, and to supervise compliance with legal rules and regulations;
- Construction Safety Plan will be developed by Contractor/s and approved by PERI

OPERATIONAL PHASE

At the railway operation stage PERI will update the **Emergency Preparedness Plan** and **Safety Program** according to the best international practices, including:

- Regular reporting on implementation of these plans on a quarterly (for the first year of construction) and semestral basis (for the second and third years of occurring (green zone working) or if blocking the line is not possible using an automatic warning system;
- PERI to provide adequate training, equipment, safety conditions or take other steps which are necessary for railroad workers to do their jobs safely;
- Segregation of stabling, marshalling and maintenance areas from running lines;
- Railway workers should schedule rest periods at regular intervals and during the night to the extent feasible, to maximize the effectiveness of rest breaks and in accordance with international standards and good practices for work time in order to avoid fatigue of workers and accidents);
- Emergency Preparedness Plan and Safety Program must includes and consider following:
  - *Safe premises - surfaces, structures and installations should be easy to clean and maintain, and not allow for the accumulation of hazardous compounds. Buildings should be structurally safe, provide appropriate protection against the climate, and have acceptable light and noise conditions;*
  - *Safe machinery and materials;*
  - *Safe systems of work;*
  - *Information, instruction, training and supervision;*
  - *A suitable working environment and facilities (that means the workplace should be equipped with lavatories and showers, potable water supply, clean eating area);*
  - *Access to first aid;*
  - *The frequency of monitoring tol increase in case of receipt of a complaint from the workers on inadequate workplace conditions through operation of the grievance mechanisms for workers;*
  - *The workplace should be designed to prevent the start of fires through the implementation of fire codes applicable to industrial settings. Other essential measures in terms of fire precautions include:*
  - *Equipping facilities with fire detectors, alarm systems, and fire fighting equipment. The equipment should be maintained in good working order and be readily accessible. It should be adequate for the dimensions and use of the premises, equipment installed, physical and chemical properties of substances present, and the maximum number of people present;*
  - *Provision of manual fire fighting equipment that is easily accessible and simple to use.*

7.2.10.2 ASSESSMENT OF RESIDUAL EFFECTS

Sensitivity of this receptor is high. The mitigation described within this subchapter and those within Community health and safety and Community tensions are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

Accidents on work

It was estimated that magnitude of this impact without mitigation measures will be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***slight negative.***

OPERATIONAL PHASE

Railway workers safety during operation of railway

It was estimated that magnitude of this impact without mitigation measures will be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in the same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***slight negative***.

7.2.11 QUALITY OF LIFE

7.2.11.1 MITIGATION MEASURES

CONSTRUCTION PHASE

The quality of the inhabitants' lives will potentially be seriously affected both during construction of the railway due to dust, noise, vibrations, safety issues and alteration of the landscape.

In order to minimize negative impacts, the following measures will be taken before and during construction:

- Construction site, transportation routes and materials handling sites will be water-sprayed on dry and windy days, especially relevant to sites and routes near residential, commercial and business areas. A **dust management plan will be implemented;**
- If crushing of construction material or waste is required, crushers would be located away from sensitive receptors;
- Vehicles and construction machinery will be required to be properly maintained and to comply with relevant emission standards and to reduce the leakages of motor oils and dispersion of pollution in waters and soil (The maintenance will be provided by the professional service company);
- Restriction of the vehicle speed within the construction location, access roads and settlements;
- Construction materials will be stored in appropriate places covered to minimize dust;
- Vehicle loads likely to emit dust will be covered;
- Usage of protective masks for the workers if the dust seems to be appearing;
- Information to the public about the construction works would be announced through the local radio/TV station for carefully low speed driving near the construction location (especially important for Kumanovo and Kriva Palanka within the urban settlements);
- Methods and equipment will be used to minimize noise during execution of foundation works, especially when working in densely populated areas as Kriva Palanka and near preservation-worthy buildings and cultural heritage. Methods to minimize the noise level such as using less machines at the same time for the work will be implemented if appropriate;
- The construction work should not be permitted during the night-time; the operations on the site shall be restricted to the hours 7.00 -19.00 h;
- The vehicles that are excessively noisy due to poor engine adjustment, damage to noise amelioration equipment shall not be operated until corrective measures have been taken;
- There will be a strict permissible speed for heavy mechanization vehicles and predetermined routes for passing near the settlements;
- The local residents will be kept informed of the planned works;

- The location of noisy equipment will be chosen as far as possible away from sensitive receptors (houses, workplaces, schools and hospitals);
- The workers will be provided with ear protection devices (ear muffs and/or ear plugs);
- Good management practices for the distribution of the heavy noise equipment along the route will be implemented, to avoid the cumulative noise issues;
- The construction work will as much as possible be organised in a manner where noise is limited as much as possible, e.g. work should be performed during day time in the populated areas and should be announced ahead in good time;
- In cases where the very noisy work has to go on at night or during a longer period than one day in a place, a noise shield will be erected around the working area;
- Methods and equipment which are minimizing noise during execution of foundation works should be utilized, especially when working in densely populated areas as Kriva Palanka and near preservation-worthy buildings and cultural heritage;
- Monitoring of vibrations during performance of critical working processes will be undertaken. Buildings which are within a distance of 20-30 meters from the area where the foundation of piles and catenary masts take place will be monitored during the works;
- Damaged buildings will be repaired or compensation paid if damage occurs as a result of the effects of vibration;
- Before construction work is initiated, the houses nearby the area where the foundation of piles and catenary masts will take place will be photo registered for later documentation of any damages, which the work may have caused. During the construction work, monitoring of vibrations during performance of critical working processes will be undertaken. Buildings which are within a distance of 20-30 meters from the area where the foundation of piles and catenary masts take place should be monitored during the work;
- Traffic management plan to be developed and implemented.

OPERATIONAL PHASE

Operational phase of the railway will expose the inhabitants to noise and vibrations in addition to electromagnetic fields caused by electric traction. The communities close to the railway will also be affected by safety issues and an altered landscape.

In order to minimize negative impacts, the following measures will be taken before and during operation:

- Mitigation of noise at the source: The contact between wheels and rails is the biggest cause to noise from railway traffic. Thus, the most efficient measures to reduce the noise level from railway traffic is maintenance of rails, railroad switchgear and other material. The rail and the wheels should be sharpened. Mitigation of noise during dissemination: Noise can be reduced by installing noise reducing material on the wheels and the rails. The material reduces the vibrations and thus the noise. The above two measures can reduce the noise with up to 6 dB;
- Distribution of noise can also be reduced through erecting noise protection shields. The higher the shields are the more they will reduce the noise from the source to the receiver. The noise protection can be a shield which is erected along the rail, a wall of soil or a buried rail. If a buried rail is supplemented with a cover of the railway like a tunnel, the noise can almost be completely eliminated;
- All residences that will be exposed to a noise level which is larger than the maximum permitted levels established by Macedonian legislation will be offered noise protection measures that will be fully financed by the project. Houses can be noise insulated, typically by changing the windows to a noise protection type. Further, ventilation holes can be isolated. In some cases, it may be necessary to protect the whole wall by erecting a glass wall on the outside of the existing house wall. Anti-noise

walls/barriers, house insulation and triple glazing in the windows should be implemented as mitigation measure for houses affected by noise caused by railway;

- There are only limited possibilities for reducing the vibrations, which are caused by railways. The vibrations from the trains can to some extent be reduced by ensuring continuously maintenance of wheels and rails. During construction of the railway line, it will be ensured that likely vibrations are limited as much as possible by inter alia installing protection material below the rails;
- The only possible measure to reduce the risk from electromagnetic field is to ensure that newly constructed railway is at a distance of 10 meters to the residences.

7.2.11.2 ASSESSMENT OF RESIDUAL EFFECTS

The mitigation measures described above are intended to avoid or minimize the following impacts:

CONSTRUCTION PHASE

- Impairment of quality of life due to the overall presence of annoying construction works and activities: dust emissions, high noise level, vibrations, safety risks and altered landscape

Sensitivity of Quality of life as receptor to change was assessed as high.

Dust

It was estimated that the magnitude of this impact without mitigation measures will be of a low negative nature. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. Due to a linear "construction" site of this size the magnitude of the impacts with the implementation of mitigation measures remains same, low negative. The significance *of the residual effect is then **slight negative.***

Noise

It was estimated that magnitude of this impact without mitigation measures will be medium negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***moderate negative***.

Vibrations

It was estimated that magnitude of this impact without mitigation measures will be medium negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***moderate negative.***

Safety

It was estimated that magnitude of this impact without mitigation measures will be medium negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes low negative. The significance of the residual effect is then ***moderate negative.***

Alteration of landscape

The magnitude of these impacts without mitigation measures was estimated to be low negative. No additional specific mitigation measures will be undertaken.

OPERATIONAL PHASE

- Impairment of quality of life due to the presence of annoying railway operations: High noise, vibration and electromagnetic levels in houses close to the tracks and altered landscape.

Noise

It was estimated that magnitude of this impact without mitigation measures will be high negative especially for the residents living close to the railway. Noise during operation of diesel traction in Section 1 will be higher then electric traction thus the magnitude will be very high especially for residents living close to the railway. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is then ***moderate negative***.

Vibrations

It was estimated that magnitude of this impact without mitigation measures will be high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is then ***moderate negative***.

Safety

It was estimated that magnitude of this impact without mitigation measures will be high negative. The probable success of the mitigation measures is considered to be high; the proposed mitigation measures have been successful in same circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is then ***moderate negative***.

Electromagnetic fields

It was estimated that magnitude of this impact without mitigation measures will be high negative. The probable success of the mitigation measures is considered to be moderate; the proposed mitigation measures have been successful in different circumstances with the same type of aim. The magnitude of the impacts with the implementation of mitigation measures becomes medium negative. The significance of the residual effect is then ***slight negative***.

Altered landscape

The magnitude of these impacts without mitigation measures was estimated to be low negative. No mitigation additional measures will be undertaken.

7.2.12 ASSESSMENT SUMMARY TABLE

The findings of the assessment are summarised in the following table for each impact identified and assessed in each phase namely; Construction Phase and Operational Phase.

Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
CONSTRUCTION PHASE												
Land and Property												
Temporary land loss (Sections 1, 2 and 3		N	D	R	L	I	MT	C	Low	Slight negative	High	Neutral/Slight negative
Livelihoods (from temporary land loss)		N	I	R	L	I	MT	C	Low	Slight negative	High	Neutral/Slight negative
Effects on residents from loss of gardens and community land and effects on agricultural production (from temporary land loss)		N	I	R	L	I	MT	C	Medium	Slight negative	High	Neutral/Slight negative
Loss of housing (including physical displacement (for Section 3)		N	D	I	L	I	MT	C	High	Large negative	High	Moderate negative
Permanent land loss (for section 3)		N	D	I	L	I	MT	C	High	Large negative	High	Moderate negative
Community Health and safety												
Impacts from influx of temporary workers		N	D	R	L	I	MT	C	Low	Slight negative	High	Neutral/Slight negative
Impacts from increased community exposure to disease		N	D	I	R	I	MT	C	High	Large negative	Moderate	Moderate negative
Impacts from increased traffic and heavy vehicles on local roads during construction		N	D	I	R	I	MT	C	High	Large negative	High	Slight negative
Safety issues associated to the entrance of non-authorized people on the construction site		N	I	I	R	I	MT	P	Medium	Moderate negative	High	Neutral
Community tensions												
Effects of influxes of workforce into local communities		N	D	R	L	I	MT	P	Low	Slight negative	Moderate	Neutral/Slight negative
Community reactions due to disturbance arising from the construction works		N	D/I	R	R	I	MT	C	High	Large negative	High	Moderate negative
Access&Severance												

Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Impacts on access and severance effects		N	I	R	L	I	MT	P	Low	Moderate negative	High	Neutral/Slight negative
Disruption of utilities												
Effects of utility cuts on local businesses and communities		N	D	R	L	I	MT	P	Low	Slight negative	High	Neutral
Economy												
Stimulation of economic growth at local levels		P	D	R	L	I	MT	C	High	Large positive	Moderate	Large positive
Employment												
Creation of local employment (direct and indirect)		P	D/I	I	N	I	MT	C	High	Large positive	Moderate	Large positive
Education and Training												
Capacity building through training		P	I	I	R	I	MT	P	Low	Slight positive	Moderate	Moderate positive
Vulnerable groups												
Section 1 “Pero Cico” settlement losing of space in front of their houses		N	D	I	L	I	LT	C	Low	Large negative	Moderate	Moderate negative
Section 3, losing of land and properties		N	D	I	L	I	MT	C	High	Large negative	High	Moderate negative
Workforce Related impacts												
Accidents on work		N	D	R/I	L	I/D	MT	P	High	Large negative	High	Slight negative
Communities “Quality of Life” **Impairment of quality of life due to the overall presence of annoying construction works and activities: dust emissions, high noise level, vibrations, safety risks and altered landscape**												
Dust		N	D	R	L	I	MT	P	Low	Moderate negative	Moderate	Slight negative

Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Noise		N	D	R	L	I	MT	C	Medium	Large negative	Moderate	Moderate negative
Vibrations		N	D	R	L	I	MT	C	Low	Large negative	Moderate	Moderate negative
Safety		N	D	R	L	I	MT	C	Medium	Large negative	High	Moderate negative
Alteration of landscape		N	D	R	L	I	MT	C	Medium	Large negative	/	/
OPERATIONAL PHASE (Stage 1) Operation of Section 1 Kumanovo to Beljakovce Only with Diesel Traction The fact the railway is operated under diesel or electrical power does not create differential impacts in social receptors												
OPERATIONAL PHASE (Stages 2/3) Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 Kumanovo to Bulgarian border (Deve Bair) using Electric Traction												
Land and Property												
Effects on livelihood (start at the construction phase)		N	D	I	L	D	LT	C	Low	Neutral	High	Neutral/Slight negative
Effects on residents from loss of gardens and community land and effects on agricultural production/activity (started at the construction phase)		N	I	I	L	D	LT	P	Low	Slight	Moderate	Neutral/Slight negative
Community Health and safety												
Impacts from better access to the larger towns and health services located in larger towns/cities		P	D	I	R	I	LT	C	High	Large	Moderate	Large positive/
Safety issues associated with crossing of rail track		N	D	I	R	D	LT	C	High	Large	Moderate	Slight negative
Community tensions												
Community reactions due to disturbance arising from operation of railway		N	D	I	L	D	LT	C	High	Large	Moderate	Moderate negative
Access&Severance												

Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Impacts on access and severance effects of general public, community services and business sector in communities at or close to the railway line		N/P	D	I	L	D	LT	P	Low	Slight	High	Moderate negative
Disruption of utilities												
Effects of diversions of utilities on local businesses and communities		N	D	R	L	D	LT	U	Negligible	Neutral	/	/
Economy												
Effects on local economy,		P	I	I	L	D	LT	C	High	Large	Moderate	Large positive
Effects on North-eastern Macedonian economy,		P	I	I	R	D	LT	C	High	Large	Moderate	Large positive
Effects on National economy		P	I	I	N	D	LT	C	High	Large	Moderate	Large positive
Effects on European Regional economy		P	I	I	G	D	LT	C	High	Large	Moderate	Large positive
Employment												
Creation of employment (direct and indirect) at local, regional, national and transboundary (through much or all of Macedonia and Bulgaria) and global level (beyond SEE area)		P	D/I	I	G	D	LT	C	High	Large	Moderate	Large positive
Improvement in access to employment opportunities across the region		P	D	I	N	D	LT	C	High	Large	Moderate	Large positive
Education and Training												
Education and training benefits from employment opportunities		P	I	I	R	D	LT	C	High	Large	Moderate	Large positive
Education and training benefits from improved access to education and employment opportunities		P	I	I	N	D	LT	P	High	Large	Moderate	Large positive
Vulnerable groups												
Section 1 “Pero Cico” settlent residing along the track		N	D	I	L	D	LT	C	High	Large	Moderate	Moderate negative

Social Aspect	Potential Impact(s)	Characterization of Impact:	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Workforce Related impacts												
Railway workers safety during operation of railway		N	D	R/I	L	D	LT	P	High	Large	High	Slight negative
Communities "Quality of Life" **Impairment of quality of life due to the presence of annoying railway operations: High noise, vibration and electromagnetic levels in houses close to the tracks and altered landscape.**												
Noise		N	D	I	L	D	LT	C	High	Large	Moderate	Moderate negative
Vibrations		N	D	I	L	D	LT	C	High	Large	Moderate	Moderate negative
Safety		N	I	I	L	D	LT	C	High	Large	High	Moderate negative
Electromagnetic fields		N	D	I	L	D	LT	C	High	Moderate	Moderate	Slight negative
Altered landscape		P	I	I	L	D	LT	C	Low	Neutral	/	/
LEGEND Characterization the impact: Positive (P), Negative (N) Type of Impact: Direct (D), Indirect (I), Cumulative (C) Reversibility: Reversible (R) Irreversible (I) Geographic extent: Local (L), Regional (R), National (N), Transboundary (T), Global (G) Time when the impact occurs: Immediate (I), Delayed (D) Duration: Short-term (ST), Medium-term (MT), Long-term (LT) Likelihood of appearance: Unlikely (U), Probable (P), Certain (C) Magnitude: Negligible/No change, Low, Medium, High Significance: Very Large, Large, Moderate, Slight, Neutral												

Table 7-2 Summarised assessment for each social impact identified

7.3 CUMULATIVE, SYNERGY AND TRANSBOUNDARY SOCIO-ECONOMIC IMPACTS

The following chapter presents the assessment of the impacts on each environmental and social resource/receptor where cumulative (additive and synergistic) and transboundary effects may occur as a result of the Railway Project (Railway Corridor VIII-Eastern Section) in combination with other past or existing projects or reasonably foreseeable projects. The cumulative and transboundary effects for combined actions within the same project have been taken into account in *Chapter 6* and are considered in this chapter as well.

The assessment in this chapter is made of the residual effects after the application of the mitigation measures and for the operational phase of the projects. Only when the effects during the construction phase may have long lasting effects (e.g. destruction of cultural heritage), an assessment of the cumulative impact has been carried out.

Likewise, in the assessment of the cumulative and synergistic effects, the combined effects will be normally treated as additive and referred to as cumulative effects since the synergistic results of combined effects are often complex to assess and require a detailed knowledge of the causing actions, which is not the case in this assessment for the other projects.

7.3.1 EXISTING AND FORESEEN PROJECTS IN THE RAILWAY PROJECT AREA

The identified past, present and reasonably foreseen projects in the area of the Project (Railway Corridor VIII-Eastern Section), which may give rise potentially to cumulative and/or transboundary effects are the following:

1. Existing Kriva Palanka, Kratovo, Kumanovo and Skopje natural gas pipeline and planned connecting pipelines.
2. Planned construction of the Vakuf water reservoir in Kratovo Municipality
3. Planned construction of the new motorway/highway Kumanovo - Bulgarian border.

A brief description of each project is provided below

Existing and projected gas pipelines

The existing natural gas pipeline system in Macedonia is a part of the Russian transit pipeline that goes through the Ukraine, Romania and Bulgaria and is constructed to fulfil the needs of Turkey, Greece and the former republics from Yugoslavia. The Macedonian part of the pipeline connects with the Bulgarian part of the gas pipeline in the border region of Deve Bair (see *Figure 7-1*).

The technical characteristics of the constructed natural gas pipeline system are as follows:

- Designed capacity 800 x 106(Nm^3) per year
- Designed pressure 54 bar
- Inlet pressure in the high pressure pipeline 40 bar

The gas pipeline runs through the municipalities of Kriva Palanka, Kratovo, Kumanovo and Skopje, but only 15 % of the total capacity of the system is used, which is significantly low considering the potential that gas offers as energy for heating and production of electrical energy. From the point of view of the regional development, the strategy of gas usage is highly supported and considered as very important for the development of the region.

Proposed natural gas pipelines in the area of the Railway Project include a gas pipeline connecting the south of Macedonia with the East-West Kriva Palanka-Kratovo-Kumanovo-Skopje main pipeline, at the population of Klecevce (approximately between K.P. 22 and K.P. 25 of the railway alignment).

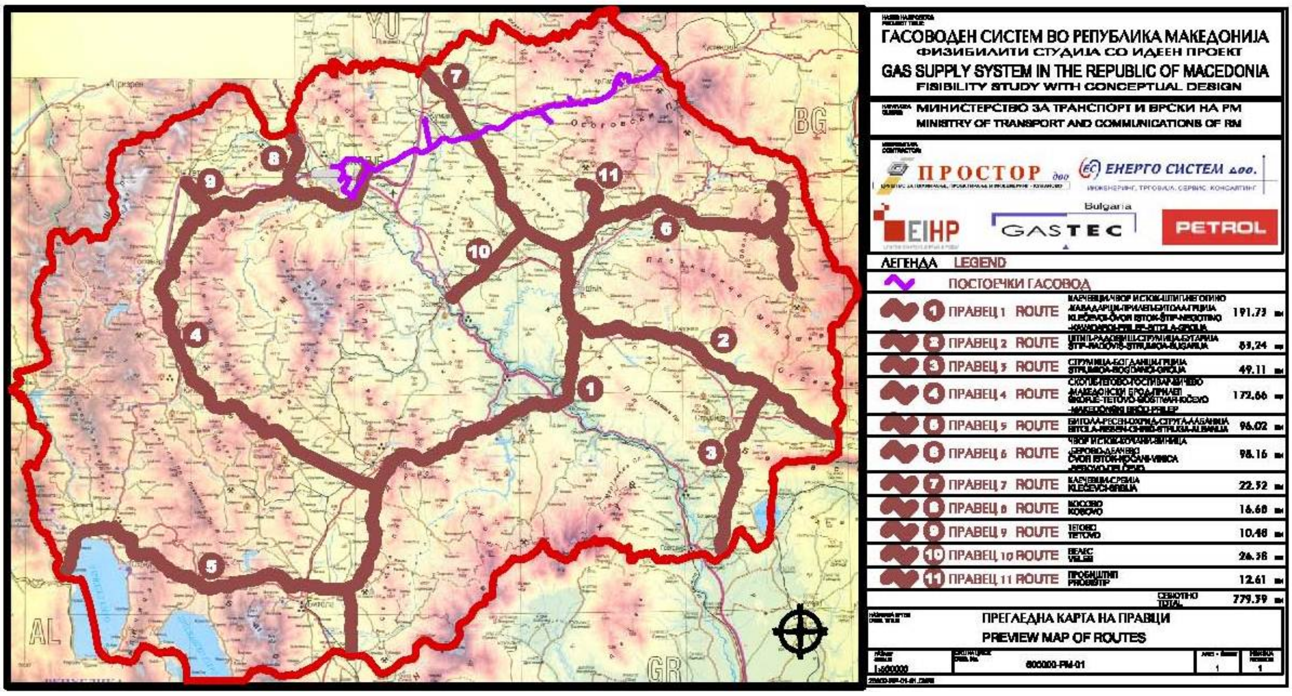


Figure 7-1 Existing natural gas pipeline and foreseen extensions of the natural gas pipeline network

With regards to the branch that connects the main East-West pipeline with Kratovo, there was a conflict about the crossing of the two routes - the natural gas pipeline route and the planned railway alignment at K.P. 52.00+948 km (near the tunnel No. 9 in Section 2, which is not constructed yet) near the village of Krilatica. The route of the natural gas pipeline was located taking into account the railway alignment and the technical possibilities of the terrain (shown in *Figure 7-2*).

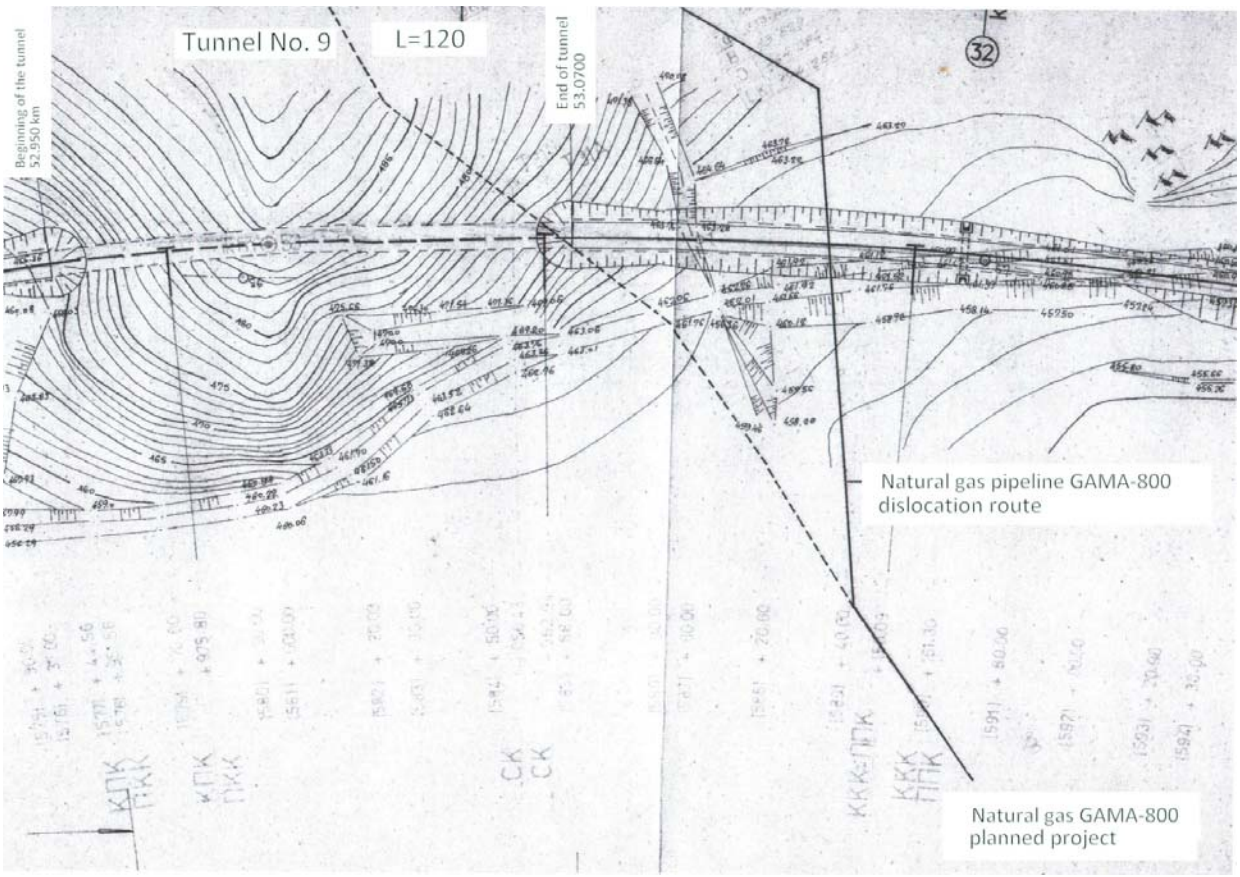


Figure 7-2 Crossing of the gas pipeline and the railway alignments

Vakuf water reservoir

The data and information on this project was obtained from the Spatial Plan of the Republic of Macedonia with regards to planned dams until 2020.

The Vakuf water reservoir belongs to the Water Management area of Pcinja and is planned on the Kriva river. It will be a multipurpose dam for water supply, irrigation, energy supply, and flood protection. The planned capacity is 146 million cubic meters of water and the water reservoir will cover 630 ha of land.

The railway alignment will cross the Kriva river at the area of the dam (at K.P. 41+350) by means of a very high level bridge, about 60 meters above the river. The alignment will then border the southern shore of the reservoir up to K.P. 53+000), as shown in *Figure 7-3*.

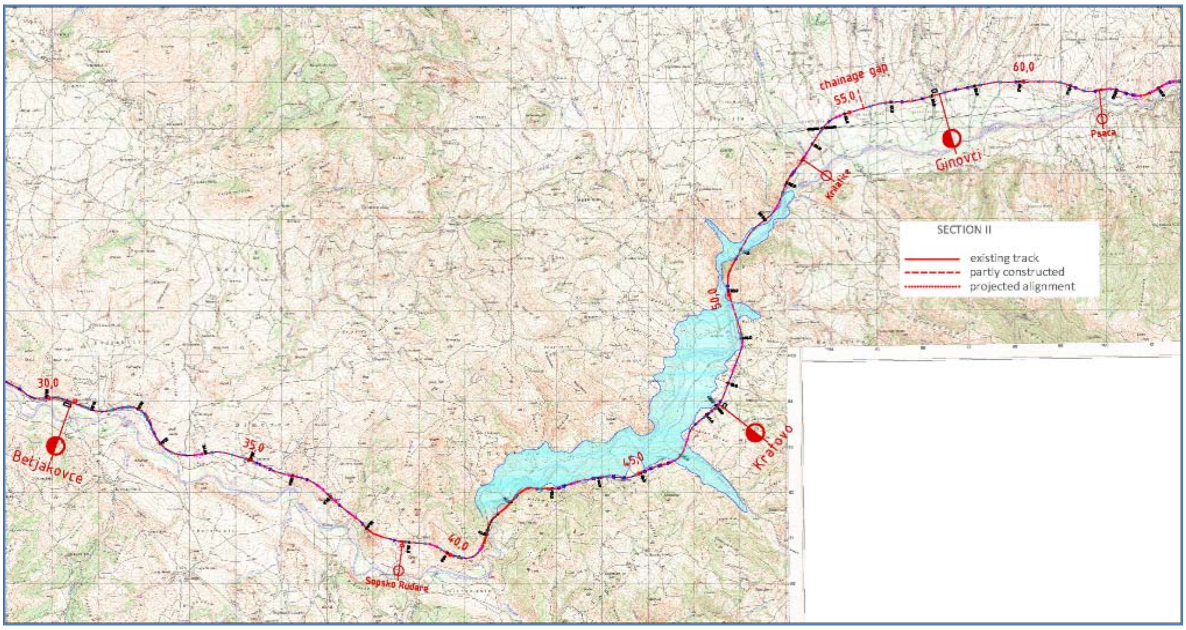


Figure 7-3 Planned Vakuf water reservoir and railway alignment (section 2)

Another water reservoir will also be planned upstream of the Vakuf reservoir along Section 2 of the railway alignment, positioned on the rivers Raska and Kriva, but this is a plan beyond year 2020 and no information is available yet on its capacity and usage purposes. Therefore, it has not been considered in this assessment.

Planned Motorway Corridor VIII

This motorway, as part of Transport Corridor VIII, will run between the populations of Kumanovo and Kriva Palanka and up to the border with Bulgaria in Deva Bair.

Figure 7-4 shows the route of the planned motorway.

Transboundary effects caused by the border tunnel

The Border tunnel at the end of Section 3 has a total length of 2,350 m. The Macedonian part of this tunnel will be 1,150 m long, and the reconstructed of this 1,150 m section forms part of this project. The remaining 1,200 m of the tunnel will be the responsibility of Bulgaria, and does not form part of this project. Given the practicalities of reconstructing this tunnel, the detailed design of this border tunnel will be prepared in coordination with the Bulgarian railway authorities during the design phase. The effects of the 1,150 m of the border tunnel in Macedonia have been considered as part of the assessment of the effects of all the tunnels and other railway structures which are present in Section 3.

In accordance with ESPOO Convention requirements, a Notification Letter will be submitted to the Bulgarian Authorities regarding the railway project, which is to include details on the reconstruction of the Macedonian part of the border tunnel between Macedonia and Bulgaria.

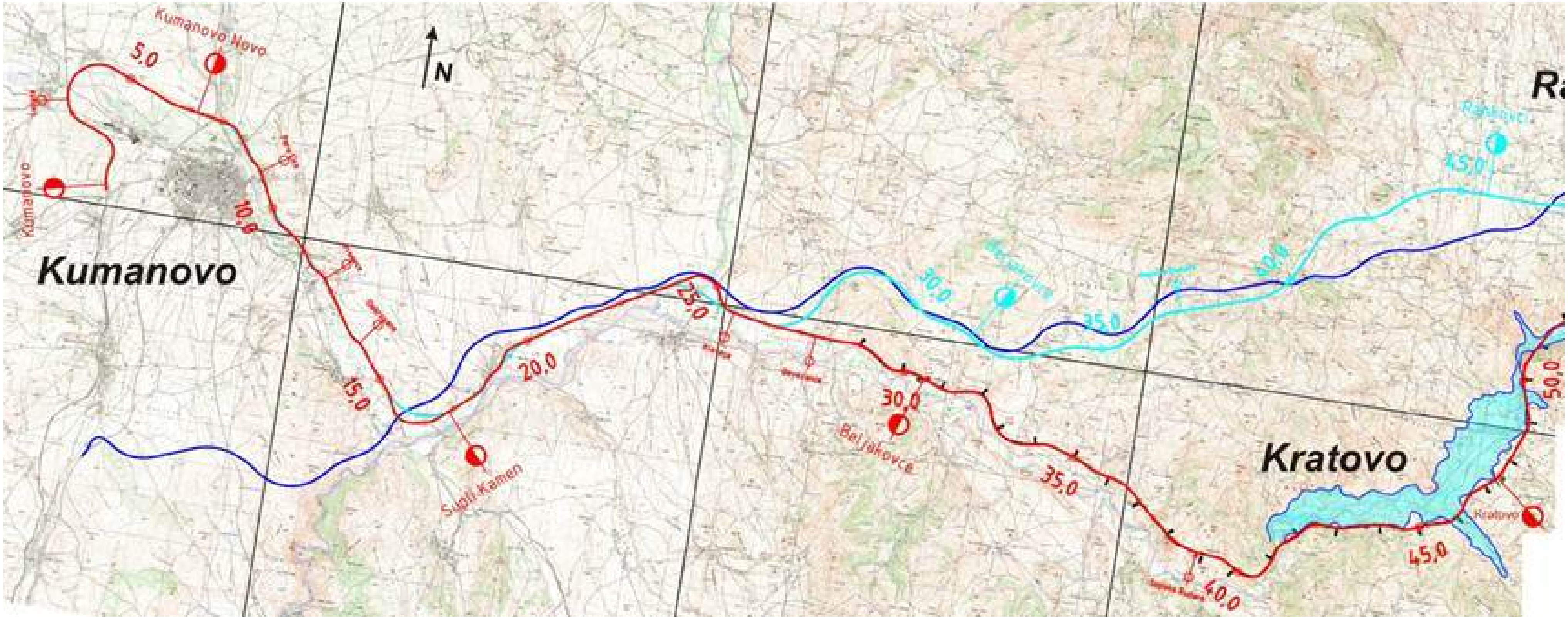


Figure 7-4 Planned railway alignment (in red) and planned motorway (in blue).

Figure 7-5 Planned railway alignment (in red) and planned motorway (in blue).

7.3.2 ASSESSMENT OF CUMULATIVE IMPACTS

For the assessment of cumulative effects, the likely cumulative impacts arising from each of the projects identified in the previous section are identified in a matrix as follows:

Environmental Receptor/Resource	Gas pipeline	Vakuf water reservoir	Motorway
Soil quality			✓
Soil erosion			✓
Surface water quality			✓
Surface water flow patterns and sediment deposition		✓	✓
Groundwater quality			✓
Air quality	✓		✓
Noise and vibrations			
Landscape		✓	✓
Flora	✓		
Fauna		✓	✓
Habitats	✓	✓	✓
Protected and Designated Areas	✓	✓	✓
Cultural Heritage	✓		✓
Social Receptor/Resource			
Land and property		✓	✓
Community Health, Safety and Security			
Community Tensions			
Access &Severance Effects			
Disruption of utilities			
Economy (local, regional, national, global)	✓	✓	✓
Employment	✓	✓	✓
Education &Training			✓
Vulnerable groups			
Workforce related impacts &issues			
Communities Quality of Life	✓	✓	✓

Table 7-3 Assessment of cumulative effects

For each receptor where cumulative impacts with other projects are identified, an explanation of the expected combined effect is provided below, with an estimation of the significance of the residual cumulative effect based on the significance criteria established in *Chapter 4.6.3*.

Cumulative impacts on soils

Impacts on *soil quality* were considered as cumulative since there are various actions such as the maintenance of the railway line and the contaminants released from passing trains where hazardous substances are released into soil. Among the projects in the area of the railway project, the motorway could also cause some soil pollution from deposition on the sides of the motorway of substances emitted from the car exhausts and wheel abrasion particles. This effect would be potential cumulative between K.P. 15 and K.P. 27 and K.P. 55 to the Bulgarian border, where the road and railway alignments run in parallel and are relatively close to each other.

With regards to *soil erosion*, the construction of the motorway, like that of the railway, will also leave exposed cuttings and banks, where the lack of vegetation will foster erosion processes, which should be mitigated with adequate reinstatement measures, including revegetation. Again, this cumulative effect will mainly occur between K.P. 15 and K.P. 27 and K.P. 55 to the Bulgarian border.

The significance of the residual cumulative effects on soil quality and soil erosion is expected to be of a slight negative nature as they may be distinguishable but they are of a low magnitude, geographically limited, and not disruptive to normal baseline environmental conditions.

Cumulative impacts on surface waters

With regards to *surface water quality*, the railway project has a cumulative impact since surface water may become polluted from the arrival to water bodies of contaminants generated from mobile and fixed elements of the railway system during traffic of trains and during track and right of way maintenance activities. The motorway will have a cumulative effect since it crosses or runs parallel to several water courses that are also affected by the railway alignment and adds to them its effluents, mainly runoff from the road surface with hazardous contaminants from leaks of the passing cars and wheel abrasion processes. With mitigation measures in both the railway and motorway projects, the significance of the residual cumulative impact is expected to be of a slight negative nature; they may be distinguishable but of a low magnitude, geographically limited, and not disruptive to normal baseline environmental conditions.

As for the impacts on the *flow patterns and sediment deposition*, the impact was not considered as cumulative for the railway project since flow and sediment deposition modifications would occur because of the presence of the railway structures, but will be cumulative in combination with the motorway, where drainage works and bridges will have a similar effect as that of the railway in several water courses that are common to both projects.

The modifications in the local flow patterns during flooding periods due a barrier effect were not assessed for the railway project alone since it was determined that such impact would already be occurring in section 1, where between km 17 and 31, some stretches of the railway line were constructed on a critical flooding area (the completion of section 2 and the construction of section 3 does not affect to this area or any other critical flooding area). The construction of the motorway parallel to the railway in section 1 could, however, have a cumulative effect, particularly between km 20 and 25, where the motorway also runs over the alluvial plain. Thus, the railway and the motorway constructed in the flood plain of the river will occupy a larger space that is no longer available for the water to expand during flooding periods and may cause modifications in the local flow patterns during flooding periods.

However, this cumulative effect has to be taken into account in combination with the Vakuf water reservoir. It is assumed this latter project will have a major impact on surface water flows downstream of the dam, since one of its main purposes is flood regulation, and also in sediment deposition. The contribution of the railway and the motorway will be insignificant compared to that of the dam, and therefore the significance of the cumulative impact neutral.

Cumulative impacts on groundwater

Potential *contamination of groundwater* from contaminants deposited on soil and leaching towards the groundwater table could have a cumulative effect in combination with the motorway, particularly between K.P. 15 and K.P. 27, where both alignments run parallel on alluvial and colluvial areas where the groundwater table is likely to be shallow. With adequate mitigation measures implemented in both projects, the significance of the residual effect on groundwater quality should be of a slight negative nature; it could be distinguishable but of a low magnitude, geographically limited, and not disruptive to normal baseline environmental conditions.

Cumulative impacts on air quality

Cumulative effects on *air quality* will be created from the combination of the railway project and the motorway and gas pipeline projects. Traffic of light and heavy vehicles in the railway will generate combustion emissions that will be added to that of the diesel trains during Stage 1 in Section 1. The cumulative effect will be most important between K.P. 15 and K.P. 27, particularly in the settlement of Shupli Kamen.

In the seldom event with the gas pipeline it is overpressure, the gas is released into the atmosphere through the safety valves installed along the pipeline section affected. The sudden release of natural gas would lead to pollution of the atmosphere (mainly methane), albeit limited in time and space, because the release of gas stops as soon as the pressure in the pipeline is below the design pressure.

The significance of the residual effect on air quality should be slight; it will be distinguishable and limited in space and time (with regards to the railway project it will be limited to Stage 1).

Cumulative impacts on noise and vibrations

Cumulative effects on *acoustic quality* will be created from the combination of the railway project and the motorway, especially between K.P. 15 and K.P. 27 and K.P. 55 to the Bulgarian border, where the road and railway alignments run in parallel and relatively close to each other and close to important populations like Shupli Kamen and Kriva Palanka. However, with the implementation of mitigation measures in both railway (stages 1 and 2) and motorway project, the significance of the residual cumulative effect should be of a slight negative nature.

As for *vibration effects*, none of the other projects are considered to produce major vibration effects during the operational phase. No cumulative impacts are therefore likely to occur.

Cumulative impacts on landscape

A major landscape modification will certainly be introduced by the Vakuf water reservoir, where the water surface will occupy a large extension of land and the landscape formed by the Kriva river flowing boxed in by the surrounding mountains will be partly covered by the water. This will occur between K.P. 41+350 and K.P. 53+000 where the railway running along the southern shore of the reservoir will also contribute, modestly, to the landscape modification. The motorway, on the other hand, will introduce landscape changes that will accumulate to that of the railway between K.P. 15 and K.P. 27 and K.P. 55 to the Bulgarian border.

The significance of the residual cumulative effects on the landscape if the water reservoir is constructed is considered to be large, albeit most of it will be attributable to the water reservoir.

Cumulative impacts on flora

The impact on flora evaluated for the operational phase of the railway is that of the effects of herbicides used in right of way maintenance. Herbicides could also be used to maintain the right of way of the gas pipeline, which has to be devoid of vegetation, especially of long rooted plants.

The cumulative effect of both projects will mainly occur in the riparian and water vegetation of those water courses intersected by both alignments. The significance of the cumulative residual effect on vegetation due to the use of herbicides will be slight; it could be distinguishable but of a low magnitude, geographically limited, and not disruptive to normal baseline environmental conditions.

Cumulative impacts on fauna

The railway project has a cumulative impact on fauna populations levels due to the killing of animals by the traffic of trains or by the fixed physical structures associated to the railway, and by driving off of individuals due to the effects of train traffic. A similar effect will have the motorway due to crushing and collisions and due to drive off effects. This impact will be accumulative especially between K.P. 15 and K.P. 27 and K.P. 55 to the Bulgarian border, where both alignments run in parallel close to each other likely affecting to the same populations of animals. Mitigation measures for both projects should be similar with regards to their nature and effectiveness. The significance of the residual cumulative effects is considered to be of a potential moderate adverse nature.

Cumulative impacts on habitats

If the Vakuf water reservoir is built, it will create a major fragmentation of the habitats, which will be added to the relatively modest one of the railway between K.P. 41+350 and K.P. 53+000 where the alignment runs along the southern shore of the reservoir. In other stretches of the railway alignment the cumulative effect will be in combination with the motorway, between K.P. 15 and K.P. 27 and K.P. 55 to the

Bulgarian border. The cumulative impact will be particularly important between K.P. 55 to the Bulgarian border, where both alignments run in parallel, close to each other, and intersecting important biocorridors for maintaining the biodiversity of the rich areas that surround the railway and motorway alignments corridor to the North and South, namely Osogovo-Bilina Planina and Osogovo-German corridors. Mitigation measures for both projects should be similar with regards to their nature and effectiveness. The significance of the residual cumulative effects is considered to be of a moderate adverse nature.

Cumulative impacts on Protected and designated sites

The four projects (railway, gas pipeline, water reservoir and motorway) cross protected and designated areas. The gas pipeline is not likely during operation to affect these areas unless an accident occurred, which is unlikely if the pipeline is buried.

The Vakuf water reservoir is likely to potentially largely affect IBA River Pcinja-River Petrosnica-River Kriva Reka (IBA Code: MK006) and designated management areas and River Vetunica and Kriva Reka – Beljakovce village. The latter is designated for the management of otter and both of them for the management of birds of prey (e.g. Imperial eagle, Long-legged buzzard) and other birds such as Black stork or Roller. The IBA meets the criteria for the presence of Imperial eagle, Roller and Long-legged buzzard and other important bird species such as Peregrine falcon, Lanner falcon, Short-toed snake eagle, Black stork, Masked shrike. The Vakuf water reservoir will significantly transform the habitat of the area, affecting to the integrity of these designated areas, but not necessarily having an adverse impact on avifauna on the long term; water reservoirs often end up representing rich biodiversity environments, especially for birds.

The railway and motorway projects will have a combined effect on the various designated sites present at the end of the corridor, where they run in parallel and close to each other intersecting ecological corridors Osogovo-Bilina Planina and Osogovo-German that connect Emerald sites Pchinja-German (MK0000029) and Osogovo (MK0000026), a continuation of overlapping Natura 2000 sites Osogovo (BG0002079) and Osogovska Planina (BG0001011) on the Bulgarian side. It is considered that with the implementation of mitigation measures for flora, fauna and habitats in both projects, the significance of the cumulative residual effect on these highly sensitive designated areas will be of a slight adverse nature.

Cumulative impacts on Cultural Heritage

Permanent *destruction of archaeological sites* may occur during the construction phase of the railway project and the motorway project, which may affect to the same resources in those stretches where both alignments run close to each other, thus resulting in a cumulative impact. Also, *plundering of unprotected archaeological sites* may occur as a consequence of an easier access to the area by road and railway. However, with adequate mitigation measures implemented during the construction and operational phases of the railway and motorway project should reduce these impacts to happening, and the significance of the residual cumulative effect is considered therefore to be of a slight adverse nature.

Cumulative impacts on land and property

Motorway and Vakuf water reservoir will have cumulative effects on land and property due to necessity for temporary and permanent land take that will be required for construction of referenced projects especially in Section 3 where motorway will go more or less in parallel with the railway line.

Cumulative socio-economic impacts are mainly associated with further loss of agricultural land and need for resettlement of more families, mainly in Kriva Palanka. The railway will require expropriation of 424,379 m^2 of land, mostly agricultural land while the motorway is estimated to require at least the same portion of agricultural land to be expropriated. Agricultural fields in Supli Kamen, Klevece, Strezovce, Beljakovce, Rugince, Rankovce, Ginovce, Psaca and T’lminci will be affected.

The motorway is planned to go through housing areas in Strezovce, Kriva Palanka and Uzem. A few families would need to be resettled in Uzem while a number of families in both Strezovce and especially in Kriva Palanka would require to be resettled. In Kriva Palanka it is the same housing area that will be affected as with the railway line.

The natural gas pipe line is already constructed, only networking needs to be done but the impacts that this project could have on this receptor is not considered to be cumulative.

Mitigation measures for both projects should be similar with their nature and effectiveness. The significance of the residual cumulative effects is considered to be of a moderate adverse nature.

Cumulative impacts on Economy (local, regional, national, global)

With the construction of the Corridor VIII, vital transport nodes on various international and regional trade routes are going to be established. Together, the railway and the motorway will provide access of the Macedonian economy to the Black See (port Burgas) as an alternative port. The Thessaloniki port in Greece is very often closed causing export losses for Macedonia. In this manner, both infrastructure projects will reinforce positive impact from improved links with sea ports in Bulgaria, Romania, Turkey and Middle East. The North-Eastern region is rich with mines. Presence of raw materials, good transport infrastructure and additionally cheep energy provided with gas pipe line will attract foreign direct investment. To avoid high transport costs in final price of the products many of users of raw materials could decide to reallocate their production in this area. The Black Sea traditionally is tourist destination for Macedonians and people from the region. Both the railway and motorway will improve the mobility of people in the region providing possibilities for increased travelling between countries for different reasons including among many others business and tourism. Construction of the Vakuf reservoir and irrigation of the agricultural land nearby will mean possibility for development of agriculture. The traffic going from Macedonia to Bulgaria and continuing towards Turkey, which is one of the bigger Macedonian economic partners, is expected to increase. This will advance increasing of trade and possibilities for tourism and business of any kind. At the beginning with traditional trade partners of Macedonia like Romania, Ukraine and Russia and later with new countries especially in metal industry where the transport costs contribute a high percentage in the final price.

The local and regional economy will benefit due to the direct economic activity generated by the construction of the projects (employee remuneration; purchase of goods, materials and services etc.) and also the secondary/induced economic activity. The benefits could be seen additionally by entrepreneurial investments, supporting businesses and realisation of opportunities and services linked with both kinds of transportation, and also from the subsequent government taxes generated by all direct and induced economic expenditure. The improved transport infrastructure and better accessibility is likely to increase land values within the vicinity of the transport infrastructure as a result of post construction opportunities. An impact on regional land uses and changed agricultural production could be expected. Future land use planned by the municipalities may change as a result of new possibilities arising.

All these mentioned shows that the three projects together with railway will have cumulative impacts on economy not only locally, regionally and nationally but within the South East Europe region and wider. The significance of the cumulative impact on economy therefore is considered to be of a very large beneficial nature.

Cumulative impacts on Employment

Increasing of employment can be expected during construction phases. However cumulative impacts will occur during operational/functional phases. Beside direct workforce required for maintenance and operation of motorway, railway, gas pipe ine and Vakuf reservoir many possibilities for indirect employment opportunities are expected to arise like motels near motorway, shops, restaurants along the motorway and railway, for tourist services near Vakuf reservoir and similar. But the potentially most significant impact on employment it is expected from development of the economy (mines, agriculture, tourism, and etc). The significance of the cumulative impact on employment is considered to be of a very large beneficial nature.

Cumulative impacts on Education &Training

The railway and motorway will have cumulative impacts on education and training in form of ability of local students to commute more easily, through increased employment opportunities and creation of new educational and training centers as a consequence of the economic growth of the area.

Operation of the railway will improve access to education and employment opportunities not only within North-Eastern region but nationally and globally. Education inclusion of young people aged from 18 will be increased. Employment or training may potentially be increased by improving school attendance. Children and young people need to have access to a wider range of academic and vocational courses to raise overall achievement and increase career choices. Local people will become more employable, so that they can share in the employment opportunities in the wider area.

Better accessibility will promote vocational learning and other opportunities to ensure people, including young people, have access to employment, further education and training opportunities. Opportunity for people to get and remain in the job market will increase, including older people, careers, parents returning to work, and those facing other barriers to employment, such as disability, or ill health.

The significance of the cumulative impact on education and training is considered to be of a large beneficial nature.

Cumulative impacts on Communities Quality of Life

It is considered that the railway together with the motorway will cause impairment of quality of life due to the presence of annoying railway and vehicle operations which will create high noise and vibrations and safety risks. Railway, motorway, gas pipe line and Vakuf reservoir are also expected to have cumulative impacts through improvement of quality of life due to better access to the larger towns and their health services, education and training centres, recreational facilities, etc.; improved economic conditions, higher levels of employment, alternative and cheaper energy, recreational possibilities with construction of Vakuf reservoir, better water supply possibilities etc.

Measurements of the distance from the projected Motorway to the closest houses of the settlements along the stretch from Kumanovo to the Bulgarian border show that dwellings will be as close as right next to the motorway. Especially in the settlements of Strezovce, Rugince, Stracin, Ginovce, T'lminci, Zidilovo, Kriva Palanka and Uzem, dwellings will be at a distance of 0 – 15 meters from the projected motorway.

Settlement	Distance to motorway (meters)
Supli Karmen	325
Klevece	190
Dovozance	480
Strezovce	0
Beljakovce	70
Rugince	10
Stracin	0
Rankovce	40
Ginovce	15
Psaca	450
T'lminci	7
Kriva Palanka	0
Drenja	50
Zidilovo	15
Uzem	0

Table 7-4 Distance of dwellings to motorway along line from Kumanovo to Bulgarian border

The dwellings in the settlements of Supli Karmen, Klevece, Dovozance (to a lesser degree), Rankovce, Ginovce, Psaca, T'lminci, Kriva Palanka, Drenja, Zidilovo and Uzem will be subject to noise and vibrations caused from operation of both railway and the motorway.

Mitigation measures for both projects regarding noise and vibrations should be similar with regards to their nature and effectiveness. The significance of the residual cumulative effects is considered to be of a moderate adverse nature.

Communities along the railway and motorway will be exposed to potential safety risks related with train operation and road traffic. Mitigation measures for both projects regarding safety risks should be similar with regards to their effectiveness. The significance of the residual cumulative effects is considered to be of a moderate adverse nature.

7.3.3 ASSESSMENT OF TRANSBOUNDARY IMPACTS

Potential transboundary environmental impacts are more likely to occur at the area of the railway alignment near the Bulgarian border, and these could include impacts to surface water, groundwater, fauna and protected and designated areas.

With regards to potential transboundary impacts to surface water, these have been discarded since the area were the railway connects with Bulgaria by means of a tunnel corresponds to the border line of two different water sheds, the one in Macedonia sheding its waters towards the Kriva river in the Pcinja water basin, not affecting the Bulgarian watershed.

Regarding potential affects to groundwater, no transboundary aquifers have been identified in the area of the border with Bulgaria at the end of the planned railway alignment. The two main aquifers consist of free water level alluvium aquifers of the Pcinja river (Kumanovo- Katlanovo) and the Kriva river (Kriva Palanka valley), not connected with Bulgaria. On the other hand, the permeability of the rocks in the area near the border of Bulgaria is low and the possibility of major water bearing formations that could extend to the Bulgarian side is low.

For fauna and protected and designated areas, the railway project in the Macedonian side could have a transboundary effect on these receptors since Macedonia and Bulgaria share in the eastern end of the railway corridor an important territory hosting a rich biodiversity used by several highly sensitive species of birds and mammals (as well as other fauna and vegetal formations), which move across without knowing of frontiers. Among the sensitive species that use this territory there are European priority species such as the grey wolf, whose presence in these areas is certain, and the brown bear, whose presence in the project area is rare and usually comes from the Bulgarian side, where this species is present in overlapping Natura 2000 sites Osogovo (BG0002079) and Osogovska Planina (BG0001011). On the other hand, the aim of the equivalent sites in the Macedonian side, Emerald sites Pchinja-German (MK0000029) and Osogovo (MK0000026) together with the ecological corridors Osogovo-Bilina Planina and Osogovo-German is the establishment of sound bear populations in the future as well as the preservation of other important fauna and flora species. As discussed in chapter 6.2, the railway alignment could cause a decrease in the fauna populations due to direct killing and a habitat fragmentation effect that could eventually affect the populations in the Bulgarian side and the integrity of the Natura 2000 sites[2]. However, the own features of

[2] Several European and North American studies and articles indicate that many wildlife species are victims of collisions with trains, including mammals (from small rodents to large ungulates and carnivores), birds (birds of prey seem especially vulnerable), and amphibians (mainly toads and frogs). With regards to priority species present in the Project area, human caused grizzly bear (*ursus arctos*) mortalities recorded between 1990 and 2010 in Mountain National Parks (Canada) showed that 35% (n=52) of the deaths were due to railway collisions.

Some of the main sources used include:

- The Impacts of Railroads on Wildlife, Edgar A. van der Grift, Road RIPorter, November/December 2001, Volume 6 #6, http://www.wildlandscpr.org/road-riporter/impacts-railroads-wildlife.
- Bird mortality in a stretch of railway (Mortalidad de Aves en un Tramo de Línea de Ferrocarril), Roberto de la Peña Leiva and Óscar Llama Palacios, SEO Birdlife, Grupo local SEO-Sierra de Guadarrama, December 1997.
- Bear Management in the Rocky Mountain National Parks, Parks Canada, September 2011, http://www.pc.gc.ca/docs/v-g/oursgest-bearmanag/sec2/CP.aspx.

the railway structure in the eastern end of the alignment, with a large number of tunnels and bridges together with the mitigations measures defined in Chapter 7 are expected to maximize the permeability of the railway line and thus minimize the fragmentation effect in the Macedonian side. The potential effects on the Bulgarian side are likely therefore to only be slightly distinguishable.

Potential transboundary social impacts are expected to occur along the railway alignment not only near the Bulgarian border but wider. It can be expected that increased trade and free movement of goods, people and services will cause tranboundary social impacts. The railway will increase the overall capacity of the Balkan transport network. This will reduce regional economic costs associated with driver delay and possible traffic congestion.

The most important transboundary impacts potentially will be the impact on economy (already elaborated above) and Communities Quality of life. In providing new opportunities for people to travel, the railway will help to break down old cultural divisions and expand social exchange for ordinary people. This could be treated as a gateway through which individuals could expand their network of social exchange beyond their town and country to the wider world. Railways bring diverse communities, regions and countries together.

The significance of the residual effects for the cumulative and transboundary impacts has been evaluated as follows:

Environmental Receptor/Resource	Gas pipeline	Vakuf water reservoir	Motorway	Significance of cumulative residual effects	Significance of transboundary effects
Soil quality			✓	Slight Negative	None
Soil erosion			✓	Slight Negative	None
Surface water quality			✓	Slight Negative	None
Surface water flow patterns and sediment deposition		✓	✓	Neutral	None
Groundwater quality			✓	Slight Negative	None
Air quality	✓		✓	Slight Negative	None
Noise				Slight Negative	None
Landscape		✓	✓	Large Negative	None
Flora	✓			Slight Negative	None
Fauna		✓	✓	Moderate Negative	None
Habitats	✓	✓	✓	Moderate Negative	None
Protected and Designated Areas	✓	✓	✓	Slight Negative	Slight Negative
Cultural Heritage	✓		✓	Slight Negative	None
Social Receptor/Resource					
Land and property		✓	✓	Moderate Negative	None
Community Health, Safety and Security					
Economy (local, regional, national, global)	✓	✓	✓	Very Large Positive	Large Positive
Employment	✓	✓	✓	Very Large Positive	Moderate Positive
Education &Training			✓	Large Positive	Moderate Positive
Communities Quality of Life	✓	✓	✓	Moderate Negative	Moderate Negative

Table 7-5 Evaluation of significance of the residual effects for the cumulative and transboundary impacts

Chapter 8 Environmental & Social Management & Monitoring !

Presents the proposed environmental and social management and monitoring program designed to evaluate the implementation and performance of the mitigation measures and the overall environmental and social performance of the Project.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The Environmental and Social Management and Monitoring Plan (ESMMP) for the Railway Corridor VIII – Eastern Section Project is presented in this Chapter. It has been prepared so that all relevant stages of the Project are implemented in compliance with applicable laws and regulations, EBRD's Environmental and Social Policy (2008) Performance Requirements, and in accordance with the ESIA and the result of the consultations with the stakeholders.

The ESMMP describes the environmental and social[1] mitigation and monitoring measures, the criteria for their successful implementation and the organizational measures to be implemented during the pre-construction, construction and operation of the Project.

The ESMMP adopts a long-term and phased process in the sense that it will need to be regularly reviewed and updated as the Project evolves to reflect any changes in the Project implementation and organization as well as in regulatory requirements. Following amendments, the updated ESMMP will need to be communicated to all relevant parties and stakeholders.

8.1 RESPONSIBILITES

Pre-Construction Phase

The ESMMP comprises of actions identified in the ESIA, which need to be undertaken during the pre-construction phase. Furthermore, the approval process for the Project is ongoing with the environmental permitting process, which involves the issuance, by the Ministry of Environment and Physical Planning (MOEPP), of the *Decision for granting consent* for the project implementation, with which the Ministry of Transport and Communication (MOTC) will issue the *Consent for project implementation* to the Project sponsor, which is the public enterprise "Macedonian Railways - Infrastructure" – PERI (hereafter referred to as PERI).

The Decision contains an assessment of whether the ESIA Study fulfils the applicable requirements, and the permit conditions for the project implementation as well as measures for prevention and reduction of the harmful effects. The ESMMP will need to be updated for any additional environmental and social requirements identified in the Decision when received. The responsible body to ensure that these actions are undertaken is PERI.

Environmental and social mitigation and monitoring measures contained within the ESMMP and other relevant project documentation and approvals will be part of tender documentation for selection of the construction contractor. Implementation of ESMMP will be a contractual commitment of the chosen contractor.

The selected Contractors will be required to provide the required plans and procedures to PERI for approval prior to construction commencing.

Construction Phase

The actual construction work will be undertaken by a railway construction Contractor to be appointed by PERI. Normally, there will be only one main Contractor, but there is the possibility that more than one main Contractor could be appointed. The ESMMP will need to be reviewed at contract award to ensure it fully reflects the project circumstances. During construction, the actual implementation of most of the ESMMP requirements will be the responsibility of the construction Contractor(s), with PERI having a supervising role.

The requirements for environmental protection and social management contained within the ESMMP, SEP and relevant project documentation and approvals will be an obligatory part of the conditions of contract

[1] For the purpose of this ESMMP social requirements cover: labour and working conditions including occupational health and safety; community impacts such as public health, safety and security.

for the construction Contractor. The Contractor will be obliged to adopt and follow relevant national legislation, Acts, Regulation, Degree, and relevant EU legislation / Good practice /International organization's standards during construction and minimize potential impacts on environmental and social receptors.

PERI is ultimately responsible for the implementation of measures outlined within the ESMMP, with the objective of ensuring effective implementation of the ESMMP, SEP and other project requirements. PERI will appoint resources to undertake environmental and social reviews and audits of the Contractor during the construction phase. Where responsibility for actions is assigned to the Contractor, the Contractor will be responsible for ensuring its sub-contractors understand the requirements contained within the ESMMP and have contract conditions in place to ensure applicable elements of the ESMMP are achieved.

An Environmental and Social Management System and Health & Safety Plans will be established for the construction of the Project.

Operational Phase

The ESMMP details environmental and social measures for the operation of the railway, including the requirement to establish and implement an Environmental and Social Management System and Monitoring Plan. Details regarding the management of the operation of the railway are not confirmed at this stage; however, PERI will ultimately be responsible for the operational management and monitoring. Therefore, the responsibility for implementation of measures during the operational phase is assigned in the ESMMP to PERI. PERI will also be responsible for ensuring its Contractors (e.g. vegetation management contractor) understand the requirements contained within the ESMMP and have contractual conditions in place to ensure applicable elements of the ESMMP are achieved.

Should PERI procure an Operator for the operation of the railway, this Operator would also be obliged to adhere to the requirements within the ESMMP, SEP and relevant project documentation and approvals. Furthermore, any Operator will be responsible for ensuring its sub-contractors understand the requirements contained within the ESMMP and have contractual conditions in place to ensure applicable elements of the ESMMP are achieved.

Public reporting

PERI and its Contractors will be required to publicly report on the Environmental and Social performance of the project on at least an annual basis.

8.2 STRUCTURE OF THE ESMMP

It is a requirement of EBRD policy that the project is undertaken in line with national law and EU standards. The requirements described in this ESMMP, therefore, reference the Republic of Macedonia legislation and are supplemented, where necessary, with measures needed to meet EU, International law and conventions, EBRD Performance Requirements and relevant international good practices.

The ESMMP has been structured as follows:

- Environmental and Social Management Plan with the following requirements (subchapter 8.3):
  - General Requirements for Environmental and Social Management
  - Socio-economic Requirements
  - Environmental Requirements
  - Stakeholder Engagement Requirements
  - Land Acquisition, Involuntary Resettlement & Economic Displacement Requirements
- Environmental and Social Monitoring Plan (subchapter 8.4)

8.3 ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
General Requirements: Environmental and Social Management			
PERI and the Contractor will regularly review and update as required the ESMMP and SEP to ensure it is responsive to changes in project circumstances.	Continual through all Phases	PERI, Contractor	All Phases
Applicable Standards			
The project will be managed, constructed and operated in a manner that is compliant with applicable national, EU and International law and conventions, and relevant EBRD and EIB requirements, policies and guidance	Continual through all Phases	MOTC,PERI, Contractor	All Phases
Applicable Project Documentation			
PERI and Contractor will implement and comply with all measures specified within the relevant Project Documentation, including inter alia: • ESMMP • Stakeholder Engagement Plan (SEP) • Resettlement Compensation Framework (RCF) • Project contractually binding documents, including the Employer Requirements • Environmental and Social Impact Assessment/Statements and related Decisions from the Competent Ministry/Authority	Performance monitoring demonstrates compliance with environmental and social requirements.	PERI, Contractor	All Phases
PERI Environmental & Social Resources & Organisation			
PERI will establish within their organisation the environmental & social management capacity and capability to undertake inter alia: • Reviews of the environmental and social performance of their contractors and suppliers during railway construction and operation; • Co-ordinate the implementation of actions/measures under the ESMMP which are the responsibility of PERI; • Regular reviews of compliance with the ESMMP obligations; and • Review and update to ESMMP to ensure it reflects project circumstance and still complies with Lender Requirements.	PERI to establish sufficient environmental and social management capacity and capability for each phase.	PERI	All Phases

<table>
<tr><th>Receptor / Proposed mitigation measures</th><th>Target</th><th>Responsible institution/s</th><th>Timing</th></tr>
<tr><td colspan="4">Environmental & Social Management Systems</td></tr>
<tr><td colspan="4">Construction Environmental & Social Management System (CESMS)</td></tr>
<tr><td>As part of the Site Management Plan the Contractor will develop and implement a Construction Environmental & Social Management System (CESMS) to support the implementation of the ESMMP & SEP and support good environmental & social management practices. The CESMS will be developed and implemented in-line with international standards (i.e. ISO 14001, EU EMAS & SA 8000) and include inter alia:
• Organization, responsibilities and resources (including commitment that critical ESHS positions will be identified and maintained) ;
• Construction Environmental & Social Management Plan, including supplementary plans (e.g. Waste Management Plans, Hazardous Materials Management Plans);
• Procedure which assesses ESHS risks;
• Monitoring Plan (see Section 8.4);
• Emergency Preparedness & Response Plan;
• An audit process and programme (including performance audits, audits on labour & working conditions);
• Training programme; and
• Reporting of Environmental & Social performance.

The Contractor shall appoint an appropriately qualified Environmental, Social, and Health & Safety (ESHS) Manager who will be responsible for the development and implementation of the CESMS and co-ordination to ensure the provisions of the ESMMP are complied with. The ESHS Manager shall have appropriate qualifications, training, authority & responsibility and resources. The ESHS Manager shall have assigned responsibilities including, but not limited to:
• Implementation and maintenance of the CESMS (including audits, corrective actions, etc.);
• Implementation of the ESMMP;
• Implementation and co-ordination of Construction Environmental & Social Management Plan and associated management & mitigation plans;
• Preparation of quarterly reports for compliance with ESMMP (and other applicable standards/documents) and related to CESMS and Construction Environmental & Social Management Plan;
• Managing an incident reporting system (including near-misses); and
• Preparation and submission of environmental monitoring reports to PERI and reports as required to EBRD/Lenders which will include review of compliance with ESMMP obligations.

In the event more than one main contractor is appointed then one overarching Project CESMS should be established for all Contractors to adopt.</td><td>CESMS must be in place prior to construction. Draft Manual to be provided for review and approval by PERI within 45 days of contract award.</td><td>Contractor</td><td>Construction Phase</td></tr>
</table>

<table>
<tr><th>Receptor / Proposed mitigation measures</th><th>Target</th><th>Responsible institution/s</th><th>Timing</th></tr>
<tr><td colspan="4">Operational Environmental & Social Management System (OESMS)</td></tr>
<tr><td>PERI will develop and implement an Operational Environmental & Social Management System (OESMS) to support the implementation of ESMMP & SEP and support good environmental & social management practices. The OESMS will be developed and implemented in-line with international standards (i.e. ISO 14001 & SA 8000) and include (but not be limited to) the following:
• Organization, responsibilities and resources;
• Operational Environmental & Social Management Plan, including supplementary plans e.g. Waste Management Plans, Hazardous Materials Management Plans, etc;
• Operational Monitoring Plan (see Section 8.4);
• Emergency Preparedness & Response Plan;
• An audit process and programme, including performance audits and railway safety audits;
• Training programme; and
• Reporting of Environmental & Social performance.

PERI shall appoint an appropriately qualified ESHS Manager who will be responsible for the development and implementation of the OESMS and co-ordination to ensure the provisions of the ESMMP are complied with. The ESHS Manager shall have appropriate qualifications, training, authority & responsibility and resources. The ESHS Manager shall have assigned responsibilities including, but not limited to:
• Implementation and maintenance of the OESMS (including audits, corrective actions, etc);
• Implementation of the ESMMP;
• Implementation and co-ordination of OESMP (and associated management & mitigation plans);
• Preparation of quarterly reports for compliance with ESMMP (and other applicable standards/documents) and related to OESMS;
• Managing an incident reporting system (including near-misses); and
• Preparation and submission of environmental monitoring reports to PERI and reports as required to EBRD/Lenders which will include review of compliance with ESMMP obligations.</td><td>OESMS must be in place prior to commissioning and operating of the railway</td><td>PERI</td><td>Operation Phase</td></tr>
<tr><td colspan="4">Site Management Plan (SMP)</td></tr>
<tr><td>Preparation and implementation of Site Management Plan for construction, including inter alia:
• Location of borrow pits and inert waste landfills to be used;
• Location of batching and crushing plants and construction camps;
• Haulage routes (as far as possible Haulage Routes previously used on Sections 1 & 2 should be re-used);
• Site Clearance plan;
• Construction Travel Plan (including volume and type of construction vehicles etc) & Traffic Management;
• Location of workforce accommodation camps; and
• Security plan.
Within the Site Management Plan the Contractor must demonstrate how they intend to ensure clear delineation of the ‘Project Area’ (i.e. site) to ensure construction activities (including site clearance, movement of machinery & vehicles etc.) do not go outside specified area approved in main design and clearly identify any additional land acquisition needs will comply with the RCF and RAP(if appropriate) .</td><td>The SMP must be in place prior to construction. Draft SMP to be provided for review by PERI within 45 days of award.</td><td>Contractor</td><td>Construction Phase</td></tr>
</table>

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Sub-contractor/Supplier Management			
The railway Contractor/Operator will apply contractual agreements for securing services of sub-contractors and suppliers, which ensure they are obliged to comply with all environmental and social requirements contained with applicable Project documentation and standards. The Contractor/Operator will advise their sub-contractors and suppliers of their Environmental, Social, Health & Safety (including Labour & Working Conditions) responsibilities, including relevant requirements within the ESMMP. Applicable ESHS requirements shall be contained within contractual agreements, including the requirement for sub-contractors to pass requirements to any of their sub-contractors and establish provisions for EHS reporting.	Sub-contractor & supplier agreements to contain ESHS requirements.	Contractor, PERI	Construction Phase/ Operational Phase
Socio-economic requirements			
Stakeholder Engagement			
PERI shall maintain and implement a Stakeholder Engagement Plan (SEP) and grievance mechanism relevant for each Phase of the Project to ensure that all stakeholders are identified, that sufficient information about issues and impacts arising from the Project (e.g. construction impacts) and proposed mitigation are disclosed in a timely manner and that all stakeholders are consulted in a meaningful and culturally appropriate way throughout project implementation. Determine whether any vulnerable / disadvantaged groups or communities are likely to be disproportionately or permanently and adversely affected by the Project and identify and implement appropriate communication methods to consult with them about mitigation measures. Contractors shall adopt the SEP and grievance mechanism principles and requirements within their own Management Systems as appropriate, and provide training to staff on the SEP requirements. PERI will aim to involve stakeholders and to keep good communication practices during the lifetime of the project through its PR Division. Their objectives will be: • Providing local communities with a project schedule and information on project activities that may affect them, together with mechanisms for their feedback • Provide general information to improve knowledge of what the project involves, with all stages and expected performance • To make available to the public a grievance procedure, in order to collect , respond and resolve issues and complaints on a timely basis (30 days) For each of the stakeholder groups defined in the SEP communication tools suggested will be used in order to ensure easy, transparent, direct, open and interactive communication with all stakeholders .	Stakeholder Engagement Plan and operational grievance mechanism in place prior to construction.	PERI/MoTC	During all phases

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Land acquisition, involuntary resettlement & economic displacement			
Information and consultation with affected people			
All feasible alternative project designs should be explored to avoid or at least minimise physical and/or economic displacement. The Project shall comply with and implement the RCF and associated RAP's and ensure all affected owners / users of land (including those who are using land informally) are appropriately informed, consulted and compensated for their assets and any losses: – Primarily through negotiated settlements; – At full replacement cost; – Additional assistance to be provided to the people who will be resettled for restoring their standards of living and further improve them; – People who have not vacated their houses which were expropriated during 2004 should be advised in good time about the Project and the risk of remaining nearby the line so they can move out; – Prior to displacement; and – With any additional resettlement assistance needed Any grievances are resolved on a timely basis, with evidence of formal and informal communication retained. **Resettlement Action Plans** to be prepared by a suitably qualified specialist approved in consultation with EBRD for each section based on Expropriation Studies, socio-economic surveys and a census. The RAPs are to be compliant with EBRD PR 5 requirements and approved by EBRD/Lenders in advance of any land acquisition in Section3. Affected persons shall be given the opportunity to participate in the negotiation of the compensation packages, eligibility requirements, resettlement assistance, suitability of proposed resettlement sites and the proposed timing.	Resettlement Action Plans to be prepared separately for each section Affected people are informed about final Project footprint. during design phase All project affected people have restored their livelihoods and standards of living. Monitor number and type of submitted grievances.	PERI	Design Phase/Construction phase
Detailed socio-economic survey needs to be undertaken in order to recognize the real situation for all project affected people particularly on Section 3, taking into consideration those without legal rights over properties and belongings. This survey should take into consideration the Expropriation Study for Section 3 (prepared in 2010). **Census** to be conducted in line with PR 5 requirements in order to facilititate the process and successful outcomes of resettlement and/or livelihood restoration.	Detailed survey and census to be conducted	PERI/MoTC	Design Phase
Resettlement Action Plans to be prepared, separately for each section based on Expropriation Study, Detailed survey and Census. PERI shall ensure that the affected families are duly compensated for all their belongings and expenses connected with being resettled in accordance with the Resettlement Compensation Framework developed under this ESIA.	Resettlement Action Plans to be prepared separately for each section	PERI/MoTC	Design Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
With regards to the loss of gardens and agricultural production due to temporary land loss in Section 3, owners to be compensated according to the Resettlement Compensation Framework. When available and preferred by owners, other land (state owned) to be utilized for continuation of agricultural production.	Support to affected families in restoring their life and standards	PERI/MoTC	Design Phase
Community Health and Safety			
Construction work shall commence on site only when the construction phase **Health & Safety** (H&S) **Plan** has been adequately developed by the Contractor and approved by PERI's Representative.	H&S Plan will be developed	PERI/Contractor	During the Design Phase and prior to the start of construction works
Traffic Management Plan will be developed for the safe use of vehicles on and off site ; driving standards; safe access to construction sites with minimum negative impact on the existing roads and in parallel for ensuring community safety and easy access to their properties (homes, land and gardens).Workforce transportation should be considered within TMP.	Development and implementation of the Traffic Management Plan	Contractor/PERI Contractor: will prepare Plan in discussion with PERI (Approval by PERI). The Police will be a consulted part in the development of the plan	During the Design Phase, prior start of construction works and during construction works
For traffic control and safety, the information about the project activities and driving standards will be announced through the local radio/TV. PERI and the Contractor/s will openly and transparently inform residents in the affected places and villages as a minimum on a quarterly basis regarding the planned activities and safety measures to be employed.			
The traffic flow through the site and within the urban areas will be coordinated with the responsible traffic engineers in the municipalities.			
The **main design** studies for construction of the railway alignment will be developed and revised by supervisor/s according to the national legislation on construction and best construction practice as well environmental requirements and pollution prevention principles.	All main design studies for railway construction prepared by designer to be reviewed by PERI. Evidence of public consultation on crossing locations.	PERI/Designer	Prior start of Construction Phase
A separate study on the siting and types of pedestrian/vehicle crossings (over/under crossings) will be developed based on the site visits and consultations with project affected local communities.			
The structural elements (tunnels, bridges including the reconstruction of the bridge over river Pcinja in Section 1, over/underpasses, viaducts) will be designed in accordance with national and international standards on safety and functionality.			
A **CONSTRUCTION Community Health and Safety Educational Programme** will be developed to inform and build awareness and understanding of the local community and drivers on the construction hazards and potential adverse impacts during the construction phase and how to minimize the potential for an accident and/or injury to occur. The Programme will be linked to the SEP and utilise various communication methods to address the needs of vulnerable groups such as children and illiterate residents.	Development and implementation of a Community Health and Safety Educational Programme	PERI/Contractor	During the Design Phase, prior start of construction works and during construction works
Workers must receive training and guidance on how to avoid conflicts with the local community members and sign a code of conduct, in order not to create conflicts with the local environment. Any damage or grievance shall be managed by the Grievance Process and any repair/compensation be made in a timely basis. Worker transportation and to avoid negative impacts on local residents	Avoid conflicts between workers and local communities. No community related grievances.	PERI/Contractor	Prior start of construction works/Construction Pphase and Operations (security)
Worker transportation and modes for workforce movements during construction works will be organised in a way that will minimize negative impacts on local residents.			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
To avoid unauthorized entrance at worker camps and contractor's facilities, the design, layout and site location of facilities should facilitate natural surveillance by police and the security guards engaged by Contractor/s. Worker camps not to be adjacent to local settlements.			
Adequate selection of qualified security guards and appropriate training. The project shall apply the Voluntary Principles on Security and Human Rights .			
The design and location of railroad level crossings overpasses and underpasses must take into account the views and concerns raised by local residents and other stakeholders . Evidence of consultation with stakeholders to be retain particularly in respect of Section 1 where the existing level crossing to be replaced with two level crossings.	Ensure all level crossings are either under and over passes. Warning devices within design and submitted to PERI for approval/review. Consultation Plan.	Designer/Contractor (PERI: review and implement (as required) provisions during Operation Phase)	During the Design Phase
Warning devices to be installed to warn pedestrians that a train is approaching, special attention to be given to the stations and where vulnerable residents are located e.g. children. Any hazards such as overhead power lines will be fitted with appropriate warning signs.			
A **Community Health and Safety Educational Programme** will be developed for railway OPERATION	Development of a Community Health and Safety Educational Programme for start of railway operation.	PERI	Prior to start of Operational Phase
PERI (Macedonian railways – Infrastructure), together with operator Macedonian railways – Transport will undertake a series of public relation activities (must run and support a series of community activities, including school visits, safety centres, diversionary activities and communications programmes), in order to inform local citizens, passenger and workers about the dangers associated with the railway line operation, crossing at unauthorised locations, electrical safety , trespass and/or vandalism.	Public access to the information on railway, informing local citizens, passengers and workers on the nature of the railway operation, benefits and risks	PERI/Macedonia Railways - Transport	Prior start of Operational Phase/During Operational Phase
Community Issues			
Workers will receive training and guidance on how to avoid conflicts with the local community members and sign a labour code of conduct, in order not to minimise potential conflict and community tensions.	No community tensions	PERI/ Contractor/s	Prior and during Construction Phase
Location of workers camps to be outside existing communities.			
Local Workforce Recruitment Plan to be developed in order to assure employment of much as possible local workforce.			
Modes for workforce movements (will be well organised and reviewed by PERI and Contractors.			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Access			
A **Traffic Management Plan** should will be developed and implemented, and will cover inter alia: • The risks assessment that which clearly identifies all risks from the construction works to the travellers, drivers, workers will need to be developed. • Identification of the new access roads for construction vehicles and safety measures used for pedestrian access and crossings minimizing and avoiding agricultural temporary land loss. • Identification of all public roads and paths that will be affected and proposed for the transport routes during the construction period (which sections will be closed and till when, where the traffic will be diverted).; • Minimization of the traffic disturbance ; • The signing of the construction area, new directions, ring roads, access roads etc.; and • Public notification of any traffic-related concerns, such as road/streets closures.. • The risks assessment which clearly identifies all risks from the construction works to the travellers, drivers, workers needs to be developed • Identification of the new access roads for construction vehicles and safety measures used for pedestrian access and crossings minimizing and avoiding agricultural temporary land loss • Identification of all public roads and paths that will be affected and proposal for the travelling route during the construction period (which sections will be closed and till when, where the traffic will be diverted); • Minimization of the traffic disturbance; • The signing of the construction area, new directions, ring roads, access roads; • Public notification of any traffic-related concerns, such as road/streets closings;	Development and implementation of a Traffic Management Plan	PERI/Designer/Contractor/ (The Police will be a consulted part in the development of this plan and PERI will work with the Police to achieve the correct implementation of the plan)	Prior and during Construction Phase
Risk assessment that clearly identifies all risks from the construction works to the travellers, drivers, workers will be developed.			
Utilities			
Prior to construction works during the Design Phase, the designer will obtain available underground cadastre from relevant service providers.	Minimal disruption of utilities	PERI/Designer/Contractor/	Design Phase/ Construction Phase/Operational Phase
Prior excavation works, Contractor/s will inform service providers in writing about planned construction activities which could affect some utilities and to request presence of their representatives on site. Where necessary the isolation of services which may pose a problem are to be arranged.			
In case of lack of underground maps consultation with local citizens will be carried out to identify underground connections especially in regards with their properties and consequently to inform referenced service providers.			
Ensure water and electricity requirements for Project do not result in supply issues with utilities to surrounding area.			
Provide adequate electrical capacity in the area such that the electrification of railway will not reduce the availability or disrupt the electrical supply in the area.			
Vulnerable Groups			
Traffic solution for Pero Cico settlement will be designed and later constructed in order to provide safe and regular access of the inhabitants to their houses (e.g. overpasses).	Implementation of structural improvements to houses, noise mitigation measures and provision of a	PERI/Designer/Contractor	Design Phase/ Construction Phase/Operational Phase
To ensure the safety of people living near railway, there will be adequate markings and signage, for both construction and operational phase.			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
To protect third parties from electrical hazards, adequate physical barriers and signage shall be located in the immediate areas of the settlement. The signage shall be pictorial in nature.	compensatory play area and bottle storage for the Pero Cico settlement.		
The level of literacy of the affected people should be taken into consideration in the communication methods and signage design.			
Strengthen any structurally unstable houses/residencies near the track, including in Pero Cico, which could be affected by vibration created by construction and operational activities in negotiation with the house owners in advance of works.			
A **Detailed Railway Noise and Vibration Study** will be completed during the development of the detailed design of the railway project to refine the results of this ESIA noise and study and with the main aim of determining the specific and optimum noise abatement measures to be taken, according with national and EU/WHO standards. Noise mitigation such as anti-noise wall/barriers, house insulation and triple glazing of windows, to reduce the adverse impact of the noise (and provide additional security and safety of residents) to an acceptable level will discussed and agreed with vulnerable groups. For section 1, during stage 1, noise abatement measures will need to be installed at locations in Chereskoselo, Lopate, Rezanovce, Sredorek, PeroCico, Proevce, Kumanovo spa, ShupliKamen, and Dovezance. During stage 2, in addition to the noise abatement measures installed in section 1, abatement measures will be need in the locations of Krilatica/Ketenovo, Odreno, Petralica and T'liminci in section 2, and KrivaPalanka and Zidilovo in section 3.			
Compensation for the loss of space at the front of the houses at Pero Ciro settlement (currently used for storage and as a children's play space). To be achieved in cooperation with the Municipality of Kumanovo. PERI must allocate a childrens's play space close to the community area affected and a safe access route to this space should be provided.			
Another location will be allocated to the Pero Cico affected community for storing plastic bottles. PERI will agree this location in close cooperation with Municipality of Kumanovo and discuss with the community, so that can continue to carry out this activity. Compensation will be agreed with the affected people for any loss of businesses and incomes.			
Anti-noise wall, house isolation and triple glazing in the windows will be implemented as a mitigation measure for settlement of Pero Čičo (where practicable) to reduce impacts to an acceptable level.			
Workforce & Worker Accommodation			
To adopt and/or maintain appropriate **Human Resources Policies and procedures**. These policies will be clear, understandable and accessible to workers and comply with PR2 requirements.	Human Resources policies to be prepared and implemented	PERI	Design Phase
To develop policies to promote non-discrimination and equal treatment and to prevent harassment (including sexual harassment) and bullying in the workplace, and make sure that they are clearly communicated and accessible to management, supervisors and workers.			
To ensure that managers and supervisors are trained in the application of the HR policies.			
To ensure that job advertisements, job descriptions and applications do not refer to applicants/workers race, gender etc. (except rare cases where legal exceptions apply).			
To ensure that decisions on hiring, working conditions, pay, benefits, training, promotion, termination, redundancy are not made on the basis of discriminatory grounds or on the basis of criteria which disproportionately impact on one group more than another.			
To ensure that women and men are paid the same wages for work of the same value, i.e. remuneration is based on the employee's skills, experience, responsibilities and other objective, non-gender related factors			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
To monitor the workplace for any form of harassment and, where it is found, act quickly to address it. To ensure that workers are not asked about or required to undergo health or pregnancy testing, except where there is a genuine health and safety need.			
To take steps to enable workers with disabilities to retain their jobs and make accommodations required by national law for physically disabled persons. Workers camps to be located outside communities. PERI to undertake audits of the design and implementation of the worker's compounds against the checklist in the IFC/EBRD guidance document [2]; audits will be scheduled as follows: – prior to construction of the accommodation (i.e. an audit of the design); – prior to its opening; – - on an annual basis (each year after opening). Audits of worker accommodation to be undertaken by PERI against the IFC/EBRD worker accommodation guidelines. Any defects or issues (where relevant) identified in the audits to be addressed and then reassessed for compliance within one month of the audit.	Ensure workers camps are designed and constructed/operated according to EBRD guidance document	PERI	Prior to Construction Phase and annually
All workers will receive appropriate ESHS training in required languages. This will form part of the site/project induction process. The ESHS training will cover appropriate ESHS requirements including: the Code of Conduct , community interactions, the grievance mechanisms and biodiversity issues; prevention measures and awareness raising of potential diseases and health issues that may be introduced or effect the workforce and Emergency Planning and Response.	Site/Project Induction Information/ ESHS Training planned within CESMS & OESMS and grievance mechanism& Response	Contractor: Construction PERI: Operation	Construction Phase & Operation PhaseCPCP
Social Facilities and Services Plan for workers to be prepared which regulates the following: • Housing standards must include special attention to minimum space allocated per person, supply of safe water in the workers' dwelling in sufficient quantities, adequate sewage and garbage disposal systems and appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects. • Medical Risk Assessment and Medical Response Plan for on-site first aid requirements and medical emergencies in compliance with Lenders requirements. • For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems must be provided. Both natural and artificial lighting must be provided and maintained in living facilities. • A separate bed for each worker must be provided. The practice of "hot bedding" should be avoided. The minimum space between beds should be 1 metre. Double deck bunks are not advisable for fire safety. • Canteen, cooking and laundry facilities must be built in adequate and easy to clean materials. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition. If workers wish to cook their own meals, kitchen space will be provided separate from sleeping areas • There must be **management plans and policies** especially in the areas of overall operation of the facility, health and safety (with emergency responses), local community and security. • A **security plan** including clear measures to protect workers against theft and attack is implemented. Security staff must be checked tonsure that they have not been implicated in any previous crimes or abuses. • Community representatives must be provided with an easy means to voice their opinions and to lodge complaints to the management. There must be a transparent and efficient process for dealing with community grievances.	Delivery of Social Facilities and Services Plan, Management plans and policies, Security plan, Processes and grievance mechanisms, Workers' consultation and grievance mechanism, Emergency Preparedness & Response Plan	Contractor/s but approved by PERI	Prior to start of Cconstruction Pphase and during Cconstruction Pphase

[2] http://www.ebrd.com/downloads/about/history/workers.pdf: Workers' accommodation: processes and standards (A guidance note by IFC and the EBRD): August 2009

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
• Mechanisms for **workers' consultation and grievances** to be designed and implemented for the duration of the project. Processes and grievance mechanisms for workers' to articulate their grievances must be provided and clearly explained to workers. Such mechanisms must be in accordance with PR2 • **Emergency Preparedness & Response Plan** for the construction stage.			
Occupational Health and Safety Plan to be provided to ensure compliance with National and EU safety requirements.	Occupational Health and Safety Plan	Contractor/s but approved by PERI	Prior to the start of Construction Phase and during Construction Phase
• All work activities carried out on site are to be properly planned and assessed so that all hazards have been recognised, those who may be at harm have been identified and adequate control measures implemented to reduce the risks to those workers and third parties who may ne harmed to as low as reasonably practicable. • All workers are to be provided with suitable information, instruction, training and supervision as is necessary to ensure the health, safety and welfare of all persons working on site. • Any lifting operations carried out on site will be properly planned, assessing the ground conditions and above ground obstruction in the immediate area. The equipment will not exceed the safe working load and be operated by a suitable competent operator. All loads will be secured and the lift control by a competent person at all times in direct communication with the crane operator at all times. • Any working at heights which can't be avoided will be carried out using suitable working platforms with adequate guard rails to prevent falls. Where a risk of falling may still be possible all workers must be provided with, and trained in the use of, suitable safety harnesses / fall arrest equipment to mitigate the consequences if a fall should occur. • All construction traffic on site will be restricted to a maximum speed of 10km/hr at all times on site. Any reversing will be carried out under the guidance of a suitable trained person wearing high visibility clothing. All traffic will have suitable warning devices to allow others of its approach and be suitable segregated from any pedestrians. • Any temporary work structures used during the construction phase will be designed and constructed under the guidance of a suitable competent engineer. • All work activities on site are to comply with EU Directives and meet best international practise.			
Implementing strict and enforceable safety practices. The general contractor and all subcontractors on a job site are required to provide a safe work environment and to warn employees of hazards there. They must hire responsible personnel to coordinate job safety, and to supervise compliance with legal rules and regulations.	Implementing strict and enforceable safety practices	Contractor/s but approved by PERI	Prior to the start of Construction Phase and during Construction Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Construction and Electrical Safety Plan is to meet international best practice and ensure compliance with EU requirements and is to be approved by PERI prior to works commencing. • Electricians are particularly at risk of death or serious injury from electric shock or burns if they fail to follow safe working procedures. It is therefore important to comply with all health and safety laws, in particular the ones to do with working safely. Electrical contractors should not allow dangerous work practices, such as working with live electricity or switching electricity on before they have finished their work and everything has been installed correctly. • It is never absolutely safe to work on or near live electrical equipment. But sometimes electrical contractors agree to switch the electricity on before they have finished their work, to make the jobs of designers, commissioning engineers, clients, main contractors or people in the finishing trades easier. By doing this, except in some very specific circumstances where they have taken steps to prevent themselves and others getting injured, they are imposing the workers to life threatening situations. • The work cannot be done if the electricity is switched off, and it is reasonable to work on or near the live conductors, and suitable steps have been taken to prevent the person doing the work and others from getting injured. • All workers, supervisors and managers on construction sites should be made aware that it is not considered acceptable to work on or near live conductors solely on the grounds of convenience, or of saving time or cost. • When the electricity is switched on, the main contractor is responsible for making sure that everyone working on site is aware of any live circuits in an area. They are also responsible for making sure that their electrical subcontractors use safe isolation procedures before working on any circuits that could possibly be live. The electrical subcontractor has the same duty and responsibility to use safe isolation practices when required.	Construction and Electrical safety Plan	Contractor/s but approved by PERI	Prior to the start of Construction Phase and during Construction Phase
Quality of life			
Dust Management			
DUST Management			
Construction site, transportation routes and materials handling sites will utilise dust suppression measures such as water-spraying on dry and windy days to reduce dust emissions. This is especially relevant to any residential areas and commercial and business areas. This will be achieved through the implementation of **Dust Management Plan.**	Dust Management Plan to minimize annoyance caused by dust	Contractor/s but approved by PERI	Prior to the start of Construction Phase
If crushing of construction material or waste is required, crushers should be located away from sensitive receptors.			
Vehicles and construction machinery will be required to be properly maintained and to comply with relevant emission standards and to reduce the leakages of motor oils and dispersion of pollution in waters and soil (the maintenance should be provided by the professional service company).			
Restriction of the vehicle speed to 30km/hr on all access roads and settlements. (There needs to be a figure here although I am not familiar with the types of roads or existing speed limits)			
Construction materials will be stored in appropriate places and covered to minimize dust.			
Vehicle loads likely to emit dust will be covered.			
Usage of protective masks for the workers if dust generation is expected.			
Noise and Vibration Management (Design and Construction Phase)			
Reduce the risk from any electromagnetic field , noise and vibration impacts by ensuring that the newly constructed railway corridor is at a distance of at least 10 meters from the residences.	No newly constructed railway corridor closer than 10 meters of any residence	Designer/s, PERI	Design, construction and operational phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Information to the public about the construction works will be announced through the local radio/TV station for carefully low speed driving near the construction location (especially important for Kumanovo and Kriva Palanka within the urban settlements).	Providing information to citizens	Contractor/s through PERI	During Construction Phase
Methods and equipment which minimize noise during execution of foundation works will be utilized, especially when working in densely populated areas as Kriva Palanka and near preservation-worthy buildings and cultural heritage. Methods to minimize the noise level include using less machines at the same time for the work.	Minimize annoyance caused by noise No grievances relating to noise issues.	Contractor/s but approved by PERI	Prior construction and during Construction Phase
The construction work should not be permitted during the nights, the operations on site shall be restricted to the hours 07.00 -19.00 h.			
The vehicles that are excessively noisy due to poor engine adjustment or damage of noise abatement equipment shall not be operated until corrective measures have been taken.			
The maximum permissible speed for the heavy mechanization vehicles and predetermined route for passing near the settlements will be strictly enforced.			
The local residents will be kept informed of the planned works and advised in advance of noisy works.			
The location of noisy equipment will be chosen as far as possible away from sensitive receptors (houses, workplaces, schools and hospitals).			
The workers will be provided with ear protective devices (ear muffs and/or ear plugs).			
The good management practice would be used for the on distribution of the heavy noise equipment along the route, to avoid cumulative noise.			
The construction work will as much as possible be organised in a manner where noise is limited as much as possible, e.g. work should be performed during day time in the populated areas and should be announced ahead in good time.			
In cases where the very noisy work has to go on at night or during a longer period than one day in a place, a noise shield will be erected around the working area.			
Monitoring of vibration during performance of critical working processes will be undertaken. Buildings which are within a distance of 20-30 meters from the area where the foundation of piles and catenary masts take place will be monitored during the work.	Vibration monitoring, measures for preventing damages and fair compensation of damages	Contractor/s and PERI	Prior to construction and during Construction Phase
Damaged buildings will be repaired or compensation paid if damage from vibration occurs.			
Before construction work is initiated, the houses nearby the area where the foundation of piles and catenary masts will take place should be photo registered for later documentation of any damages, which the work may have caused.			
Noise and Vibration Management (Operation Phase)			
Mitigation of noise at the source, by ensuring adequate maintenance of rails, railroad switch and other material. Adequate measures can reduce the noise with up to 6 dB.	Minimize annoyance caused by operational noise at all affected properties	Designer/s, Contractor/s, overall responsibility with PERI	Design, Construction and Operational phase
Mitigation of noise at the receptors will be reduced through erecting noise protection shields.			
All residences which will be exposed to a noise level which is larger than the max levels established by Macedonian legislation /WHIO standards will be offered noise protection measures such as noise protection shields, triple glazing. which are fully financed by the project.			
The vibration from the trains will be reduced as much as possible by ensuring continuously maintenance of wheels and rails. Noise and vibration complaints to be recorded and investigated through the grievance mechanism. Damaged buildings will be repaired or compensation paid if damage as a result of the project is proven. During construction of the railway line, it should be ensured that likely vibrations are limited as much as possible by inter alia installing protection material below the rails.	Minimize annoyance and no lasting damages to buildings	Designer/s, PERI	Design, Construction and Operational phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Environmental requirements			
General			
Construction workers will be given training sessions, prior and during construction works, to make them aware of the importance of soil, surface water and groundwater, flora, fauna, landscape, and archaeological remains as valuable resources for humans and nature, and the need for protecting them.	High level or awareness on environmental issues in the construction workforce	Contractor/PERI	Prior and during construction phase
Soils			
Sedimentation and Erosion Control Plan, will be developed in order to identify specific erosion control techniques for use at particular sites along the railway alignment. The Plan will be based on several principles and approved by PERI prior to construction: • Each site characteristics (topography, soils, drainage patterns, and covers) will be considered when developing the plan. Areas which are prone to erosion will be left undisturbed and undeveloped if possible. Entrance and exits points for runoff will be protected from erosion and equipped with sediment control devices. • Minimize the extent of the disturbed area and the duration of exposure and stabilize disturbed areas as soon as possible. Typically, if an area is not going to be worked on in more than 45 days, it will be protected by erosion control mats. • The use of heavy equipment and techniques that will result in excessive soil disturbances or compaction of soils will be minimized, especially on unstable slopes. • The drainage and runoff controls will be established before starting the site clearance and earthworks. The existing vegetation will be retained as much as possible. • Where water would need to be removed from excavations, it will be transferred at the minimum practical distance to be discharged. • Concentrated flows if possible will be diverted away from sensitive areas. • Sediment control devices such as sediment control ponds will be used to retain sediments from leaving the site. • The most effective erosion control devices will be implemented: i)temporary seedings; ii)temporary mulching; iii) permanent sodding; iv)temporary or permanent erosion control blankets; v) permanent vegetative buffer strips • Sediment control devices to be implemented will include: i) site fencing; ii) straw bales; iii) sediment basins or traps; iv) storm inlet traps; vi) rock check dams and vii) interception berms/swales. • Once construction is completed at a site, the decompaction and restoration of the disturbed areas that are not going to be occupied by permanent structures will be carried out by tilling the land before proceeding to the vegetation reinstatement. • Each river or large stream will have a specific Crossing Plan defining the mitigation measures to be applied (see Surface water below).	Preparation and implementation of the sedimentation and erosion control plan minimize the loss of soil	Contractor/PERI	Construction phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Hazardous Materials Management and Spill Prevention Plan to address issues such as: • All roads and hard standings will be kept clean and tidy to prevent the build-up of oil and dirt that may be washed into a watercourse or drain during heavy rainfall. • The spill kits will be located close to the construction sites in case there is an accidental spill, so that it can be immediately cleaned up. • No refuelling, storage, servicing or maintenance of the equipment will take place within 100 m of drainages, water courses, alluvial plains or other sensitive environmental resources. If these activities had to be done at the construction site, all precautionary measures shall be taken to prevent leaks or spills from reaching the soil or nearby water courses. • These activities (refuelling, storage, servicing or maintenance) will take place in designated repair and maintenance third party sites adequately prepared for these purposes (adequately lined for preventing any soil and groundwater contamination, and equipped with culverts along the perimeters to collect water runoff that will be directed to wastewater treatment facilities). • Ready-mix concrete trucks containing alkaline cement or residues of cement will not be allowed to enter any watercourse. Washout of the concrete trucks shall be performed at the concrete batching plant camp, where appropriate facilities will be provided. If the washout of concrete trucks were necessary at or near the construction site, this shall be done at distance greater than 200 m of any watercourse and never in a very high or high habitat sensitivity area. The washout area will be clearly signposted and drivers shall be aware of the designated locations for washout. • Setting up camps on alluvial terrains has to be avoided because of the high levels of the underground water table and the risk of pollution. • The proper handling and storage of lubricants, solvents will be organized as well proper usage of construction equipment. • The storage of substances that are harmful to soils and waters (e.g. fuels for construction machinery) on the construction site will be minimized. All hazardous substances either products to be used or waste, shall be stored in adequate places, far from sensitive areas (e.g. water courses, habitats with a rich biodiversity) and adequately equipped to prevent any soil, surface water or groundwater contamination). • For the storage of the wooden sleepers removed from the railway track in section 1, the temporary storage areas near the construction site will be lined and provided with runoff collectors. Removed sleepers will be taken to a safe storage place or handled to a hazardous waste contractor as soon as possible. • Vehicles and construction machinery will be subject to regular preventive maintenance so as to reduce leakages of lubricants, motor oil and fuel.	Preparation and implementation of the Hazardous Materials Management and Spill Prevention Plan to prevent the contamination of soil and waters with hazardous substances	Contractor/PERI	Construction Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
The Waste Management Plan will implement procedures for waste minimisation, recycling, treatment and disposal in accordance with national and EU requirement and will cover the following: • The different waste types that could be generated at the construction site (due to the materials used and waste generated in different sections) shall be identified and classified according to the national List of Waste (Official Gazette no.100/05) on hazardous and non-hazardous waste streams. • Complete separation of hazardous from non-hazardous waste streams at the construction site will be done. • The waste material (concrete, iron, rocks, etc.) accidentally deposited will be immediately removed from highly sensitive habitats. • Municipal solid alike waste generated in the construction site and camps (food, beverages, packaging waste such as paper, bottles, glass, etc., glass bottles, batteries) will be collected and treated according to national legislation (separation of recycling waste materials from the waste stream that will be disposed of in the solid waste municipal landfill). Recyclable waste will be given to an authorized recycling company. • The Annual Report for non-hazardous waste management will be fulfilled before the municipalities of Kumanovo, Rankovce, Kratovo and KrivaPalanka and reported to the Ministry of Environment and Physical Planning. • A contract with the company for waste collection and transportation shall be signed for the collection and transport of the waste generated at the construction site to the nearest municipality landfill. • Inert waste landfills shall be constructed according to specifications set in the national and EU requirements. • The Closure Plan for the closure of the inert landfills will be established and implemented taking into account the need for cultivation of the landfills area. • The contracts signed with the companies dealing with waste recycling and recovering will ensure that the delivery and acceptance of the waste streams is performed on a frequent basis so that the construction sites remain clean at any time. • The excavated soil and construction waste will be reused as much as possible. • Possible hazardous waste (motor oils, vehicle fuels) should be collected separately and authorized collector and transporter should be sub-contracted to transport , recovery or finally dispose the hazardous waste; • The Temporary Hazardous Waste Storage Points should be established according the national legislation on handling, labelling, storage and management with hazardous waste; • The hazardous waste management procedure should be established and followed • The hazardous waste will be packaged and labelled showing the R and S phrases (risk and safety statements of the hazardous waste) and it will be temporary stored on safety storage facility equipped with adequate ventilation, fire resistant conditions especially if there are VOC emissions, mercury containing lamps, asbestos materials form demolition works; • The access to these temporary hazardous waste storage points need to be allowed only for trained and equipped staff with prohibited entrance of workers and public; • All waste spills will be promptly cleaned up; • Full records of the type of waste stream generated, quantity composition, origin, disposal destination and method of transport for all different waste streams will be kept be available for inspections; • The reporting on waste management will be done on regular base to the particular municipality and the legal obligation is for further reporting by the municipality to the MoEPP through the Annual Reports; The waste material (concrete, iron, rocks etc.) accidentally deposited will be immediately removed from highly sensitive habitats.	Waste Management Plan to be prepared and implemented to prevent soil and water contamination with hazardous substances contained in wastes, the introduction of extraneous materials in soils and waters, and to prevent the impairment of the landscape quality.	Contractor – Construction Phase PERI – Operational Phase	Construction Phase & Operational Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Soil Management Plan shall be prepared by Contractors and approved by PERI. Selective removal and storage of top soil will be conducted which will : • Topsoil will be stripped from the soil surface so as to serve for reuse in the restoration of disturbed areas not occupied by the railway. • Topsoil will be reused to restore cuttings, embankments, wildlife crossings, construction and workers camps, landfills, and borrow pits. • Temporary storage areas will be located along the strip of land along the alignment, near the sites where the soil was removed from, so that it can be reused in those same areas. • The layers of the stripped top soil will be placed aside, on the established storage areas, in the same order as the original soil levels. The topsoil removed will be collected on ridges to be built in flat areas so as to avoid the loss of the organic and biotic properties of the soil, and protected it from weather agents, mainly wind and rain, which cause the erosion of the soil ridge. The top soil storage areas shall be signposted and maintained in proper condition until the reutilization of the topsoil.	Selective removal and storage of topsoil to be conducted to minimize the loss of fertile soil and ensure its properties are preserved for its reuse in rehabilitated construction sites or elsewhere (e.g. agricultural amendment)	Contractor/PERI	Construction Phase
A **Chemical Accident and Spills Management Program** will be developed for all railway operations to prevent and mitigate the negative impacts to soil, surface water and groundwater that could arise from eventual railway accidents and spills involving hazardous substances, and provide early response actions as well. The program shall be prepared in close cooperation with the Crisis Management Centre and the local offices of Kumanovo, KrivaPalanka and Kratovo. The Chemical Accident and Spills Program will provide information that at a minimum will accomplish the following: • Present the measures that will be taken to minimize the risks associated with chemical, fuel, oil spills and accidents. These measures will include issues like: monitoring purchasing requirements, product substitutions, design features for containment, operational controls, work practices, labelling and storage requirements. • Specify the document-control procedures for maintaining material inventories and MSDS (Material Safety Data Sheets). • Assign an emergency response team involved in assessing the risk of hazardous material releases and working to avoid any harmful effects if any accidents happened. The will evaluate the concentrations of the chemicals, where and how population might be exposed and the potential toxic effects on the exposed people, soil and waters. They will plan and implement rapid clean up measures depending of the extent of the spills (bioremediation, floating booms and adsorbents, solid materials that capture the soil, chemical oxidation in order to break the chemicals down). • The emergency calls and coordination with the national authorities relevant for Crisis Management will be essential. The relevant national institution is the Crisis Management Center with itsregional branch offices across the country. The local Crisis Management offices in the North-Eastern region are in Kumanovo, KrivaPalanka and Kratovo. • Chemicals used for everyday trains operation (fuel, lubricant oils, solvents, greases) will be appropriately stored in areas specifically designed for such purpose (either in stations along the railway or in the train)	Chemical Accidents and Spills Management program to be prepared and implemented to prevent / manage spills and prevent the contamination of soil and waters with hazardous substances	Operator/PERI	Operational Phase
Train maintenance shall be done on a regular basis in order to avoid leaks and spill of hazardous materials	Regular maintenance of trains for avoiding leaks and spill of hazardous materials	Operator/PERI	Operational Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Surface Water			
Each river or large stream will have a specific **Crossing Plan** defining the risks and mitigation measures to be applied (taking into account the measures listed below as relevant). Plans will be approved by PERI in advance of works.	River Crossing Plans	Contractor approved by PERI in advance	Before Construction Phase.
The construction of drainage pipes and bridges in watercourses will be carried out during the dry season. The design of the drainage pipes will take account of projected maximum flood events and potential changes in future flow regimes due to climate change.	Construction of civil objects in water courses to be done during dry season to minimize effects on water flow, water quality and aquatic flora and fauna	Contractor/PERI	Construction Phase
The extension of the construction area next to water courses will be only that strictly necessary to adequately perform the construction works. The perimeter of the area will be marked with signalling ribbons that neither vehicles and machinery nor workers will trespass. No occupation of the stream bed or the banks will be allowed, unless there is no other reasonable alternative to carry out the construction work.	Any extension of the construction area next to water courses only occurs when signed off by PERI	Contractor for application to develop near water course. PERI to sign off on application.	Construction phase
The following guidelines will be taken into account in the construction of bridges: • Single span bridges are the preferred structure for crossing streams as they cause the least disturbance to watercourses both hydraulically and environmentally. • Multiple span bridges are acceptable on wide streams. Acceptable arrangements will include: o Piers located outside the normal low flow stream width. In this regard, a three span bridge may be preferable to a two span bridge. The spans do not need to be of equal length. o Piers aligned parallel to the direction of flow. o Riprap provided around the piers to mitigate local scouring. o If piers/piles have to be constructed inside the normal low flow stream width, they would occupy less than 5% of the cross sectional area for not to cause a significant change to the available waterway. o The bridge abutments would be located so they do not significantly encroach into the waterway and thereby reduce the available waterway area. Abutments will also be located so as to avoid obstruction of movement of terrestrial fauna along the riparian zone. o Rock beaching will be used on the batters to protect against abutment scour, as this area will generally not revegetate due to inadequate light and lack of rainfall. Beaching should generally extend 3 metres upstream and downstream of the bridge abutments. o The batter is to be excavated to the depth of the beaching to maintain the waterway area. The slope of the batters would be in the range of 1V:1H to 1V:2H. In general, the beaching should extend at least 600 mm below the toe of the bank to mitigate undermining. Where the stream banks are stable, rock beaching may not be required.	Design & Construction to follow stated guidelines	Designer/Contractor/PERI	Design and Construction Phase
The railway drainage will be directed to retention basins or grassed filter zones to trap sediments and other contaminants, rather than discharging directly to the water courses. These sediment and contaminant retention structures will be constructed in the areas where habitats of very high or high sensitivity are located along the alignment or in a close location downstream of the effluent discharge point.	Designing & Construction to follow stated guidelines	Designer/Contractor/PERI	Construction Phase
Domestic type wastewater generated in the construction camps will not be allowed to be discharged untreated into natural water courses. The camps will be provided a wastewater treatment system to treat effluents to admissible levels for discharge in the water body. The construction sites will be provided with chemical portable toilets and the waste adequately managed.	No untreated wastewater discharge in watercourses	Contractor/PERI	Construction Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Regular control and maintenance of drainage structures and retention basins will be conducted to check they are not clogged with debris or sediments	No blocked drainage structures	PERI	Operational Phase
Domestic type wastewater generated at the stations will be treated according to the relevant national legislation and EU standards. Untreated wastewater will not be allowed to be discharged into natural water courses. In the event the connection of the sewage system of the station to the municipal collector were unfeasible, the station shall be provided with a wastewater treatment system to treat effluents to admissible levels for discharge in the water body.	No untreated wastewater discharge in watercourses	Designer/PERI	Operational Phase
The cleaning water generated by the washing of the trains will be treated.	No untreated wastewater discharge in watercourses	Operator/PERI	Operational Phase
Groundwater			
Where the groundwater table is encountered during excavation, cutting or tunnelling works, the intercepted area will be sealed as soon as possible so as to re-establish the normal hydrogeological flow regime.	No major alterations of groundwater flow	Contractor/PERI	Construction Phase
Hazardous Materials Management and Spill Prevention Plan to be developed (see mitigation measures for soil) and will address the potential for direct groundwater contamination for activities where the groundwater may become exposed to the atmosphere (e.g. during the construction of pillars near a water course).	No significant contamination of groundwater	Contractor/PERI	Construction Phase
Air Quality			
Measures to be implemented to minimize dust emissions and included with a Dust Management Plan: • Hoardings will be constructed around the construction sites to minimize the spread of dust. • Accesses and construction sites will be kept moist to reduce dust formation. Water sprays will be implemented during drilling and excavation activities. • In the dry season, hygroscopic additives will be used in water to increase its presence in the ground. • Dust-generating activities will be slowed down in days of strong wind. • In windy and dry conditions, earth stockpiles will be moistened to prevent the lifting of dust particles. • Ground will be moistened during loading and unloading of aggregates in trucks. • Truck dumpers carrying spoil or other dusty materials will be covered with tarps. • Loaded trucks will be washed down prior to exit from the working site to ensure that loose material is not tracked onto the roads. • During tunnel construction, movement and handling of excavated spoil will be performed within enclosed work sheds constructed prior to the start of tunnelling. • Work sheds will be large enough to allow stockpiling of the excavated tunnel material, access of trucks and truck loading operations. • Tunnels will be ventilated during the excavation works using particulate filters, which need to be regularly maintained.	**Dust Management Plan** to be prepared and implemented	Contractor/PERI	Construction Phase
Measures to be implemented to minimize emissions of combustion gases: • Vehicles and construction machinery will be required to be properly maintained and to comply with relevant emission standards. • No unnecessary idling of construction vehicles at the construction sites will be allowed. • Construction truck traffic will be optimized so as to get a minimum number of trucks carrying the maximum volume of materials. This will be addressed in the **Construction Traffic Management Plan.** • The truck routes will be planned to avoid peak traffic hours or routes with heavy traffic.	Minimise emission of combustion gases and no breach of limit values.	Contractor/PERI	Construction Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Measures to be implemented to avoid **asbestos** emissions during demolition of buildings: • An asbestos operational control procedure during demolition works will be developed according to national legislation on hazardous waste, Directive 91/689/EEC on hazardous waste, Council Directive 87/217/EEC on the prevention and reduction of environmental pollution by asbestos and EU Directive 2009/148/EC on the protection of workers from the risks related to exposure to asbestos at work. • The storage and transport of demolition materials will be removed, packed, labelled and processed in according the national and EU legislation on management of hazardous waste and asbestos (Directives 87/217/EEC and 91/689/EEC). • A risk assessment will be carried out before beginning an activity involving exposure to asbestos dust or to materials containing asbestos.	Management of asbestos emission and no exposure to any parties	Contractor/PERI	Construction Phase
Regular maintenance of the diesel locomotives will be performed to keep them in optimal working conditions, including the achievement of minimal air emissions set by the manufacturer.	Minimise emission of combustion gases	PERI	Operational Phase Stage 1
Every effort will be made to use the cleanest fuels (e.g. on-road grade diesel) within technically feasible possibilities.			
In train stations with heating systems based on fossil fuels, these systems will be subject to regular maintenance so that combustion is complete and emission of combustion gases are kept below regulatory thresholds.			

Noise and Vibrations

All construction equipment will comply with the requirements of EU Directive 2000/14/EC on noise emission in the environment by equipment for use outdoors (there is a lack of national legislation on outdoor equipment emission noise levels). All the equipment shall bear the CE marking and the indication of the guaranteed sound power level and shall be accompanied by an EC declaration of conformity.	Noise emissions from the Project meet national and EC guideline limits	Contractor/PERI	Construction Phase
The equipment will be fitted with appropriate noise muffling devices that will reduce sound levels.			
As the project activities are performed in several noise level areas (I, II, III and IV, according to the national legislation), every effort shall be carried out to comply with the correspondent noise limits for each area.			
Construction works shall not be permitted during the night; the operations on site shall be restricted to the period 07.00 -19.00 h.			
All vehicles and machinery used at the construction sites shall be subject to regular maintenance. The vehicles and machines that are excessively noisy due to poor engine adjustment or damage noise control devices shall not be operated until corrective measures have been taken.			
The construction traffic plan shall establish speed limits for construction vehicles and machinery at the construction site and the haulage roads used, and organize traffic so as to avoid as much as possible populated areas.			
Affected local residents will be kept informed on due time of the planned works and the vibration and noise levels and periods during which they will occur.			
The location of noisy equipment will be chosen as far as possible from sensitive receptors (houses, workplaces, schools and hospitals). When near sensitive receptors, construction works will be scheduled and provided with the necessary resources so that the time of exposure is as short as possible.			
Good management practice will be used to distribute heavy noise equipment along the route so as to avoid the cumulative effects of noise.			
In the case where noisy works would need to be performed at night or during a longer period than one day at a given site, a noise shield shall be erected around the working area.			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Monitoring of vibration during the performance of critical work processes (e.g. foundation of piles and catenary masts) should be undertaken in buildings which are within a distance of 20-30 meters from the area where the these works take place. Should buildings result damaged as a result of vibrations generated by the construction works, the damaged buildings will be repaired or compensation paid.	No lasting damage to buildings		
Operate earthmoving equipment on the construction site far away from vibration-sensitive receptors as possible.			
Activities such as demolition, earthmoving and ground-impacting operations shall be scheduled so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately.			
Decrease vibration from construction sources, including: • Blasting. Explosive type and weight, delay-timing variations, size and number of holes, distance between holes and rows, method and direction of blast initiation. • Dynamic compaction. A smaller falling weight will produce smaller vibrations. • Pile driving. Predrilling, prejetting, replacement of displacement piles with non-displacement ones, switch impact hammer to vibratory one, replacement of driven piles with augered cast in-place piles or drilled shafts. • Select demolition methods not involving vibration impact, where possible. • Avoid vibratory rollers and packers near sensitive receptors.			
A Detailed Railway Noise and Vibration Study will be completed during the development of the detailed design of the railway project to determine the specific and optimum noise abatement measures to be taken.	Detailed Railway Noise Study	Designer/PERI	Design Phase
Proposed noise mitigation measures leading to the decrease of noise exposure include measures implemented at the source of noise and measures that intercept the noise between the source and the receptor: At the source: • Retrofitting international and regional trains with composite brake blocks with noise reduction potential by 8-10 dB(A). • Wheel and track absorbers with potential of reduction noise by 1-4 dB(A). Between source and receptor: • Noise barriers (protective walls) with noise reduction potential by 5-15 dB(A). • Insulation of house windows and facade with noise reduction potential by 10-30 dB(A).	Noise impacts meet national and EU legislative limits	Designer/Contractor/PERI	Construction Phase / Operational Phase
Landscape			
The landscape impact can be mitigated by hiding from observers the construction site, the camp and ancillary areas. For this, screens will be installed around the perimeter of these sites.	No significant visual impacts	Contractor/PERI	Construction Phase
Shaping of the terrain around altered impacted areas so as to recreate the surrounding land morphology. During further design areas where potential visual and/or shading issues for residential areas/properties could occur will be reviewed and measures incorporated into design and/or mitigation measures identified and implemented.		Designer/Contractor/PERI	Design Phase/End of Construction Phase/Operational

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Vegetation with autochthonous species present in the surrounding area of: • slopes of the cuttings and embankments. Vegetation measures are generally recommended for 2H:1V slopes. • areas around the tunnel mouths. • water courses and banks underneath constructed bridges, as well as in the abutment areas. • Affected areas underneath the viaducts as well as above, in abutment zones. • Aesthetic integration of the structural parts of viaducts and bridges (e.g. deck, pillars) and tunnel mouths, using construction materials with colors and textures that blend well with those of the surrounding landscape (e.g. dark concrete for pillars in a black pine forest).			Phase
Design of the landfill waste disposal patterns so that the final contours are integrated with those of the unaffected part of the waste receiving valley.			
Vegetation of the sealed landfills with autochthonous species adapted to the resulting valley conditions.			
If borrow pits are open for the construction of the railway project, these will be reinstated at the end of the construction works.			
BIODIVERSITY ***(Also see Flora, Fauna & Protected & Designated Sites Provisions)***			
A **Biodiversity Management Plan** (BMP) will be prepared and implemented for Section 3 (and covering Section 2 if determined to be required) to ensure the integrity and conservation objectives of the Emerald Sites in Macedonia and the Natura 2000 sites on the Bulgarian side, and that works in these areas or close to them are carefully managed. The BMP shall include the necessary assessments need to fully comply with Article 6 of the Habitats Directive. The BMP will be prepared and finalized in advance of and prior to any works in Section 2 and 3. The necessary assessments to meet the provisions of Article 6 of the Habitats Directive will be completed in consultation with national nature conservation authority and other relevant stakeholders. The BMP will be publicly disclosed.	Biodiversity and Management Plan approved by national nature conservation authority and publicly disclosed.	PERI	Design Phase (prior to any construction operations in Section 3)
Flora			
In Sections 2 and 3 of the railway alignment, the surface for carrying out the clearance of vegetation will be limited to the strip of land needed for the occupation of the permanent way and the right of way of the future railway corridor and the adjacent working width for buildings.	Minimal impact on Flora. No areas cleared unless required for construction.	Contractor/PERI	Construction Phase
As far as possible, the path of the haulage route shall avoid areas of highly sensitive vegetation, including Thermophilous oak forests; Mesophilous oak forests; Submontane beech forest; Hill pastures on stony sites; Unmanaged mesic grasslands; Rivers and streams - epipotamal and hiporhitral streams; Montane streams - Metarhitral streams; Meadows – mesophilous; Wet meadows, or very highly sensitive vegetation, including Riparian willow-poplar woodland; Hill pastures. Any requirement to impact such sensitive vegetation will be documented and approved by PERI before the work commences			
As far as possible, the workers camps constructed during the previous construction period of the railway (1994-2004) shall be reutilized. Should new camps and auxiliary facilities be needed, these will be constructed in areas of vegetation with negligible sensitivity vegetation (only on abandoned fields, ruderal and trampled sites) or low sensitivity (only on Black locust stands and plantations and Black Pine plantations)			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
In areas of high and very high sensitive vegetation, the working sites will be marked by means of ribbons or other type of landmark so that workers and construction vehicles and machinery do not trespass on non-working areas.			
In forested areas, and especially those where the value of vegetation is high or very high (Thermophilous oak forests; Mesophilous oak forests; Submontane beech forest; and Riparian willow-poplar woodland), each tree lying in the border of the construction site will be protected by covering its trunk with wooden planks avoiding any damage to the tree.			
The cutting of trees, will only be done with the required permits in compliance with the applicable regulations and all the necessary permits will be obtained prior to the clearance of vegetation.			
Non operational areas will be restored to a state as close to the original conditions as possible through reinstatement activities, using native plant species from the surrounding areas.			
Control of vegetation along the track will be managed through an integrated vegetation control and management program, which defines: a) type of herbicides to be used, b) application doses, c) time and frequency of application, d) areas where the use of herbicide is prohibited (e.g. in areas of sensitive vegetation, in some buffer zones near the rivers or shallow groundwater), e) alternative methods to the use of chemical methods.	No impacts from herbicides outside of the track bed and immediate margins	PERI to prepare program in coordination with responsible experts from the Faculty of Agriculture (Plant Protection), the Drugs Agency and the Ministry of Health.	Operational Phase
From the edge of the track area to the boundary of the right-of-way, vegetation will be structured with smaller plants near the line and larger trees further away from the line to provide habitats for a wide variety of plants and animals. This means that: • Mowing can be used to control growth of ground covers, minimize propagation of plants in the track area, and prevent the establishment of trees and shrubs in the right-of-way. • Herbicides in combination with mowing can control fast growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. • Trimming and pruning can be utilized at the boundaries of rights-of-way to maintain corridor breath and prevent the encroachment of tree branches. • Hand removal or removal of vegetation, while labor intensive, can be used in the vicinity of structures, streams, fences and other obstructions making the use of machinery difficult or dangerous.);	Development of a natural vegetation along the railway corridor which assist the screening of the Railway	Operator/PERI	Operational Phase
Native species will be planted and invasive plant species removed. This includes: • Dense, thorny native shrubs can be used to help deter trespassers. • Native plants can also help to stabilize clay soils, reducing the need for ballast maintenance. • Leaves of some tree species with invasive root systems can cause traction problems for rail wheels. Therefore, such trees are often removed, even if native to the area. • Waste from removal of invasive species will be disposed of (e.g. by incineration of at a landfill) to avoid accidental spreading of the weeds to the sites.);	Development of a natural vegetation along the railway corridor which assist the screening of the Railway		Operational Phase
Railways will be designed and maintained to discourage plant growth in the track area (e.g. providing lateral barriers to plant migration and ensuring rapid drainage of the track area.);			
Biological, mechanical and thermal vegetation control measures will be used where practical, and use of chemical herbicides on the bank beyond the transition area will be avoided (approx. 5 meters from the track);			
Maintenance clearing in riparian areas will be avoided or minimized.			

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Where the integrated approach to vegetation management indicates the use of herbicides as a preferred approach to control fast growing vegetation within railway rights-of-way, the recommended precautions include: • The herbicides used for vegetation management shall be checked to ensure that PERI uses approved pesticides and avoids using herbicides included in the "forbidden" list issued by international organizations such as WHO (Stockholm Convention) and national legislation (Law on Plant Protection – Official Gazette of RM No. 110/2007, amended 16.02.2009). • Atrazine diuron and other organic long lasting herbicides will not be used along extensive stretches of tracks. They will be replaced by more environmentally friendly glyphosphate or imazapyr containing substances. • The use of persistent soil acting herbicides shall be avoided. • Spraying will be conducted with non-residual herbicides (vs use of residual herbicides). • Application of soil herbicides will be avoided and foliar herbicides used instead (the active ingredient is taken up by the foliage rather than by the roots of plants). • The herbicides used will have a half-life of no more than 2-6 months and be totally degradable within a year of application. • Personnel will be trained in herbicide application, including applicable certification or equivalent training where such certifications are not required. • The users will review manufactures' directions on maximum recommended dosage, as well as published reports on reduced rates of herbicide application without loss of effect, and apply the minimum effective dose. • An optimal dosage and accurate spraying only when and where needed will be practiced, even with the less toxic herbicides. • Herbicide application equipment will be maintained and calibrated in accordance with manufacturers' recommendations. • The herbicide application will be based on criteria such as field observations, weather data, time of treatment, and dosage, and using a pesticide logbook to record data. • Application practices will be designed to reduce unintentional drift or runoff. Herbicide application shall be restricted during adverse weather conditions (e.g. avoiding extensive spraying in rain, inefficient due to dilution, or wind, inefficient due to drift. Larger quantities are needed to get same results). • Untreated buffer zones or strips will be established along water sources, rivers, and streams to help protect water sources. • Spraying of environmentally sensitive areas will be avoided (e.g. those defined in this ESIA as having very high and high sensitivity). Alternative weed removal measures will be sought for these areas (e.g. use of sealing layers, for example made of cloth, to prevent weeds from growing on embankments, or mechanical clearance where possible). • Contamination of soils, groundwater, or surface water resources due to the accidental spills during transfer, mixing and storage of herbicides will be prevented by following the Chemical Accident and Spills Management Program.	No impacts from herbicides outside of the track bed and immediate margins	PERI	Operational Phase

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Fauna			
Construction activities shall be scheduled so as to avoid the breeding season and other sensitive seasons or times of day, especially in areas where high sensitive species are concerned associated to sensitive habitats (see Chapter 6.2.9): • High sensitive habitats for this ESIA include areas of Mesophilous oak forests, Submontane beech forest, Riparian willow-poplar woodland, Hill pastures, Rivers and streams (epipotamal and hiporhitral streams), Montane streams (metarhitral streams), Meadows (mesophilous), and Wet meadows. • The eastern part of the alignment, particularly the stretch of section 3 between K.P. 64 and the end of the planned railway alignment needs to be specifically taken into account in the scheduling of construction activities. In this section the railway passes near or crosses Emerald sites Pchinja-German (MK0000029) and Osogovo (MK0000026), ecological corridors Osogovo-BilinaPlanina and Osogovo-German, proposed protected areas KiselickaReka and Osogovo Mountains, and the two overlapping Natura 2000 sites across the Bulgarian border, which are a continuation of the Macedonian Emerald sites (SPAOsogovo (BG0002079) and SAC OsogovskaPlanina (BG0001011)).	No construction activities during the breeding season in sensitive habitats	Contractor/PERI	Construction Phase
Prior to the commencement of any construction work activity on a site, a fauna survey of the area and its surroundings shall be carried out by a qualified biodiversity expert.	No significant disturbance of sensitive fauna occurs		Construction Phase
If active breeding sites of sensitive species of fishes, amphibians, reptiles, bird, or mammals, including bats, are found, they will be transported by specialized technicians to another appropriate location away from the railway construction area, unless the biodiversity expert decides on other precautionary measures to take.			
If a female bear with cubs is detected in the vicinity of the construction work site, the works shall stop until they have left the area. The same approach applies to wolf, otter, wildcat and marbled polecat.			
Traffic of construction vehicles and machinery will be the minimum required to perform construction works adequately.	No mortality of sensitive fauna		Construction Phase
The speed of vehicles in the area of construction works and hauling roads will be limited to a maximum speed and remembered to the drivers through signage and installation of speed bumps, where necessary.			
Any animal injury or mortality will be recorded in a logbook, and as appropriate further mitigation measures are developed.			
Hunting of wildlife in the area of the construction works will be prohibited to workers.			
Before the start of works, construction workers will be trained on the natural values of the area and the need to be proactive in implementing the measures for the protection of wildlife.	All workers to be trained on measures required to be undertaken to mitigate impacts on fauna		Prior construction phase and during Construction Phase
Regular removal of food and organic waste from the railway.	Minimise animals crossing or moving on the railway	PERI	Operational Phase
Immediate removal of animal carcasses from the railway.			
Fences will be installed in the parts of the right of way corresponding to tunnels or bridges in forested areas and in non-populated open terrains. These fences should deter animals from crossing the railway and lead them towards adequate railway crossing sites. Escaping devices will be provided to allow animals, which accidentally enter in the railway corridor, leaving the area.			
During winter, small clearings of snow along the railway will be carried out every 50-100 m in the areas of biocorridors Osogovo-BilinaPlanina and Osogovo-German.			
Drainage pipes along the railway alignment will be adapted to facilitate the passage of small animals.		Designer/Contractor/PERI	Design Phase/ End

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
The approaches to the bridges crossing water courses will be vegetated so as to create vegetal screens that hide the railway structure (e.g. shrubs and small trees in the area of the abutments).		(BMP: MoTC/PERI)	of Construction Phase/Operational Phase
Fenced areas will be vegetated with native plant species that are attractive to local fauna and with plantation patterns designed to lead the animals towards the wildlife crossings.			
Perform a detailed fauna study to determine the need of additional wildlife passages and disclose the results. Specific wildlife over-crossing for the passage of large animals may need to be constructed in the most highly sensitive areas of the railway alignment, namely biocorridors in the railway stretches that intersect the Osogovo-German corridor (km 64.5 to 68.5) and the Osogovo-BilinaPlanina corridor (km 77 to 89). These sections have a high number of bridges and tunnels (especially Osogovo-BilinaPlanina corridor) and therefore, a potential good permeability. However, there are some stretches of more than 500 meters without tunnels or bridges, where a more detailed study will be carried out in order to determine whether additional wildlife crossings will be necessary to warrant the greatest permeability needed for this part of the railway line. This study shall be extended to Section 2 of the railway alignment, where there are several high sensitivity habitats with a very rich biodiversity and where there are several stretches of more than 2 km without bridges or tunnels. (A **Biodiversity Management Plan** (BMP) will be prepared and implemented in relation to managing the potential effects on these Sensitive Habitats. Within the BMP prior to any works necessary assessments to meet the provisions of Article 6 of the Habitats Directive will be completed.)			
Overhead power lines and catenary shall be signalled to avoid bird collisions. There are a number of devices used to signal ground wires and conductors in transmission lines of electricity, which could be used in the railway, including balls of aluminum, colored spheres, colored plastic spirals, colored plastic bands, luminous markers, colored polyethylene pipes, silhouettes of birds of prey, signaling metal plates, X shaped strips of neoprene, black plastic hanging clamps.	Minimise risk of electrocution of birds	Designer/Contractor/PERI	Operational Phase
Isolation of those stretches of the overhead power line where the catenary is double to avoid the death of birds by electrocution upon contact with the catenary.			
Avoid the use of rigid insulators in the towers supporting the catenary since this arrangement of the insulators increases the risk of electrocution. It is advisable to change the arrangement of these insulators to minimize this risk (e.g. with suspended insulators).			

<table>
<tr><th>Receptor / Proposed mitigation measures</th><th>Target</th><th>Responsible institution/s</th><th>Timing</th></tr>
<tr><td colspan="4">Protected and Designated Sites</td></tr>
<tr><td>The implementation of the mitigation measures identified for flora, fauna and habitats, as well as those identified for soils, water and groundwater, and landscape will serve to ensure the integrity and conservation objectives of all the protected and designated areas in the railway corridor area, including Macedonian Emerald sites and Bulgarian Natura 2000 sites. These measures include:
• The construction of drainage pipes and bridges in water courses will be carried out during the dry season.
• The extension of the construction area next to water courses will be only that strictly necessary to adequately perform the construction works. No occupation of the stream bed or the banks will be allowed, unless there is no other reasonable alternative to carry out the construction work.
• Bridges will be designed and constructed so as to cause the least disturbances to the waterway and banks.
• Retention basins or grassed filter zones to trap sediments and other contaminants will be constructed in the areas where habitats of very high or high sensitivity are located along the alignment or in a close location downstream of the effluent discharge point.
• Untreated wastewater will not be allowed to be discharged into natural water courses.
• Disturbed areas not to be occupied by permanent railway structures will be reinstated by shaping the terrain to that of the surrounding land morphology and using autochthonous plant species present of the surrounding area.
• The surface for carrying out the clearance of vegetation will be limited to the strip of land needed for the occupation of the permanent way and the right of way of the future railway corridor and the adjacent working width for buildings.
• The path of the haulage route shall avoid areas of highly sensitive vegetation
• New workers camps and auxiliary facilities will be constructed in areas of vegetation with negligible sensitivity vegetation.
• All equipment and personnel movements will occur within the established construction works site and hauling roads, especially in zones of high and very high sensitive vegetation.
• Training will be delivered to constructions workers before construction works start and during construction to increase their awareness and responsibilities with regards to the surrounding natural values.
• Control of vegetation along the track to be managed through an integrated vegetation control and management program.
• Construction activities shall be scheduled so as to avoid the breeding season and other sensitive seasons or times of day, particularly in areas where high sensitive species are concerned associated to sensitive habitats.
• Prior to the commencement of any construction work activity on a site, a fauna survey of the area and its surroundings shall be carried out by a qualified biodiversity expert.
• If a female bear with cubs is detected in the vicinity of the construction work site, the works shall stop until they have left the area. The same approach applies to wolf, otter, wildcat and marbled polecat.
• The speed of vehicles in the area of construction works and hauling roads will be limited to a maximum speed (30 km/h).</td><td>BMP
Ensure the integrity and conservation values of protected and designated sites</td><td>PERI/ the relevant Macedonian nature conservation/protection authority and EBRD.</td><td>Design phase, during construction phase and operational phase</td></tr>
</table>

Receptor / Proposed mitigation measures	Target	Responsible institution/s	Timing
Cultural Heritage			
PRECONSTRUCTION ARCHAEOLOGICAL SURVEY - During the construction works, and more specifically prior to any earth works in undisturbed terrain, an archaeological survey will be conducted to check that no archaeological remains are unburied/unearthed without control. The survey will be conducted by a team of expert archaeologists holding valid archaeological research licenses. The archaeologists will be permanently on site to implement the chance finds procedure.	No earthworks to be undertaken unless the area has an archaeological survey	Contractor/PERI	Construction Phase
The construction works should not begin until all relevant permits are provided by the responsible institution, the Administration for protection of the cultural heritage of the Ministry of Culture.	No earthworks to be undertaken unless a permit is held from the ministry		Construction Phase
Chance Find Procedure to be established and implemented prior to construction works commencing. In accordance with Macedonian Law on Protection of Cultural Heritage and EBRD PR 8 requirements. In the event of the unexpected discovery of archaeological objects the Contractor shall immediately inform PERI and the Ministry of Culture and follow their instructions. The construction works will be temporary stopped while the authorities decide if any research are needed or any protection measures should be applied. The Contractor shall follow the instructions provided by the authorities responsible for the protection of cultural heritage.	Implement a Chance Finds Procedures	PERI	Construction Phase
Cultural Heritage training shall be provided to construction workers before the start of earth works to foster their awareness on how to identify artefacts and the importance of protecting Macedonian cultural heritage, including existing cultural monuments and archaeological sites and to be discovered sites.	All staff, particularly those operating excavation equipment to be trained in the chance finds procedure.		Construction Phase
PERI to undertake the necessary works as directed by the authorities responsible for the protection of cultural heritage to protect any archaeological finds from damage and plunder.	No damage of discovered cultural heritage sites	PERI	Construction Phase

8.4 ENVIRONMENTAL & SOCIAL MONITORING PLAN

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
Project stage: Design and Construction								
ENVIRONMENTAL ASPECTS								
Top soil	All construction sites and top soil stockpiles.	Visual inspection of: • disturbed areas for top soil erosion • Top soil stockpiles for erosion.	Monthly with selected areas inspected after heavy rainfall events at the discretion of the environmental manager	To minimize the loss of top soil.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
	All chemical and waste storage areas	Visual inspection of areas for spills and leaks which might impact top soil quality (and ultimately potentially groundwater)	Monthly	To avoid soil (and surface water and groundwater contamination).			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
Surface water	At all construction sites in vicinity of surface watercourses (up to 200 meters at each side of the banks)	Visual checking of: • Construction sites for drainage pipes and bridges. • Retention basins or grassed filter zones. • Chemical analysis of outfalls from wastewater treatment systems which discharge to surface water.	Start-up of activities involving works near and at watercourses. Monthly during construction	To minimize the risk of pollution of surface water To avoid affections to flow and sedimentation patterns. To avoid health risks to residents. To minimize damages to riparian and aquatic vegetation. To minimize damage to riparian and aquatic fauna.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
Groundwater	At all construction areas where the railway alignment runs on alluvial and colluvial terrains and in cutting and tunnels.	Visual checking of groundwater discharges during excavation, cutting or tunneling works for contamination and ensuring that these are sealed efficiently.	Daily or more frequently in excavations to identify groundwater flows.	To enable groundwater flows can be sealed to avoid affecting hydrogeological flow patterns.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
	Springs and wells	Measurement of groundwater quality parameters Visual assessment (or measurement) of spring flow rates	At start of construction and quarterly and for four quarters after the completion of the works	Assessing impact on the chemistry and flow rate of springs Assessing impact on wells			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
Air Quality - Dust	On site at all three sections of the railway alignment	Visual checking of dust emissions from construction sites. Air monitoring procedures will be implemented at sensitive receptors	Monthly during construction works involving earth movements. Increased frequency during dry season.	Minimization of particulate air pollution.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
Air Quality – Combustion Gases	On site at all three sections of the railway alignment	Visual checking of gas emissions for signs of incomplete emissions Air monitoring procedures will be implemented at sensitive receptors	Monthly during construction works	Meeting air quality standards and minimizing impacts to workers and neighbouring sensitive receptors			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
Noise	All construction sites, camps and ancillary areas.	Measurement of noise levels at sensitive receptors	At start up and then monthly	To minimize noise pollution from construction activities			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned	
Landscape	Construction sites, camps and ancillary areas	Visual assessment of landscape impact	At start up and then monthly	To ensure that landscaping is effectively managed and minimize temporary visual impacts during construction			Contractor Sign off by PERI Supervisor Audits by Environmental	

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
							Inspector from each municipality concerned.	
Flora	Construction sites, camps and ancillary areas	Visual inspections of all sensitive habitats adjacent to the construction sites to ensure that these are not being impacted by the construction works and are being protected in accordance with the recommendations of the flora survey.	Monthly	To reduce as far as possible impact and disturbance of flora.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned.	
Fauna & Habitats	Along the three sections of the railway alignment. Section 3 Protected Sites including Emerald Sites &Bio-corridors	Visual inspections of all sensitive habitats, nesting sites, etc., adjacent to the construction sites to ensure that these are not being impacted by the construction works and are being protected in accordance with the recommendations of the fauna survey. Monitoring parameters identified in Biodiversity Management Plan.	Monthly	To reduce as far as possible impact and disturbance of fauna and on sensitive habitats.			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned. (Monitoring reports should be shared with the National Nature Conservation Authority)	
Cultural heritage	All areas where earth movements take place, particularly Section 3.	Visual inspection of all identified cultural heritage sites.	Quarterly unless more frequently required around sensitive locations	Preservation of archaeological sites			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned.	

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
SOCIAL ASPECTS								
Resettlement	Each resettled household	Input and output indicators specified in the RCF Assess resettled household to ensure that the resettlement has been undertaken in compliance with RCF and RAP, and EBRD PR 5, has been done in accordance with RCF and RAP. Complaints from residents through the grievance mechanism.	As detailed in RCF /RAP	To ensure that the RCF and RAP have been undertaken effectively.			PERI	
Community Health & Safety	Communities adjacent to the construction sites	Safety barriers and signage. Monitoring of Community health and safety educational program to ensure that it is effective. Monitoring accidents and near misses. Complaints from residents through the grievance mechanism.	Prior to the start of the construction phase Daily checking of construction sites boundaries.	Mitigating health and safety risks to residents.			PERI	
Influx	At the construction camps	Monitoring of protection measures for workers including monitoring of workforce accommodation.	Monthly and in response to grievances	Ensuring health and well being			Contractor Environmental Inspector from each municipality concerned	
Occupational health and safety measures for workers	At the construction sites	Monitoring compliance with applicable standards and national legislation for worker PPE and safety	Before the start of the project activities Every working day	To avoid occupational injuries and / or professional illnesses			Contractor Environmental Inspector from each municipality concerned	

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
		equipment					State Inspector for OH&S issues	
Local employment	At the construction sites	Monitoring of number of locals employed on the project.	Before the commencement of construction works. Montly during the construction period.	Ensuring local communities benefit from employment opportunities.			Contractor	
Project stage: Operation								
ENVIRONMENTAL ASPECTS								
Soil	Along the three sections of the railway alignment.	Visual inspection of the track and adjacent areas for spills and leaks which might impact soil quality (and ultimately potentially groundwater)	Before operational activities and periodically during operation: quarterly for the first year and then annually there after	To avoid soil (and surface water and groundwater contamination).				PERI
Surface water quality	Water courses crossed by the railway alignment, upstream and downstream the crossing	Chemical analysis of surface water (Suspended particles, hydrocarbons, herbicides) Visual inspection of riparian and aquatic organisms	Before operational activities and periodically during operation: quarterly for the first year and then annually there after	Assessing impact on the chemistry of surface water Assessing impact on riparian and aquatic organisms (flora and fauna)				PERI
Groundwater quality.	Springs and wells	Chemical analysis of groundwater water (hydrocarbons, herbicides)	Before operational activities and periodically during operation: once a year	Assessing impact on the chemistry of springs and wells				PERI
Air Quality – Combustion Gases	Areas with sensitive residential receptors (only	Visual checking of gas emissions of diesel locomotives and heating	Before operational activities and periodically during	Meeting air quality standards and minimizing impacts to passengers and neighbouring				PERI

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
	during stage 1 operated with diesel traction) and train stations	systems at stations for signs of incomplete emissions Air monitoring procedures will be implemented at stations and along the track at sensitive receptors	operation: twice a year during stage 1 and once a year during stage 2	sensitive receptors				
Noise	Areas with sensitive receptors along all three sections of the alignment	Day and night measurement of noise levels at sensitive receptors	Before operational activities and twice a year during operation	Meeting noise quality standards				PERI
Vibrations	Areas with sensitive receptors along all three sections of the alignment	Measurement of vibration at sensitive receptors	Before operational activities and once a year during operation or upon appearance of damages in neighbouring buildings	Assessing impacts on buildings				PERI
Landscape	All three sections of the railway alignment, particularly: Slopes of cuttings and embankments; Tunnel mouths; Water courses and banks underneath constructed bridges; Bridge abutments; Areas underneath viaducts; Structural parts of viaducts and bridges, Stations; Landfills	Visual inspection for signs of erosion, poor vegetation cover, poor maintenance conditions of railway elements, including station buildings.	At the end of construction activities Once a year during spring time	To ensure that landscaping is effectively managed			Contractor Sign off by PERI Supervisor Audits by Environmental Inspector from each municipality concerned.	PERI

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
	and borrow pits							
Flora	Areas adjacent to the right of way of the railway Riparian areas at the points of discharge of railway drainage	Visual inspection of the vegetation to check the growth (density, diversity, coverage) of local (autochthonous) plant formations	Before operational activities and twice a year (spring and autumn) during operation	To assess the impact of herbicide use in areas outside the target treatment areas				PERI
Fauna	All three sections along the railway alignment.	Visual inspection, counting and recording of dead animals along the railway tracks.	Before operational activities Periodically during track inspection within regular maintenance procedures	To assess the impact on animal populations				PERI
Habitats	Animal crossings	Animal surveys to assess the use of animal crossings	During the design phase Before the commencement of the operational phase Periodically during the operational phase: twice a year (in spring and autumn)	To assess the impact on habitat fragmentation				PERI
Cultural heritage	Archaeological sites found during the construction phase	Visual inspection of sites to observe signs of plundering	Before operational activities Periodically during the operation of the railway: four times a year					Macedonian Ministry for Culture – Government of Macedonia
SOCIAL ASPECTS								

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
Stakeholder Engagement	Along alignment	The number and types of stakeholder engagement activities should be monitored and reported on – activities need to be processed and analyzed Monitoring to be done through following activities: how many public meetings were held, how many people attended, what issues were discussed, what were the comments/grievances about, how will they be addressed, etc. The number and types of grievances received should also be monitored and reported on. This should also involve processing and analysis, for example: categorisation of grievances (those related to land acquisition, economic displacement, health and safety, construction nuisances, community impacts, etc.), average time to respond, outstanding grievances, etc.	Regular monitoring on monthly base	To allow and provide full engagement of stakeholders during all phases of the project				PERI Sign off by MoTC And Audits by Local Self Government
Land Acquisition, Involuntary Resettlement & Economic Displacement	PERI/MoTC offices, Legal and property offices/ on site	Activities related to land acquisition should be recorded in an appropriate manner to	Regular monitoring on monthly base	To assure that affected families are receiving necessary support in restoring their life and standards from				PERI

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
		allow for data processing, monitoring and reporting, for example: number of people / households affected, type of impact - temporary or permanent land acquisition, type of compensation packages or assistance provided, identified and assisted vulnerable groups, number of negotiated settlements, number of court or administrative appeals, etc.)		temporary and permanent land take				
Social Monitoring	Contractor's offices	Record the number of job vacancies resulting from the Project and the number of vacancies taken up by residents of affected local communities.	On each three months	To assure proper management of Local Recruitment plan				PERI
	Railway stations	Monitoring effects on population by reporting on a number of question for the impairments and improvements of the life from project realization and specific problem identified by local residents.	On each three months	To assure that the project realization will improve life of the residents				PERI

Receptor/Parameter to be monitored	Monitoring Location	Monitoring Parameters	Frequency of monitoring	Reason for monitoring	Cost		Responsibility	
					Construction	Operation	Designing phase, construction and reconstruction works in all three sections	Operations of the railway system
Labour & Workforce Monitoring	Along the alignment	Monitoring of protection measures for preventing workers accidents during operational phase, worker and labour inspections and disputes	Regularly on daily base	To assure that all required standards are fulfilled			Contractor/PERI/Consultant	Macedonian Railways Transport /PERI
		Monitoring the safety of workers (alcohol testing)	Regularly on daily base	To prevent workers accidents				Macedonian Railways Transport /PERI
Community health and safety educational program developed for the railway operation	Along the alignment	Checking that the program is prepared and implemented. Visual monitoring of the implementation through media and other education forms.	Regular monitoring on monthly base	To avoid accidents that may occur during the operation of railway				PERI/ Macedonian Railways Transport/ MoTC

Chapter 9 Analysis of Technical Insufficiency & Need for Update of the ESIA Study !

Describes the various technical insufficiencies encountered during the ESIA development in terms of data availability (lack of data) and collection.

9 ANALYSIS OF TECHNICAL INSUFFICIENCY & NEED FOR UPDATE OF THE EISA STUDY

For the preparation of the ESIA, the team had at their disposal it is considered sufficient information, data and documents withstanding the technical insufficiencies and assumptions detailed below. The main sources were official adopted documents by municipalities, documents at regional or national level, environmental reports issued by the responsible institutions and the Project Proponent – PERI. Several site visits along the railway alignment, and interviews with responsible persons (environmental officers, inspectors, communal inspectors, water management staff, urban planners) from the Municipality of Kumanovo, Kratovo, Staro Nagoricane, Rankovce and Kriva Palanka were held. Scoping stakeholder meetings were held and at these where additional information was pointed out by the different stakeholders. Following revew of this information the team conducted further detailed research on some of the environmental and socio-economic issues. Relevant national legislation, EU legislation and good practice examples from other railway projects were considered in the development of the ESIA as well.

Several technical insufficiencies and assumptions in the preparation of the ESIA were identified, which are addressed below.

9.1 ENVIRONMENTAL ISSUES

Topography & Landscape

There are no published landscape unit maps for the study area.

A digital terrain model (DTM) to describe the visual envelope could not be prepared due to lack of available 3D map data for the study area. Therefore, a digital intervisibility map (or “point to point” visibility map) for systematically determining visual exposure relationships (e.g. visual envelope), was not be prepared.

Geology, Geomorphology and Soils

The primary resource for the geological data was the Basic Geological Map of SFR of Yugoslavia - Sections Kumanovo, Kratovo & Kustendil; 1:100000, Geological Institute Skopje, edited and published by the Federal Geological Institute, Belgrade 1983 and the geological maps of the area with scale 1:25,000. No other geological maps are available.

The information was collected from the sources indicated above and is limited to these sources and the expert knowledge of the geologists that prepared the baseline.

The description of soils along the railway alignment was based on the limited available information existing about the study area, the different types of soils known to be present in the area of the railway corridor may occupy and on the types of geological substrates intersected by the railway alignment.

Hydrology (Surface Water) & Hydrogeology (Groundwater

There is still a lack of secondary legislation in the water sector, this is required to fully bring national water protection legislation in line with EU environmental legislation.. The legal base for this secondary legislation is the Law on Waters (Official Gazette No. 87/08, 6 /09, 161/09, 83/10, 51/11). The following secondary legislation for the water sector is planned to be prepared by the middle of 2012:

- Degree on criteria for the determination of the good ecological status of the surface waters – physical/chemical, biological and morphological conditions;
- Degree on criteria for the determination of the good ecological status of the ground waters – physical/chemical, biological and morphological conditions;

- Rulebooks on the determination of the sensitive water zones and water bodies.

With regards to groundwater, existing hydro-geological information for the North-Eastern region is very scarce.

With regards to geothermal areas, the detailed investigations about this area are lacking.

Climate and Air Quality

In the North-Eastern region there is only one air quality monitoring station located in Kumanovo. No other monitoring stations are in place, so that there is no information about the air quality in other cities of the region, like KrivaPalanka, which is one of the most sensitive urban settlements with regards to air pollution due to heavy traffic and a large amount of construction works planned. No strategic mapping has been done for Kumanovo and for the main railway Tabanovce – Gevgelija (Corridor X).

Expert judgment was used to describe the baseline conditions, taking into account the sources of air pollution in the region, especially in Kriva Palanka municipality (stationary and mobile sources).

There is no national legislation adopted yet on air emissions from mobile sources and outdoor equipment specification on air emission limits. There is no information on the transposition of the EU Directive 2004/26/EC on non-road machinery, including emissions from the railway-locomotive operation and testing for compression ignition engines and emissions limits on CO, HC, NO_x, NMHC and particulates.

Noise and Vibration

Other than for Kumanovo, there is no official noise measurement performed for other towns or villages in the North-Eastern region (e.g. Kratovo, Kriva Palanka, and Rankovce).

The strategic noise mapping for Kumanovo has not been prepared at the time of preparation of the ESIA.

Noise measurements were performed only during the day because it was estimated that due to low population density and traffic levels of the study area, noise levels during evening and night time periods would be very low. This assumption was made by the Consultant based on their knowledge about the regional circumstances.

There is a legal basis for the development of secondary legislation on conditions for noise protection from roads, railways, airports and marine ports within the Law on Noise Protection (Official Gazette of RM No. 79/2007, 124/10 and 47/11), but it secondary legislation has not been developed yet. Also, there are no national standards developed for outdoor equipment where the requirements set in EU Directive 2000/14/EC on noise emissions for outdoor equipment will be transposed.

There were no data available for vibrations along the railway alignment.

A Detailed Railway Noise and Vibration Study shall be completed during the development of detailed design to identify and predict noise levels at all sensitive receptors along the alignment (especially across housing zones) and determine specific and optimum noise abatement measures according the national and EU/WHO standards.

Waste Management

From the interviews with the PERI staff who were involved in the previous construction works during the period 1994 – 2004, plenty of information and data related to waste management in that period was obtained (inert waste landfills and borrow pits in each municipality in the North- Eastern region).

However, there is no information on total quantities of waste disposal in the existing landfills. All the municipalities in the North-Eastern region have adopted annual programs for waste management, but there is limited implementation. Moreover, not all municipalities report to the Ministry of Environment and Physical Planning.

Nature Conservation & Biodiversity

The preparation of the biodiversity baseline has been mainly limited by the lack of existing detailed data specific to the railway corridor. This has been particularly true for plants and mammals. No vegetation maps or habitat maps exist in the Republic of Macedonia at the national or regional levels. Much of the information, thus, has been newly generated by the experts in the various biology fields participating in the ESIA study, through interpretation of cartography, satellite images and aerial photographs, and field surveys.

Moreover, the determination of sensitive plant and animal species that are potentially present along the railway corridor has been limited by the fact that no Red Data Books and Red Lists for Macedonian flora, fauna and fungia have been prepared yet at a national or regional level. Thus, the establishment of the presence of sensitive species in the railway corridor area had to be done on the basis of the most relevant international conventions and treaties (Bern Convention, IUCN red list, Habitats Directive, etc.). These international documents contain lists of species threatened to different levels (e.g. from Least Concern to Extinct). The problem arises from the fact that there may be species that are of low concern at an international level, but have some level of threat in the Republic of Macedonia (or vice versa), thus underestimating (or overestimating) the sensitivity value of the species.

Cultural Heritage and Archaeology

No assumptions have been made or limitations encountered.

9.2 SOCIAL ISSUES

The latest available census data was from the Census 2002 which obviously is a limitation of this dataset. However all available recent data, from different sources were used in preparation of this study in order to present more or less the current socio –economic baseline within this region. Furthermore, a census will be undertaken in Section 3 for the Project during the next stage of project preparation identifying all directly affected by the Project.

Need for Update of the EISA Study

The need for update the ESIA fully depends of the existing technical insufficiency that the ESIA Team was faced during the developing the Study.

Each of the project stages (design, construction and operation) need environmental and social evaluation with main objectives: a) to determine the effectiveness of the proposed minimizing (preventive, mitigative or compensatory) measures and b) to provide feedback to the project developer regarding necessity of modification/add some more effective measures.

The broader benefit of the post-construction evaluation will convert ESIA into a more accurate and useful tool to achieve sound, rational and sustainable infrastructure /railway development.

The main tasks to be performed raised from the proposed Monitoring Plan for each environmental and social element and the general activities include: a) listing of parameters to be evaluated (from the Monitoring Plan), b) Nomination of the Evaluators, c) Adoption of the standard evaluation methodology, d) involvement of the public participation in open-transparent way, e) Collection, review and analysis of the monitored data and information, f) Evaluation of the compliance with national, EU and good practices from the IFC.

The separate Report should be added to the main ESIA Study with the main findings after the evaluation and the updated version of the Environmental and Social Mitigation and Monitoring Plan should be prepared and discussed with the public.

Chapter 10 Conclusion !

Summarizes the key findings and conclusions of the assessment including the potential significant residual environmental and social effects.

10 CONCLUSIONS

10.1 INTRODUCTION

Corridor VIII is a multi-modal transport system along the East-West axis comprising of sea and river ports, airports, multi-modal ports, roads and railways, comprising of a total extension of 1270 kilometres of railways and 960 kilometres of roads. The main alignment of Corridor VIII runs from the southern Italian ports of Bari and Brindisi, the Albanian ports of Durres and Vlora, the cities of Tirana, Skopje, Sofia, Plovdiv, to the Bulgarian ports of Burgas and Varna (Black Sea), thus connecting the Italian Adriatic Transport Corridor, the Adriatic branch of Motorway of the Sea and the Mediterranean Transport Area to the Black Sea Pan-European Transport Areas.

Railway Corridor VIII, which passes through the territory of the Republic of Macedonia, is partially finished in this country, except for two unfinished parts: the first one, the Western part, towards the Republic of Albania and the second one, the Eastern part, towards Republic of Bulgaria.

The rationale of the Project Railway Corridor VIII-Eastern Section is to complete the railway link between Macedonia and Bulgaria. It includes the reconstruction /rehabilitation Section 1 (Kumanovo to Beljakovce, first 30,764 km) of the railway alignment, and construction of Sections 2 (Beljakovce to Kriva Palanka, from K.P. 31,164 to K.P. 65,092) and 3 (Kriva Palanka to Deve Bair at the Bulgarian Border, from K.P. 65,092 to K.P. 88.515).

The Project is to be delivered in two main phases of investment:

- **Stage 1**: Comprises of the rehabilitation of the Kumanovo-Beljakovce section (Section 1) without electrification and with very basic signalling and telecommunication equipment. The envisaged construction period is from 2013 to the end of 2014. The operation period is expected to be from the end of 2014 to 2018 using diesel traction and for local passenger services but with no freight services; and
- **Stage 2**: Rehabilitation and construction of Beljakovce-Deve Bair section (Sections 2 and 3) and the electrification of the whole eastern section Kumanovo-Deve Bair (including Section 1). The envisaged construction period is from 2015 to 2018 with the commencement of railway operations by the end of 2018.

The purpose of the ESIA was to identify and assess the potential positive and adverse impacts that may arise from the Project on the physical and natural environment, on the socio-economic wellbeing and conditions of the population (community and workforce) at the local (municipalities), regional (North-Eastern region), national (Macedonia) and transboundary levels. Identified impacts have been assessed taking into account the environmental and social baseline conditions analyzed for the study area, and, where necessary and appropriate, mitigation measures to avoid, prevent, mitigate or compensate significantly adverse impacts and enhance beneficial impacts have been proposed. In this regard, a mitigation and monitoring plan to both monitor and evaluate the implementation of mitigation measures and the Project performance on environmental and social baseline conditions has been included as an integral part of the ESIA. Furthermore, the assessment has determined the significance of residual effects remaining on the environment and community as a result of the Project following implementation of the mitigation measures.

10.2 SUMMARY OF POTENTIALLY SIGNIFICANT RESIDUAL ENVIRONMENTAL EFFECTS

10.2.1 CONSTRUCTION PHASE

With the application of the mitigation measures during the construction phase, the majority of residual effects were found to have a slight negative significance except for 2 potentially significant residual effects in relation to the ***destruction of top soil*** and ***impairment of noise quality***, which were found to be of a moderate adverse nature.

Destruction of Top Soil

In Section 3, about 82% of the top soil present along the railway corridor which will be permanantly removed comprise of natural and semi natural soils of high to very high sensitivity and 10 % corresponds to medium sensitivity agricultural soils. It was determined in the assessment that even if top soil is removed selectively for reuse in the rehabilitation of disturbed surfaces along the railway alignment and for agricultural purposes, the loss of top soil would still be distinguishable and measurable, although however it is not considered this will affect the integrity of the resource in the area.

Impairment of Noise Quality

Noisy construction operations (earth movements, tunnels and bridges construction, demolition, dredging, production of gravel and concrete, transport of materials in and out the construction site, etc.) will take place in areas which are currently very quiet, within several small villages along the route. It has been considered that for most of the receptors in any section that live near to the railway alignment, there will be potential impacts on noise levels during construction of a high magnitude. Mitigation measures to minimize noise and vibration emissions during construction include compliance of all construction equipment with the requirements of EU Directive 2000/14/EC on noise emission in the environment by equipment for use outdoors, application of restrictions to noise emissions according to noise level areas, limitation of construction activities to a day-time schedule, regular maintenance of vehicles and machine, implementation of a traffic plan, and monitoring of vibrations during the performance of critical work processes. However, it was considered that although these measures are certainly necessary to minimize the impact, the disturbance to neighbours due to noise and vibrations from the construction activities would still have a moderate significance, even though this will be of a temporary short-term nature.

10.2.2 OPERATIONAL PHASE

With the application of the mitigation measures during the operational phase, one impact was found to still be of a potential moderate adverse significant nature (***impairment of landscape quality***), and 2 impacts were found to have their significance reduced from large and moderate/large to a moderate adverse nature (***habitat fragmentation and decrease of animal populations***).

Impairment of Landscape Quality

The railway tracks, the new bridges and viaducts, the tunnel entrances and exits, the stations and their platforms and the new landfills, will create an adverse impact on landscape during operation arising from the appearance of linear and geometric forms and the introduction of color changes (due to the removal of the vegetative cover, the use of construction materials with textures and colors different from those of the nearby natural elements, and the creation of new substrates in cuttings and embankments). This impact was found to have a moderate significance due to an overall medium sensitivity of landscape receptors, a high intensity of impacting activities, high aesthetic values, and a variable number of potential observers, particularly in sections 2 and 3. Proposed mitigation measures such as landscape planting and the integration of the design of the railway structures in the surrounding landscape, even though they greatly offset the adverse effects on the landscape scenery, they have a moderate success in hiding the alterations introduced by the presence of the new railway objects.

Habitat Fragmentation

Habitat fragmentation caused by the physical presence of the railway track and the traffic of trains was found to have a large significance, particularly because of an abundant presence of habitats with a rich biodiversity in Sections 2 and 3. The last 2 kilometers of Section 1, practically all Section 2, and the first 5 to 6 km of Section 3 of the railway corridor is dominated by hill pastures, often alternating with degraded xerothermophilous oak forest. Hill pastures provide good possibilities for breeding and feeding to animals, and consequently are rich habitats concerning animal biodiversity. In Section 3, from P.K. 74 to P.K. 78, the railway corridor is mostly dominated by thermophilous oak forests with some alternation of hill pastures and black pine plantations. From P.K.78 to the border of Bulgaria, the railway corridor is basically comprised of a succession of forested areas; mixed plantations of black locust and pine with oak at the beginning, and then woods of mesophilous oak in the north-faced slopes and thermophilous oak woods in the south-faced slopes, with areas of submontane beech in the north-faced slopes. These are all habitats rich in fauna where the presence of wolf and the sporadic presence of bear (Ursus arctos), both priority species under the Habitat Directive, have been reported. In addition to the biodiversity richness associated with Section 3, this stretch of the railway alignment is important in considering the fragmentation impact because it intersects with two biocorridors, the Osogovo-German landscape biocorridor and the Osogovo-Bilina Planina linear biocorridor. These corridors are expected to be part of the national ecological network of the Republic of Macedonia.

Even though there are several tunnels and viaducts, particularly in Section 3, that offset the fragmentation effect, the significance of the effect without the application of mitigation was estimated to be of a potentially large adverse nature because the physical presence of the railway tracks and the heavy traffic of trains during the day (>65 trains/day) will considerably limit the free movement of animals across relatively long stretches of habitats that are rich in fauna and host important species like wolf and bear, including several Macedonian endemic species. Moreover, the railway overlaps with two fauna corridors connecting regions within Macedonia and between Macedonia and Bulgaria. The application of mitigation measures, particularly the construction of wildlife crossings at strategic sites and the rehabilitation of the passages underneath bridges, will certainly help to increase the permeability of the railway to wildlife, but still, the impact would be distinguishable and measurable, although amenable to management. Its significance, thus, is estimated to be of a potentially moderate adverse nature.

Decrease of Animal Populations

The decrease of animal populations would be due to the killing of animals by the traffic of trains (collisions) or by the fixed physical structures associated to the railway (collisions and electrocutions), and by driving off of individuals due to the effects of train traffic.

In Section 1, killings by the passing trains and the railway infrastructure could potentially affect sensitive bird species, since from approximately K.P .15 to K.P. 55, the alignment crosses IBA River Pcinja-River Petrosnica-River Kriva Reka (IBA Code: MK006), which hosts Imperial eagle, European roller, Long-legged buzzard, Peregrine falcon, Lanner falcon, Short-toed snake eagle, Black stork, and Masked shrike, all of them sensitive bird species. In addition, there are several areas designated for the management of birds in the railway corridor or in the vicinity. In Section 2, the risk of killing animals by passing trains and the electrical infrastructures of the railway will be highest for flying species of birds and bats as well as for terrestrial species of mammals, amphibians, reptiles and insects because: 1) hill pastures and oak forests are rich in biodiversity and host many sensitive species of these animal classes, 2) there are long stretches without bridges and tunnels (more than 2 km in some areas) where terrestrial animals are prone to crossing the tracks, thus increasing their probabilities of being hit by the train, there are areas where the railway runs between high cutting talus, from where birds may find difficult to escape. For Section 3, the railway corridor is mostly dominated by oak forests (more degraded in the proximities of Kriva Palanka and well preserved as the alignment advances towards the border), with areas of submontane beech in the north-faced slopes, at the end of the alignment. These oak and beech forests have a rich biodiversity and host sensitive species, including that of the bear for which sporadic occurrences from Bulgaria, through Osogovo mountains have been registered. Other identified sensitive mammals known to be present in these areas are the grey wolf and the wildcat. Reptiles are represented by Hermanns Tortoise, greek tortoise, and snake-eyed skink, and beetles by greater capricorn beetle and long-horned beetle. Although there are several tunnels in Section 3 of the railway, there are several stretches of more than 250 m where collisions with terrestrial animals could potentially occur, as well as bridges, where birds and bats can also be hit by trains or electrocuted by aerial electrical lines and supporting poles.

Because of the richness of fauna all along the railway, and the high probability of accidents involving animals, the significance of the impact was found to be moderate to large nature locally before consideration of mitigation beyond that incorporated within the design. Mitigation measures to reduce animal killings include regular removal of food and organic waste from the railway, installation of fences in the parts of the permanent way not corresponding to tunnels or bridges in forested areas and in non-populated open terrains, devices in overhead power lines and catenary to prevent death of birds by electrocution and collision, creation of adequate wildlife crossings in number, size, location, and vegetal coverage. These measures will certainly reduce the number of killings and will help to keep the integrity of animal populations, but it has been considered the impact could still be distinguishable and measurable, thus the significance is estimated to be of a potentially moderate adverse nature.

10.2.3 SUMMARY OF CUMULATIVE & TRANSBOUNDARY RESIDUAL ENVIRONMENTAL EFFECTS

In regards to cumulative impacts with other projects, the significance of the cumulative residual effects on each of the environmental receptors that were considered in the assessment was found to be slight in all cases except for landscape, fauna and habitats, where the significance of the residual effect was found to be large adverse potential for elements of landscape, and moderate adverse for fauna and habitats. It was found that the project that most contributed to the cumulative impact in all cases would be the Vakuf water reservoir.

As for the transboundary effects, the effect on protected and designated sites was found to have some slight adverse significance, mainly due to the importance and the presence of the Natura 2000 sites across the border of Bulgaria (Special Protection Area for birds Osogovo BG0002079 and Special Area for Conservation Osogovska Planina, BG0001011), which are a continuation of Macedonian Emerald sites (Pchinja-German MK0000029 and Osogovo MK0000026).

10.3 SUMMARY OF POTENTIALLY SIGNIFICANT RESIDUAL SOCIAL EFFECTS

10.3.1 CONSTRUCTION PHASE

According to the assessment of social receptors the most adversely affected receptors will be land and property and vulnerable groups. With the application of the mitigation measures during the construction phase, the majority of residual social effects were found to not be of a significance adverse nature except for potentially significant residual adverse effects in relation to the ***Loss of Land & Property and Effects on Vulnerable People.*** Significantly beneficial residual social effects in relation to the ***Stimulation of economic growth at local levels during construction*** and ***Creation of local employment (direct and indirect)*** during construction are also anticipated.

Loss of Land & Property

During the construction works, most land to be utilized will be of a temporary nature and is a result of requirements for construction of compounds and working sites along or close to the line in addition to space for storage of plants, materials and site offices etc. Contractors' may temporarily also require land for Borrow Pits & Landfills. The temporary use of land during construction works is estimated to be 19,000m^2 for Section 1, 103,200m^2 for Section 2 and 424,678m^2 for Section 3.

For the construction of the new railway line a permanent land take of 11 meters on both sides of the railway line is required. This is in accordance with national legislation on Railway System (Official Gazette of RM. 48/2010, Article 59). For Sections 1 and 2; legal procedures for permanent land expropriation are completed. For Section 3, the planned railway line will mostly go through open land and according to the preliminary assessments; a total of 424,379 m^2 of land will have to be expropriated.

Preliminary assessments conclude that 25 residences in total will be affected by the Project within Section 3. The following settlements within the Municipality of Kriva Palanka will be affected by physical displacement by the project activities: Gradec – one residence, Kriva Palanka town – 19 residences and Uzem – 5 residences.

Significance of the impacts without mitigation measures both for permanent land loss and loss of housing was found to be large adverse. With implementation of mitigation measures significance of residual effects was found to be of a moderate adverse nature. Mitigation measures include: preparation of Resettlement Action Plans separately for each Section based on the Resettlement Compensation Framework prepared within this ESIA. Already prepared Expropriation study for Section 3 has been considered but a detailed survey and Census will be conducted in line with PR 5 requirements in order to ensure that all affected families, not only those with legal rights already elaborated with Expropriation study will be duly compensated for all their belonging and expenses connected with being resettled.

Situation caused from loss of gardens, community land and agricultural production raised by temporary land loss during construction phase will be returned into previous state during operational phase. However loss of gardens, community land and agricultural production due to permanent land loss during construction phase cannot be returned into previous condition. The owners will be compensated for lost land (with land or financially). For those who have agricultural land without practicing agricultural activities may be expected to choose financial compensation with those with farming activities will require land for land. That will mean that new gardens will be erased, agricultural activities on new land will start maybe with some different crops.

Effects on Vulnerable Groups

Two vulnerable groups were identified. First group is local community "Pero Cico" in Kumanovo where the railway is passing by. Ten houses with 20 families are residing at a distance of 7-8m from the railway. They are very vulnerable due to their social and economic exclusion in the society. They are mostly unskilled labours working in the cleaning, black market trading, collection and selling used plastic bottles, playing music etc. They are living in substandard housing conditions. Due to the economic crisis in Macedonia and transition related factors most of them rely on social welfare for survival. They are at the bottom of the social hierarchy thus their ability to cope, resist and recover from the impacts is very low. In the length of around 10 meters on the existing railway line, structures of temporary character have been raised by the people who are living in the nearby houses. These are three cottages (sheds) made from lightweight materials, used as storage for plastic bottles and various boxes which will be sold as recycled material by the owners. Direct adverse impact of project activities is that some of the space in front of their houses will be lost for the purpose of the railway line. The space is used both for storing plastic bottles and for playing by 48 children under the age of 18. Selling of the empty plastic bottles is for some of the families the main source of income in addition to the social welfare. The concerned people remember that the railway line was operational previously and trains were passing on the track they use as playground and for storing empty bottles. They are also aware that the state and Macedonian Railways have plans to reactivate the rail traffic and that they are occupying the line illegally. During initial reconstruction works in previous years, Macedonian railways built a protection wall with the height of 1.5 to 2m at a distance of 3m from the railway. Between the protection wall and the houses there will be an open area/path to be used as access road to the houses.

With application of mitigation measures the significance of residual impact was found to be ***moderate negative*** . Mitigation Measures includes: traffic solution for this settlement has to be designed and later constructed in order to provide safe and regular access of the inhabitants to their houses (over passing) , safety of people who live near railway should be insured with adequate marks and signs, for both construction and operational phase, illiteracy of some of the affected people should be taken into consideration, to avoid negative impacts of vibrations and having in mind the unstable house structures, it has to be anticipated strengthening of the houses during construction phase, during operational phase, inhabitants to be protected with anti noise wall, which will significantly reduce the adverse impact of the noise and will secure safety of residents, lost space in front of the houses, used for storing and as space for play, it needs to be compensated. In cooperation with Municipality of Kumanovo, PERi must point out location in vicinity of settlement where children could play. Access road to this space should be provided; another location should be pointed out for storing the plastic bottles in close cooperation with Municipality. Municipality of Kumanovo already has plans for placing containers where affected people could continue with their activity. PERI should cooperate closely with Municipality in regards with this. Due to the loss of businesses and incomes, affected people would be duly compensated, anti noise wall, house insulation and triple glazing in the windows should be implemented as s mitigation measure for settlement of Pero Čičo.

Identified second potentially vulnerable group are residents in Section 3 who will lose their houses and land. During the construction phase 25 families will lose their homes in Section 3. Some will lose their land, forestry, pastures, fields, orchards. Some families may lose both their homes and part of their land. People will need to leave their memories, to change their livelihood and to establish new social relations within a new environment. New agricultural activities will result from loss of land. The magnitude of the impacts with the implementation of mitigation measures becomes medium. The significance of the residual effect is then ***moderate negative***.

Economy & Employment: Stimulation of economic growth at local levels during construction and Creation of local employment (direct and indirect) during construction

Positive impacts from construction activities are mainly those on economy and employment. Direct and indirect business opportunities will potentially increase significantly for local contractors and especially subcontractors during construction works. Food and some construction materials will be supplied locally and thus increase local trade. The local economy will also experience opportunities for providing skilled services from e.g. like craftsmen and hammer mill operators. Increased revenue and taxes that will be accumulated by construction activities will partly be diverted from the state to the local level. Due to the limited capacity of local economy it is expected that demand for material, services and subcontractors will extend to the entire North-Eastern region of Macedonia. National economy is expected to be affected as well. Most of the larger construction companies are established at national level. For some of the materials to be used during construction, suppliers from other parts of the country will have to be utilized and thus improve opportunities for trade at national level.

Especially important are the positive impacts that will be created by improving the employment situation. The employment benefits during the construction phase is positive since it relates to the project activities, induced by increased employee spending. Considering that a bigger proportion of the total population is economically inactive, the project will increase opportunities for a bigger percentage of the population by improving their them access to employment opportunities. Employment opportunities will be created for both skilled and non skilled labor in the community. The community has the capacity to absorb the employment opportunities arising during construction phase. During construction of the railway, employment will be generated mainly for construction workers. During previous construction work, all four of the biggest national construction companies worked as Contractors. Mainly using their constant employees but due to the size of the works additional workforce was engaged from local communities directly or indirectly through subcontractors. Due to technological developments and investment in laborsaving equipment, the workforce needed when work will be assumed on the four sections of Corridor VIII is thus estimated to be in the range of 6 - 700 workers. The workers camps where workers will be accommodated include kitchen and dining room and provided medical service. Although those camps will provide for canteens, it is expected that both the camp management and the workers will spend money locally utilizing the local business community for ensuring supplies for the camps and entertainment and other services for the workers. Thus, positive spin off effects during the construction period on the local economy are expected.

10.3.2 OPERATIONAL PHASE

With the application of the enhancement measures during the opertational phase, the majority of residual social effects were found to have a large positive effects except for potentially significant residual adverse effects in relation to:

- ***Community reactions due to disturbance arising from operation of railway;***
- ***Community & Railway workers safety during operation of railway***
- ***Effects on Communities Quality of Life due to Noise, Vibration & Safety***

Significantly beneficial residual social effects during operation as a result of the development of the Railway Project are also anticipated in relation to:

- ***Economic, Employment and Education & Training Beneficial Effects*** including:
    - *Effects on local economy, North-Eastern Macedonian economy, National economy and Regional economy*
    - *Creation of employment (direct and indirect) at local, regional, national and transboundary (through much or all of Macedonia and Bulgaria) and global level (beyond SEE area)*
    - *Improvement in access to employment opportunities across the region*
    - *Education and training benefits from employment opportunities*
    - *Education and training benefits from improved access to education and employment opportunities*
    - *Improvement of quality of life due to changes in economic well.*

Community reactions due to disturbance arising from operation of railway

Community reactions due to the disturbance arising from the operation of railway are expected, especially from communities living at or close to the railway that will be mostly disrupted. Once the railway is operational, freight and passenger traffic will be diverted from roads to trains. The new railway line will lead to a reduction of negative externalities. The shift in mode of transportation will lead to a relatively reduction in traffic accidents on the roads, in air pollution and CO_2 emissions. Communities at or close to the railway line will mainly be disturbed from and react on noise, vibration and electromagnetic fields caused by train operation in addition to safety regulation at railway crossings. This is expected to be more in the beginning until they have adapted to the changed living conditions associated with railwayThe significance of the residual effect is ***moderate negative***.

Economic, Employment and Education & Training Beneficial Effects

Following the construction period, it is estimated that a number of people who will find employment within the local communities and within region mainly with the railway operation and maintenance, at the stations and other transport related services will be significant. On activation of the whole corridor, passenger and freight transport should induce many employment positions along the railway line. Direct employment opportunities will be created, related with operation and maintenance of railway (on permanent way, on signalization, on loading and unloading and similar). Additionally, the train travelers are expected to have certain needs that can be fulfilled from the local restaurants, cafeterias, markets etc. Thus, long term business opportunities at the new railway stations are likely to emerge. All in all, it is estimated that around hundred people may find employment with the railway operations, at the stations and with other services linked with transport in addition with servicing travelers' needs.

Expected development of the economy at regional, national and beyond national level should create many job positions. In the region it is expected development of mining, tourism and forestry. Free industrial areas are expected to also have huge importance in jobs creation.

Operation of the whole Corridor VIII should improve and strengthen economic and other kinds of cooperation between Macedonia, Albania, Italy, Bulgaria and Turkey. This should encourage prosperity of the SEE. Beside creation of direct employment possibilities on the railway, indirect employment possibilities should occur as a result of increased trade and increased economic activities.

The operational railway should result in positive effects on the local economy, North-Eastern Macedonia regional economy, National economy and Global economy,

During the operational phase, the local economy will benefit through some employment opportunities with the operator and railway Infrastructure Company, by opening of restaurants, shops at railway stations, through development of local economic activities like agriculture, forestry, mining, tourism, harvesting of forest foods which is expected to be intensified due to better access to newly opened markets nationally and regionally. Passengers should save money due to the cheaper transport. All Municipalities in the region have planned for free development zones within their general Urban Plans and with available railway transport, these free zones will be more attractive for foreign investors. Increased direct investments and green field investments can be expected.

The North-Eastern region is classified as the least developed planning region in the Republic of Macedonia. The Region is rich with natural resources. Their explotation could be supported with development of a railway line as an alternative cheap transport solution. By having the Railway Corridor VIII constructed, the region will have access to transport facilities which can accommodate almost any transportation needs of people and goods, and it is likely that this will contribute to the stimulation of economic growth within the North-Eastern region. There is potential for increasing and intensifying the agricultural production of the region. Small and large farmers can have their agricultural products transported to Skopje and also to the rest of Europe. The region is rich with high productive pastures, cattle breeding is also an area with great development potential. The railway should improve the connection between the farmers (producers) and meet indutry. Forestry is another area with prospects for development. Forestry is a production that requires railway transportation. Trains can carry up three times more forest products than a truck which results in lower per unit costs of inventory and shipping. The region is one of the most significant mining areas in Republic of Macedonia. The municipalities of Kriva Palanka, Kratovo all have substantial metal ores e.g. lead, zinc, antimony, copper, silver, gold, uranium and non metal ores e.g. bentonite clays, tuffs, quartz, diatomaceous earth, alluvium, silica, marble, granite. With access to freight trains, the mining operation may become more economically feasible and thus be intensified. All municipalities within the North-Eastern region have devoted an area for industrial free development but as of now only few businesses are established. With operation of railway these areas will become attractive for foreign companies, due to the closeness of the sources of row materials, lower salary costs and good access to markets through the Corridor VIII. Thus, a new railway link will improve the socio-economic situation within the municipalities of the North-Eastern region. The Region has much potential and railway transport could help this potential to be utilized in direction of economic growth. As potential economic impact that could arise within this impact could be considered following: Increased income, changes in wages, improved living standard. It can be estimated that around 1,500 families will have positive benefits from the railway development.

Operation of railway will promote economic growth by building, enhancing, managing and maintaining the railway transport service to the economy. Railway transport should decrease transport costs in the final market price of the products which will lead to bigger competitiveness of national economy abroad, especially in the countries along the Corridor VIII (in first instance neighbouring countries). Railway corridor VIII will provide new transport model as integrated and interconnected transport network that will establish effective services to the users in the country (both for passenger and freight traffic). North-Eastern region of Macedonia as the most disadvantaged region in the country will be connected to the national economy which will contribute to its economic development. Railway will help provide social inclusion by connecting remote areas and increasing the accessibility to the transport network.

Pan European Corridor VIII spans over the South Eastern European area where transportation infrastructure is traditionally weak. Road connections are inadequate both in Albania and in Macedonia, especially along Qafe Thane (Albania- Macedonia border) and Deve Bair passages (Macedonia-Bulgaria border). As regards railways, some crucial links are still missing, while the existing ones are insufficient in Macedonia and Bulgaria, and scarce in Albania. Pan European Corridor VIII is thus a challenging project, requiring additional resources and more international cooperation to disclose its very potential. Corridor VIII is bound to open new, crucial connections between Macedonia and Albania, and of similar importance for the Italian regions facing the Southern Central Mediterranean basin. Thanks to the sea links between the Apulian ports and Durres in Albania, and the road-rail connections towards the Black Sea, Corridor VIII will allow a further extension to the East, so as to increasingly extend industrial and commercial cooperation the two shores. A better integration with South Eastern Europe is a fundamental need for North Eastern and South Central Italy. What is more, fostered relationships with South Eastern European countries are of the utmost importance for South Central Italy and Turkey. Finalizing of whole corridor VIII will provide possibilities for increased economic and other kinds of cooperation between companies from Macedonia, Albania, Italy, Bulgaria and Turkey. This will lead to prosperity of the Balkan region. Links already established through Corridor X, it could be expected to be rerouted to Corridor VIII. The corridor will connect the Balkan peninsula with Turkey and provide possibilities for growth and development. Transport of goods is going to be linked between Macedonia, Turkey and the Middle East who are traditional foreign trade partners of the Republic of Macedonia. Operation of railway will create significant economic benefits in the region providing a significant boost in the regional economic cooperation. During operation, the Project will provide wider regional socioeconomic benefits as result from savings in journey times for business and personal purposes. In addition, connection from East to the West will create trans-boundary possibilities, especially in trade of goods and services and traveling of the people.

Safety during operation of railway

Key potential impacts that will be caused from operation of railway are those Safety issues associated to rail track (community safety and railway workers related during operation phase). When the railway Corridor VIII is finished and operational, the railway will function as a new means of transportation. Transport with trains that run with a speed up to 120km/h increase the safety risk of the workers on the railway, passengers and third parties. Operational railway will significantly change old society patterns in regards with transport culture. Communities along the railway will be exposed to safety risks related with train operation especially if they do not obey the traffic rules. The railway is not a safe place for children and young people to play and it is not safe for adults to take short cuts across the rails. During diesel traction risks could arise due to fires that could happen due to inappropriate handling with fuel (near train or storage) both by railway workers and passengers. During electric traction, trains powered by electricity cannot be ever switched off. Electricity on overhead power lines can jump and arc, so person do not have to touch them to be injured or even killed. The “third rail” is really an electricity line and so strong that if touched by a person he/she will stick to it like glue and not be able to get off.

Passengers and third parties can suffer from railroad injuries when they are traveling by train, driving or walking near railroad crossings or tracks on stations or in the open area. Railroad level crossings are the most risky in terms of accidents and are the greatest health hazard from trains for the general public. Without adequate warning devices, railroad crossings will leave drivers or pedestrians without warnings that a train is approaching until it is too late. Although well marked crossings are accommodated for, accidents happen due to the carelessness of passengers and railway workers or faults with signals. Due to this as mitigation measure is proposed that all level crossings are to be replaced with over and under passes. Beside this mitigation measures ours are included, such as: adequate warning devices to be installed to warn pedestrians that a train is approaching, special attention to be given for the stations, community health and safety educational programme to be developed, Macedonian railways – Infrastructure together with operator will undertake a series of public relation activities in order to inform local citizens, passenger and workers about the dangers of railway operation and related activities with passing the railway, diesel and electric traction, trespass and vandalism and to emphasize necessity traffic rules and regulations to be obeyed by everybody, Macedonian Railway – Infrastructure and MZ- Transport will support community activities, including school visits, safety centers, diversionary activities and communications programmes, information on safety performance (relating to both accident investigations and overall statistics) will be publicly available, safety performance and other safety related data will be developed, full harmonization to be achieved on technical, engineering and operational matters, methodology for risk assessment to be developed, widening of public access to the information of railway - for example by release to a website or newspapers. With application of mentioned mitigation measures the significance of the residual effect is not considered to be of a potentially significant nature.

With start of operation of railway Corridor VIII -Eastern section, failing to provide safe working conditions can cause on-the-job injuries or exposure to hazardous chemicals that can leave railway workers severely injured and unable to work. PERI will prepare an **Emergency Preparedness Plan** and **Safety Program** according to the best international practices for safety of workforce during operation of railway.

Effects on Communities Quality of Life due to Noise, Vibration & Safety Electromagnetic Fields

The quality of the inhabitants life's will be seriously affected both during construction of the railway due to dust, noise, vibrations, safety issues and alteration of the landscape while also the operational phase of the railway will expose the inhabitants to noise and vibrations in addition to electromagnetic fields. The communities close to the railway will also be affected by safety issues and an altered landscape. Mitigation measures to reduce negative impacts during construction phase will include: implementation of **dust management plan,** good management practice for **minimizing** noise level, techniques for reducing vibrations and assuring the appropriate distance between the new railway and houses along the line. .

With application of mentioned mitigation measures the significance of residual effects in regards with noise, vibrations and safety should be reduced to an acceptable level.

Improvement of quality of life due to changes in economic wealth

Communities quality of life will improve potentially due to changes in economic wellbeing as a result of the Project, better access to the larger towns and their health services, education and training centers, recreational facilities, from employment opportunities, etc. ‼¶Operational railway will provide to the local residents new and improved public transport besides busses and private cars. Villagers of the settlements will in general be able to move more freely e.g. visit relatives. Students, workers, other residents and older people who presently have to commute to Kumanovo and Skopje for different needs like education, health treatment, school, work, will have a cheap and fast alternative to busses. The magnitude of the impacts with the implementation of enhancement measures remains high positive. The significance of the residual effect is therefore considered to be ***large positive***.

10.3.3 SUMMARY OF CUMULATIVE & TRANSBOUNDARY RESIDUAL SOCIAL EFFECTS

With regards to social impacts, the significance of the cumulative effects was found to be very large for economy and employment. Both three analyzed projects contribute to the positive cumulative impacts. The motorway project and this Project should have positive cumulative effects on education and training. Vakuf reservoir and the motorway will also have negative impact on land and property. All three projects along with railway will have both positive and negative cumulative impact on Quality of life.

As for the transboundary effects it was found that there are going to be effects on economy (it was found that the significance is of a large beneficial nature). Effects on employment, education &training and Communities quality of life was found to be also beneficial.

10.4 SUMMARY

To summarize, it is expected that the railway operation will stimulate a large and competitive economy in the North-Eastern region of Macedonia which could provide jobs for working-age residents and a highly qualified local workforce. Operation of railway as well will create possibilities for direct and indirect employment. At the moment, the area has high levels of unemployment and dependency on state benefits.

Some of the residents have been out of work for a long period of time (from start of privatization in 90's) and not all young people from 18 are taking part in education, training or employment. Economic development should improve the overall employment rate and reduce the number of people dependent on state benefits. Tackling this economic exclusion is important for improving the quality of life for the residents.

Operation of railway will significantly improve quality of life in many aspects. The railway will not just create jobs in the railway company; it will also create jobs in the mining industry which is one of characteristics of the region of North-east Macedonia. Transport costs for moving goods from one place to another will be reduced. This in turn means that the people who made these goods could sell them cheaper. Once goods become cheaper more people can afford to buy them and more can be produced which will create more jobs. Quality of life will be improved through increased financial income, possibility to have better access to the larger towns and their health services, to educational and training centers, to recreational facilities and etc.

In providing new opportunities for people to travel, railway will help to break down old cultural divisions and expand social exchange for ordinary people. The railway station can develop as the place where people meet and mingle the starting and arrival point for journeys to work, the country, the city and the wider world. The station could be treated as a gateway through which individuals could expand their network of social exchange beyond their town and village to the wider world. Railway brings diverse communities and regions together. In this process, it will help to diminish regional differences and, at the same time, they advanced the process of urbanization by breaking down the distinction between town and country. Operation of railway will help for social inclusion of North-eastern region of Macedonia which at the moment is most undeveloped region in the country.

From the point of view of environmental impacts, even though there will be a few residual impacts which will have a moderate adverse significance during the construction phase (destruction of top soil and impairment of noise quality) and the operational phase (impairment of landscape quality, habitat fragmentation and decrease of animal populations), it is concluded that if the mitigation measures that have been proposed in this ESIA are implemented, the significance of the overall residual impact of Project Railway Corridor VIII-Eastern Section should be of a slight adverse nature, with no major damages caused to the environmental resources present along the railway corridor.

Chapter 11 Non-Technical Summary !

Presents the Non-Technical Summary of the ESIA of the proposed Project.

11 NON-TECHNICAL SUMMARY

11.1 INTRODUCTION

The Macedonian Ministry of Transport and Communication (MoTC) intends to improve the Country's transport capacities by rehabilitating and constructing the Eastern Section of the Railway Corridor VIII between Kumanovo and Deve Bair, at the border with Bulgaria. Corridor VIII is an important multi-modal transport network comprising sea and river ports, airports, roads and railways running east-west; starting in the southern Italian ports of Bari and Brindisi before crossing through Albania, Macedonia and Bulgaria to the Black Sea ports of Varna and Burgas. Two parts of the Railway Corridor VIII through Macedonia need to be completed comprising the Western Section towards the Albanian border and the Eastern Section towards the Bulgarian border, which forms this Project. The Public Enterprise Macedonian Railways – Infrastructure (PERI) will operate the railway.

The Railway Corridor VIII - Eastern Section Project comprises 88.1 km of railway running across the North-Eastern region of Macedonia. The Project has been divided into the following 3 sections (*Figure 11-1*):

- **Section 1: Kumanovo to Beljakovce (30.8 km)**: the railway previously operated along this section until 1994 and rehabilitation of this section will be undertaken as part of this Project;
- **Section 2: Beljakovce to Kriva Palanka (33.9 km):** railway construction works in this section were previously undertaken and need completing along with construction of missing railway line and structures; and
- **Section 3: Kriva Palanka to Deve Bair, at the Bulgarian Border (23.4 km):** no previous railway development has been undertaken within this section (except for border tunnel works between 1940 and 1945) therefore construction of the railway line and structures is required along the entire route.

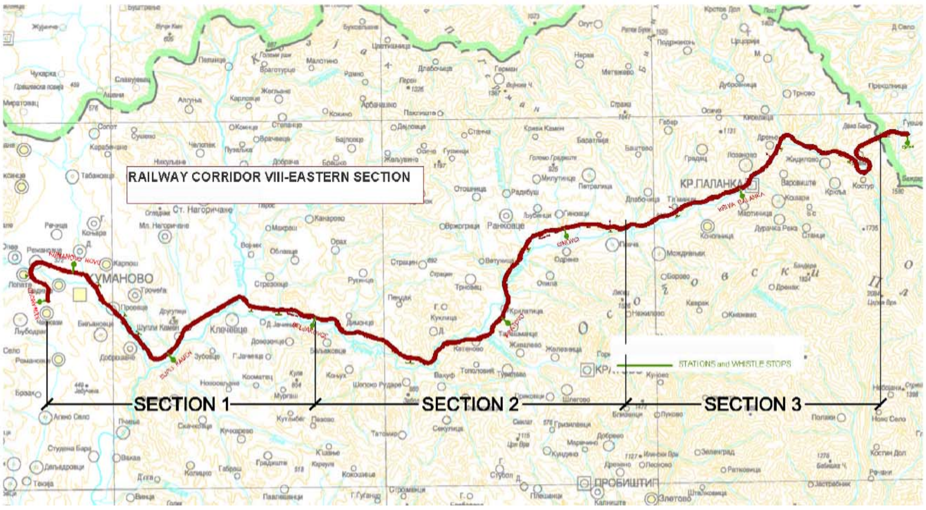


Figure 11-1 Sections of Project "Railway Corridor VIII – Eastern Section"

With funds from the European Bank for Reconstruction and Development (EBRD) the MoTC initialized the Railway Corridor VIII – Eastern Section Project with the preparation of the Feasibility Study and an associated Environmental and Social Impact Assessment (ESIA). The purpose of the ESIA is to identify and assess the potential positive and negative impacts that may arise from the Project on the physical and natural environment, socio-economic wellbeing and conditions of the population. The ESIA has been prepared in line with the national Macedonian Environmental Impact Assessment (EIA) requirements, relevant EU standards and with reference to EBRD and the European Investment Bank (EIB) requirements and other international applicable standards. This Non-Technical Summary (NTS) summarises the findings of the ESIA. Full project preparation documents, including the ESIA, are available on the MoTC website (http://mtc.gov.mk).

Given land acquisition is required for the Project and some has already occurred a Resettlement Compensation Framework (RCF) has been prepared under which entitlements for resettlement and livelihood restoration are defined. It has been determined that a Resettlement Action Plan (RAP) will be prepared for each section of the Project.

11.2 BACKGROUND

11.2.1 CORRIDOR VIII

Corridor VIII is a multi-modal transport system along the East-West axis comprising sea and river ports, airports, multi-modal ports, roads and railways, including a total extension of approximately 1270 km of railways and 960 km of roads. The main alignment of Corridor VIII runs from the southern Italian ports of Bari and Brindisi to the Albanian ports of Durres and Vlora, then through the cities of Tirana, Skopje, Sofia, Plovdiv, to the Bulgarian ports of Burgas and Varna (Black Sea). Corridor VIII will therefore connect the Italian Adriatic Transport Corridor, the Adriatic branch of Motorway of the Sea and the Mediterranean Transport Area to the Black Sea Pan-European Transport Areas*;* see *Figure 11-2.*

Figure 11-2 Route of Corridor VIII

Corridor VIII will bring economic development benefits to the sub-regions and municipalities along its route and provide better connection to ports on both the Adriatic and Black Seas, allowing better access to raw materials and markets. The Corridor will be part of a network of Pan-European Corridors *(shown in Figure 11-3),* connecting with Corridor X in Skopje, Corridor IV in Sofia and Corridor X in Gorna Oriahovica.

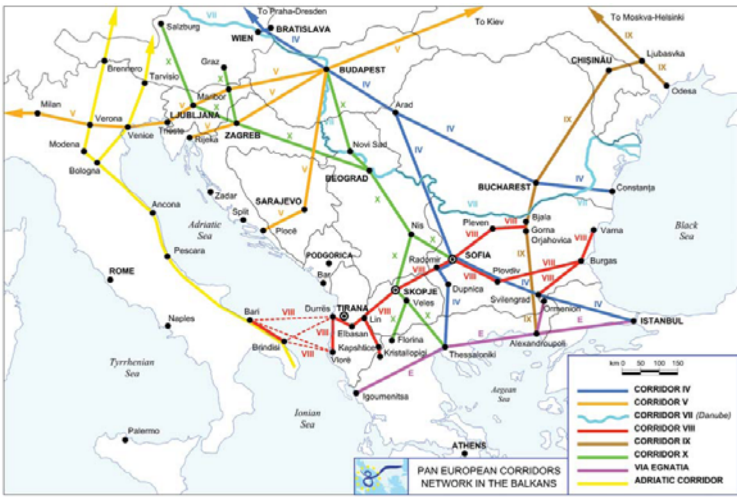


Figure 11-3 Pan European Corridors in the Region

With regards to Railway Corridor VIII, its construction is at various stages of development in the various countries, as shown in *Figure 11-4*:

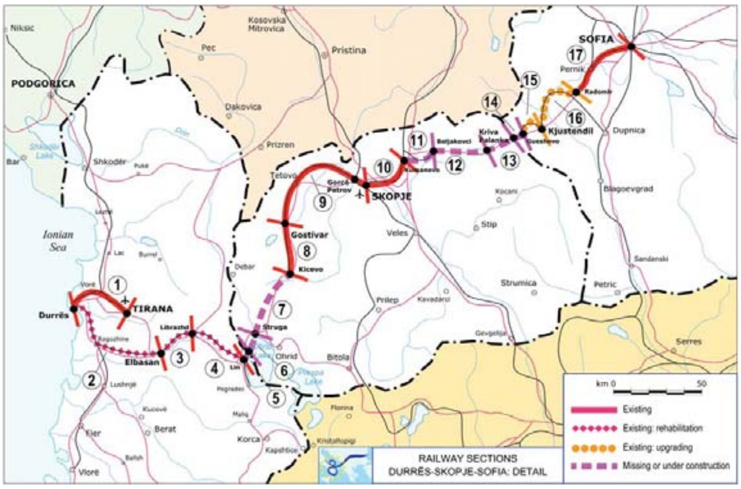


Figure 11-4 Status of Railway Corridor VIII

The Republic of Macedonia, within the National Strategy of Transport 2007-2017 (http://mtc.gov.mk/new_site/en/storija.asp?id=1782) confirmed Corridor VIII as a high government priority for the Country.

11.2.2 RATIONALE FOR THE PROJECT

The rationale for the Project is to complete the railway link between Macedonia and Bulgaria, as part of the commitment of the Republic of Macedonia in the development of the Pan European Corridor VIII. It is anticipated that the Project will significantly influence socio-economic growth of the North-Eastern Region of Macedonia, Macedonia, and South Eastern Europe, bringing sustainable benefits to the population, businesses and the economies of these areas.

Specific objectives of the Project include:

- Reducing travel time between Skopje and Sofia by rail by approximately 1 hour against current road travel time;
- Reducing regional travel time between Kumanovo and Kriva Palanka by rail to approximately 35 minutes against current travel time of approximately 50 minutes by road;
- Shorten the Macedonia to Black Sea railway link by approximately 200 km;
- Shorten the Macedonia to Istanbul railway link by approximately 150 km; and
- Increasing freight capacity by being able to accommodate up to 10 daily freight trains per direction which is equivalent to 400 road trucks.

The expected benefits of the Project include:

- Provision of part of the transnational route connecting the Mediterranean/Adriatic Transport Area with the Black Sea Transport Area;
- Facilitation and boosting of trade exchanges between Bulgaria, Macedonia and Albania;
- Connection to the TRACECA Corridor[1];
- Better connection of the regional catchment area of Corridor VIII to the main Southern Italian ports and this area;

1 TRACECA is the acronym for Transport Corridor Europe-Caucasus-Asia

- Provision of a direct railway route between Macedonia and Bulgaria; avoiding the need for transiting through Serbia and facilitating trade with Bulgaria;
- Creation of an alternative railway access for Macedonia to ports in Bulgaria and Albania; and providing an alternative route for travel between Macedonia and Thessalonica;
- Improving accessibility of the North-Eastern Region to other Macedonian regions for both freight and passengers; and
- Improvement of passenger services by rail along the project section and to/from destinations such as Skopje, other regions in Macedonia and Bulgaria.

11.2.3 HISTORY OF THE PROJECT

The plans for the construction and operation of a railway line between Kumanovo to Bulgaria started in the XIXth century (1873-1888). Since then the development of this railway line has been relatively continuous except for interruptions due to wars and the political situation. After World War II, Yugoslavian Railways completed the works of the railway line from Kumanovo to Beljakovce, which was operational from 1956 until 1994. Between 1994 to 2004 design and construction works were undertaken by the Government for the rehabilitation of the section between Kumanovo and Beljakovce (see *Figure 11-5*) and the construction of the missing section between Beljakovce and the border tunnel at Deve Bair. The alignment of the railway line remained nearly the same as it had been designed 50 years earlier. These works, however, stopped in 2004 due to lack of funds. By that time, several bridges and tunnels had been partly constructed between Beljakovce along with approximately 5.5 km of railway track west of the town of Kriva Palanka.

Figure 11-5 Part of Rehabilitated Section Kumanovo - Beljakovce

11.2.4 CONSIDERATION OF ALTERNATIVES

Two alternatives have been considered during the development of the Project, named the "Reference" alignment and the "Alternative" alignment (see *Figure 11-6, Figure 11-7* and *Figure 11-8*). The "Reference" alignment corresponds to the railway corridor formerly proposed by Public Enterprise Macedonian Railways – Infrastructure (PERI). The "Alternative" alignment more or less follows the route of the planned Corridor VIII Kumanovo to Deve Bair motorway. *Figure 11-6, Figure 11-7* and *Figure 11-8* show the alignments of both the railway alternatives as well as that of the planned motorway.

For practical purposes and taking into account the routes historical background, the development of Railway Corridor VIII - Eastern Section Project has been divided into three sections:

- **Section 1: Kumanovo to Beljakovce:** this section requires rehabilitation in both alternatives;
- **Section 2: Beljakovce to Kriva Palanka:** In the "Reference" alignment around one third of all construction works have been completed therefore rehabilitation and construction is required for this section. In the "Alternative" alignment, this section is to be newly constructed; and

- **Section 3: Kriva Palanka to Deve Bair at the Bulgarian Border:** this section is to be newly constructed in both alternatives.

Both the Reference and Alternative alignments start 400 m north of the existing station in Kumanovo. A comparison of the technical characteristics between the “Reference” and “Alternative” alignments is given in table below.

	Reference Alignment			Alternative Alignment		
	Section1	Section 2	Section 3	Section1	Section 2	Section 3
	Existing line Kumanovo - Beljakovce	Line under construction Beljakovce – km 65.1	Feasibilty study of PERI	Existing line Kumanovo – Klecevce upgraded to 160 km/h	Motorway corridor Klecevce – km 59.6	Motorway corridor Km 59.6 – Bulgarian border
Length	30.8 km	33.9 km	23.4 km	25.7 km	34.6 km	19.9 km
	88.1 km			80.2 km		
Design speed	100 km/h	100 km/h	100 km/h	100/160 km/h	160 km/h	160 km/h
Minimum curve radius	500 m	500 m	500 m	700 m / 1100 m	1100 m	1100 m
Maximum gradient	15 o/oo	15 o/oo	24 o/oo	15 o/oo	24 o/oo	24 o/oo
Number of stations and halts	3 stations	2 stations	2 stations	2 stations	3 stations	2 stations
	6 halts	3 halts	3 halts	6 halts	1 halt	3 halts
	7 stations, 12 halts			7 stations, 10 halts		
Length of viaducts	200 m	3931 m	4410 m	250 m	5637 m	3453 m
	8341 m			9341 m		
Length of tunnels		3390 m	9036 m		7150 m	8735 m
	12426 m			15885 m		
Motorway crossings	1		5	1	3	3
	6 crossings			7 crossings		

Table 11-1 Comparison of technical characteristics of the Reference and Alternative Alignments

Both alternatives would operate with a single track. The first section between Kumanovo to Beljakovce will be operated initially using diesel traction. Following completion of development of Section 2 and 3 the railway line will be electrified. The capacity of the railway line would be 64 trains per day for the Reference alignment and 73 for the Alternative alignment. The transit time from Skopje to Deve Bair for the Reference alignment would be approximately 60 minutes and for the Alternative alignment 40 minutes.

At the end of both alignments there is a border tunnel with a total length of 2,350 m, of which 1,150 m would be within the territory of Macedonia and 1,200 m within the territory of Bulgaria. The construction works for the tunnel started in the 1940’s but ceased before 1945 and these works have never been completed. Section 3 of this Project would finish at the border within the territory of Macedonia.

In order to evaluate the two potential project alignments a multi-criteria analysis was applied for each section of the railway alignment to help identify the preferred option for each of the sections. The Alternative and Reference alignments were compared considering technical, traffic, environmental, social, economic and financial criteria. Specifically, the multi-criteria analysis showed that the Reference alignment was preferable from the point of view of environmental and social impacts for the first two first sections, from Kumanovo to Kriva Palanka, as a significant part of the construction work has previously been undertaken for this part of the railway line. The Alternative alignment for Section 3 is significantly shorter than for the Reference alignment and, thus the Alternative alignment from the environmental and social point of view is preferable. However, other criteria, such as the engineering risk, the indicative construction costs, the operational expenses and the public preference, led to the recommendation of the Reference alignment also for Section 3. Analysis of Preliminary Social Impact of Alternatives and Summary of multi-criteria analysis of alternatives are presented in Chapter 3 Project Description & Consideration of Alternatives.

The Government of the Republic of Macedonia, with decision number 51-3556/1 of 19.07.2011 followed the recommendation arising from the multi-criteria analysis, officially selecting the Reference alignment, which has been assessed within the ESIA.

Figure 11-6 Layout of Reference Alignment and Alternative Alignment for Section 1

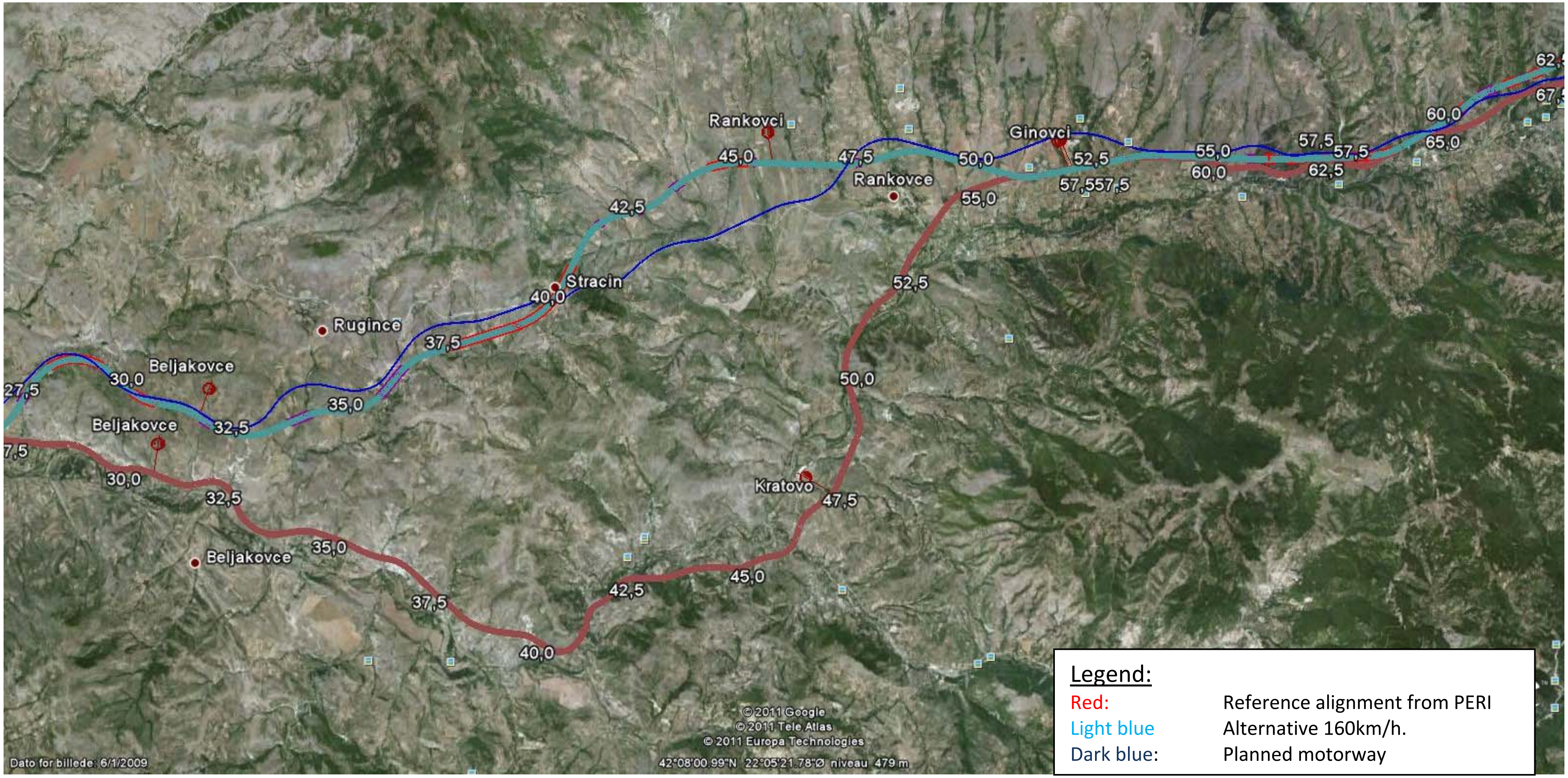
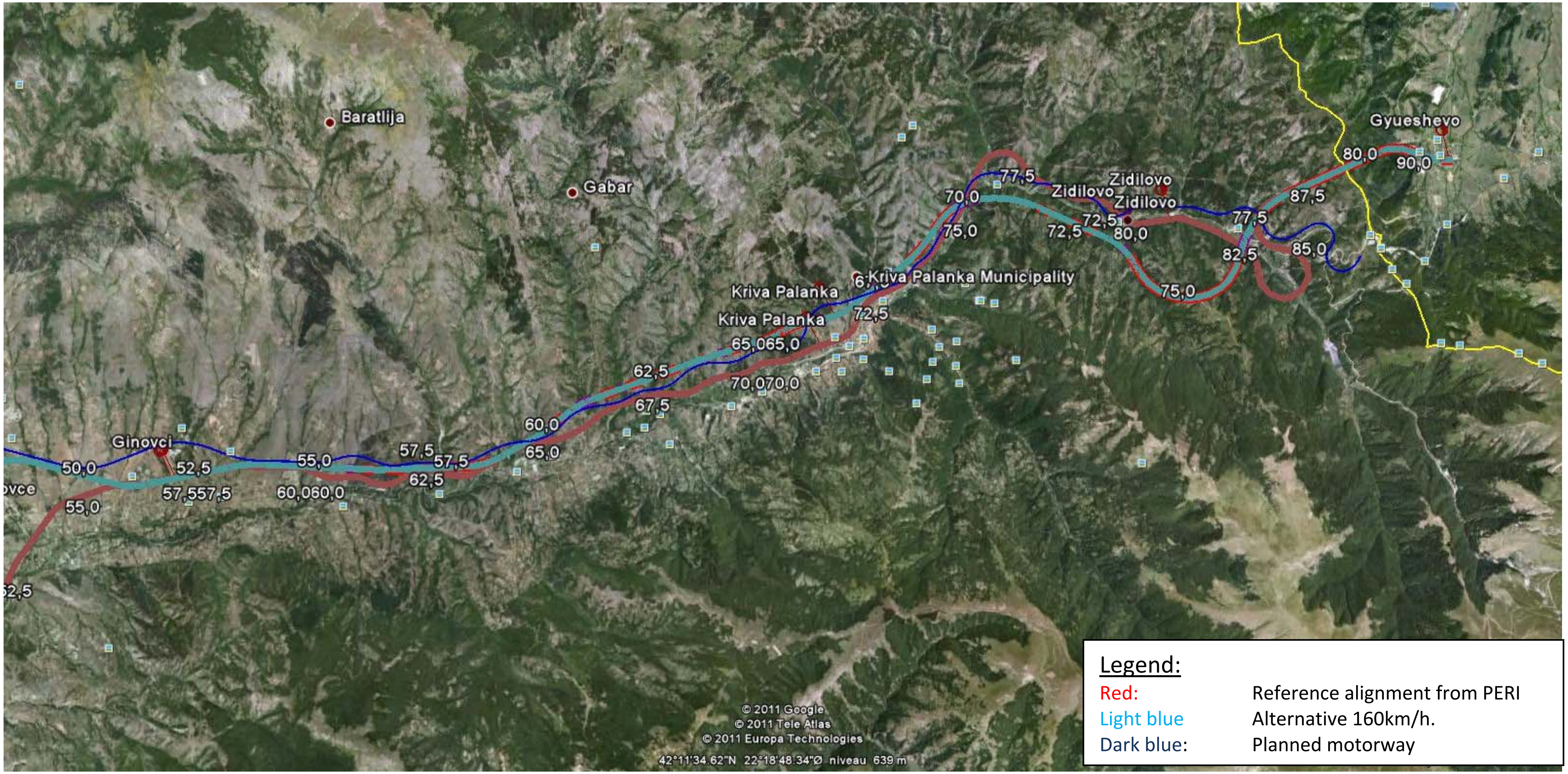


Figure 11-7 Layout of Reference Alignment and Alternative Alignment for Section 2



Legend:

Red:	Reference alignment from PERI
Light blue	Alternative 160km/h.
Dark blue:	Planned motorway

Figure 11-8 Layout of Reference Alignment and Alternative Alignment for Section 3

11.3 SUMMARY OF LEGAL AND POLICY FRAMEWORK

11.3.1 NATIONAL ENVIRONMENTAL AND SOCIAL LEGISLATION

The environmental legal framework within Macedonia contains overarching laws covering such areas as Environmental Protection, Water, Waste, Nature Protection, Noise Protection, Air Quality and Cultural Heritage, which transpose the main obligations of the environmental EU Directives. The key legislation for protection of the environment, where the EIA procedure has been prescribed, is the Law on Environment (Official Gazette (O.G.) Nos. 53/05, 81/05, 24/07, 159/08, 83/2009, 124/2010 and 51/2011). The requirements of the EU EIA Directive 85/337/EEC (amended by Directive 97/11/EC) have been transposed within the Law on Environment.

With regards to social aspects, there are national laws covering Health Protection, Occupational Health & Safety, Labour Relations, Working Conditions, Employment, Wages, Social Protection, Child Protection and Equal Opportunities. Macedonia has ratified many International Labour Organisation Conventions and a number of international environmental and social treaties and conventions, including:

- Aarhus Convention: Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters: UNECE (Aarhus, Denmark 1998);
- Espoo Convention: EIA in a Transboundary Context: UNECE: (Espoo, Finland 1991);
- Convention on Biological Diversity (United Nations, 1992);
- Bonn Convention: Conservation of Migratory Species of Wild Animals: (Bonn, 1979);
- Bern Convention: Conservation of European Wildlife and Natural Habitats: (Bern, 1972); and
- UNESCO World Heritage Convention (November 1972).

11.3.2 NATURE PROTECTION

11.3.2.1 NATURE PROTECTION LEGAL FRAMEWORK

The legal basis for nature protection in the Republic of Macedonia is contained within the Constitution, the Law on Nature Protection (O.G. Nos. 67/04, 14/06 and 84/07), the Law on Environment[2], international agreements signed or ratified by the Country and laws regulating the use of certain natural resources. The majority of the obligations within EU legislation on nature conservation has been transposed into the Law on Nature Protection, which also contains obligations from relevant ratified international agreements. Full implementation of the Law is still to be achieved with the adoption of several by-laws.

The Law on Nature Protection regulates the protection of nature through protection of biological and landscape diversity and protection of natural heritage within and outside protected areas. The development of the national ecological network in the Republic of Macedonia, as part of the Pan-European Ecological Network (PEEN) is an obligation of the Country as one of the signatory countries of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS, 1996). The goal of this Strategy and PEEN is to enable efficient implementation of the United Nations Convention on Biological Diversity at a European level. In addition to Law in Nature Protection, the establishment of the national ecological network has been prescribed in several national strategic documents, such as the Spatial Plan (2004), the National Biodiversity Strategy and Action Plan (2004) and the Second National Environnemental Action Plan (2006).

With regards to the transposition of the two directives that comprise the cornerstones of EU nature protection policy, the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC), there are still requirements pending full transposition. In this regard Macedonian legislation has not yet fully

[2] The Law on Environment (Official Gazette No. 53/05, 81/05, 24/07, 159/08) is the framework law which is the pillar of environmental and nature protection in FYR Macedonia. Specific environmental aspects tackled by this Law are regulated by several separate laws (Law on Nature Protection, Law on Ambient Air Quality, Law on Waters, etc.)

incorporated the obligations arising from of Article 6 of the Habitats Directive regarding the assessment of plans and projects significantly affecting Natura 2000 sites. Nor do similar requirements exist for the Emerald network sites *(see below)* or ecological corridors. The Law on Nature Conservation does though state in Article 53(4) that *'The ecological network, by its characteristics, principles, measures and scope of protection shall be fully compatible with the Coherent European Ecological Network "NATURA 2000"'*. Therefore following discussions with the Ministry of Environment & Physical Planning (MOEPP) in order to fulfill requirements of Article 53(4) an appropriate assessment under Article 6 of the Habitats Directive should be undertaken if appropriate. In order to promote the system of protected areas, the Republic of Macedonia accepted the approach of ecological networks. In 2002, the development of the **EMERALD network** was initiated comprising of areas of special interest for conservation (ASCI).

11.3.2.2 EBRD & EIB BIODIVERSITY PROTECTION & CONSERVATION POLICY

The protection and conservation of biodiversity in the context of projects in which they invest is widely recognized in EBRD's and EIB's environmental and social sustainability policies. Both EBRD and EIB support a precautionary approach to the conservation and sustainable use of biodiversity through the implementation of applicable international laws and conventions and relevant EU Directives. Detailed guidelines addressing this approach which this Project must meet the requirements of are provided in:

- Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: EBRD Environmental and Social Policy (2008); and
- Part C6 and Annex 7 of EIB's Environmental and Social Practices Handbook.

11.3.2.3 ESIA & PERMITTING REQUIREMENTS

The EIA procedure is regulated by the Law on Environment. The Project comprises of the construction and rehabilitation of a railway line which falls under Annex I of the Decree on Determining Projects for which the EIA procedure should be carried out (O.G. No. 74/05) under sub-category 7(a): Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2,100 m or more. For all projects under this category, the full EIA procedure should be carried out. The Ministry of Environment and Physical Planning (MoEPP) issued the EIA Scoping Decision 17th June 2011. The Project is also a Category I Construction Project according the Law on Construction (O.G. No. 130/2009[3]). The national responsible body for issuing the construction permit for this category of projects is the Ministry of Transport and Communication (MoTC).

According to the EBRD Environmental and Social Policy (2008)[4] the Project falls under Appendix 1: Category A projects, sub-category 7: Construction of motorways, express roads and lines for long-distance railway traffic. For all Category A Projects EBRD require an ESIA to be prepared.

11.3.2.4 LAND ACQUISITION LEGAL FRAMEWORK

Land tenure and property rights are regulated by the Law on Property Cadastre (O.G. Nos. 40/08, 158/10, 51/11); the Law on Survey and Land Cadastre (O.G. Nos. 34/72, 13/78); and the Law on Ownership and Other Material Rights (O.G. Nos. 18/01). Expropriation of property and real estate (immovable properties) which will result from implementation of the projects that are for public interest is regulated by the Law on Expropriation (O.G. Nos. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08 & 76/10). Construction of railway lines falls under the expropriation law as being projects of public interest. The legal justification of why the project is believed to be of public interest is submitted together with the request for expropriation by the expropriation beneficiary to the offices for legal and property affairs. The Law on Expropriation recognizes affected people who have formal legal rights; those without legal title are not entitled to

[3] http://www.slvesnik.com.mk/Issues/FBF336E3D52F564EB336352005348491.pdf
[4] http://www.ebrd.com/pages/research/publications/policies/environmental.shtml)

compensation under this law. According to the Law on Expropriation, the expropriation value of properties subject to compensation cannot be lower than the market value of the affected properties and it is assessed against recent market transactions in neighbouring areas. According to the law, compensation can be provided by replacement of property or in cash. Macedonian law allows compensation of lost profit/income for affected businesses, if incurred as a result of expropriation. Furthermore, the Law on Safety of Railway Systems (O.G. No. 48/2010) includes requirements that mean that houses should be at least 11 m from the edge of new railway lines[5].

Along the Project alignment, land has been acquired for the first 65 km of the railway corridor, starting in Kumanovo and ending in the first settlement, Mozdivnjak, in the Kriva Palanka Municipality. Land of a varying width of 10-20 m on both sides of the line was expropriated during the period 1994-2004. Land owners have been compensated mainly by building new houses away from the proposed railway line.

The Project will be undertaken in line with EBRD's Environmental and Social Policy (2008) which contains Performance Requirement (PR) 5 that covers Involuntary Resettlement and Economic Displacement. According to this PR, not only those who have legal title are entitled for compensation, but also those who do not have legal rights that are directly affected by the Project.

11.4 STAKEHOLDER ENGAGEMENT & CONSULTATION

The Project will be prepared in line with both the national and EBRD Environmental and Social Policy (2008) requirements for stakeholder engagement and public consultation. Therefore the draft ESIA study will be disclosed to the public for 120 days, during which time the comments period will last, ensuring that all stakeholders have an opportunity to express their views. Upon completion of the disclosure and comment period, the ESIA study will be updated to reflect the comments made by stakeholders, including explanations on how comments were taken into account in the updated study. The final decision on whether or not to grant consent for the Project will be made by the MoEPP and publicly disclosed. The decision will be published in at least one daily newspaper available throughout the territory of the Republic of Macedonia, and on the web site and the notice board of the MoEPP.

The stakeholder engagement process started at the earliest stage of project planning and will continue throughout the entire life of the Project. A Stakeholder Engagement Plan (SEP)[6] has been prepared and is contained within the ESIA. The SEP identifies the key project stakeholders and will be updated accordingly during the development of the Project. Stakeholder engagement regarding the Project is an on-going process involving the public disclosure of appropriate information so as to enable meaningful consultation with stakeholders and potentially affected parties, and includes procedures contained within the SEP so people can make comments or complaints.

During the development of the ESIA affected stakeholders were carefully identified as well as those interested in the Project, and their concerns, expectations and preferences were taken into consideration. Attention was given to the identification of vulnerable stakeholders whose lives and well-being may be affected by the Project. Additionally, close interaction with the local communities was maintained in order to identify opportunities for improving social performance of the Project.

For each of the stakeholder groups specific communication tools have been identified in order to ensure easy, transparent, direct, open and interactive communication with all stakeholders and to get as earlier as possible their feedback during the different phases of project implementation. Public information, participation and consultation will be undertaken during all stages of project implementation and the engagement of stakeholders has been divided into the 5 main phases below. The full list of stakeholders to be consulted can be found in Annex 1 of the SEP[7].

[5] The least width of the railway area is 1 metre on both sides of the earthworks of the railway line.
[6] The SEP can be viewed on the following web pages: http://www.mtc.gov.mk (Ministry of Transport and Communication), http://www.moepp.gov.mk (Ministry of Environment and Physical Planning) and http://www.mz.com.mk (PERI)
[7] http://www.moepp.gov.mk/WBStorage/Files/Study%20for%20corridor%20VIII%20-%20Eastern%20section%20-%20List%20of%20stakeholders.pdf .

- Phase 1: Pre-ESIA Consultations
- Phase 2: ESIA Study Consultations
- Phase 3: ESIA Disclosure
- Phase 4: Detailed Design and Construction
- Phase 5: Operation

Disclosure of relevant project information during Phase 1 and Phase 2 was through disclosure of the SEP and Project Leaflet on the following web pages: http://www.mtc.gov.mk (Ministry of Transport and Communication), http://www.moepp.gov.mk (Ministry of Environment and Physical Planning) and http://www.mz.com.mk (PERI). Key information about the Project has been disclosed through the Project Leaflet which was distributed in Municipalities Information Centres, as well as through the Macedonian government web sites mentioned above and the municipal web pages [8] [9].

Public Enterprise Macedonian Railways – Infrastructure (PERI), who will operate the railway, will continue to involve stakeholders and will maintain good communication practices during the lifetime of the Project. According to this approach, the aims of information disclosure and Project communications will be:

- Providing local communities with a schedule and information on activities that will be arranged, together with mechanisms for their feedback;
- To improve knowledge of what the Project involves, the stages of the Project and its expected performance;
- Ensuring best practice in terms of environmental protection and health and safety for workers and contractors; and
- To make available to the public a grievance procedure.

PERI are implementing a Grievance Mechanism to ensure that it is responsive to any concerns and complaints particularly from affected stakeholders and communities (more details are contained within the Stakeholder Engagement Plan).

11.5 PROJECT DESCRIPTION

The proposed works per section are summarized below:

Section 1: Kumanovo to Beljakovce

- The rails of the existing track will be completely renewed, the track will be re-ballasted and realigned;
- At Supli Kamen station, the track will be dismantled and replaced;
- The existing bottleneck at the northern end of Kumanovo station will be removed;
- The existing reinforced concrete bridges along this section will be refurbished;
- The existing road overpasses along this section will be equipped with electric shock protection and earth conductors;
- A slab track steel bridge at Lopate will be replaced by a new bridge;
- The damaged railway bridge over the Pcinja River will be replaced by a new bridge located upstream;
- The existing 17 level crossings in this section will be replaced by 8 over/underpasses; and

[8] http://www.northeastregion.gov.mk; http://www.kumanovo.ca; http://www.opstinakratovo.gov.mk; http://www.rankovce.gov.mk; http://www.krivapalanka.gov.mk; http://www.opstinastaronagoricane.gov.mk

[9] Telephone information lines have been established and details can be found under the following link: http://www.moepp.gov.mk/WBStorage/Files/Study%20for%20corridor%20VIII%20-%20Eastern%20section%20-%20Contact%20points.pdf

- There is no excavation work needed for Section 1 and therefore no surplus soil and rock is expected. The mixed construction waste that will be generated will be re-used.

Section 2: Beljakovce to Kriva Palanka

- The construction and completion of earthworks and drainage;
- The completion of 25 bridges and the construction of 11 new bridges, including a long span bridge in front of the planned Vakuf Dam;
- The completion of 10 tunnels and construction of 4 new tunnels;
- The installation of 33.3 km of main track , 7.05 km of station tracks and 28 set of points;
- The construction of a substation near Beljakovce; and
- In Section 2 there will be a balance of the excavated and re-used soil and rocks and therefore no need is anticipated for disposal of any surplus inert material (waste).

Section 3: Kriva Palanka to Deve Bair, at the Bulgarian border

- The execution of earthworks and drainage;
- The construction of 47 bridges and 22 tunnels, including reconstruction of the 1,150m border tunnel within the Macedonian territory;
- The execution of 23.5 km main track, 4.3 km station tracks and 14 set of points;
- The construction of a substation West of Kriva Palanka; and
- For Section 3 whilst excavated soil and rocks will be re-used as a construction material as far as possible, it is estimated that there will be a surplus of soil and rock which will need to be disposed of in specially designed inert landfills. There will also be waste generated from the demolition of houses and buildings. The total number of planned inert landfills for Section 3 is 35. For any new landfills which will be established for the Project that have not be fully assessed additional ESIAs and/or consents will be prepared when details are available, if required.

The Project is to be delivered in two main phases of investment:

Stage 1: Rehabilitation of Section 1 (Kumanovo - Beljakovce) to operate diesel trains, with signalling and telecommunication equipment and without electrification. The envisaged construction period for Stage 1 is from 2013 to the end of 2014. The operation period is expected to be from the end of 2014 to 2018 for diesel traction, local passenger services, and no freight services.

Stage 2: Rehabilitation and construction of Sections 2 and 3 (Beljakovce to Deve Bair) and the electrification of the whole eastern section Kumanovo - Deve Bair (including Section 1). The envisaged construction period is from 2015 to 2018 with the commencement of railway operations by the end of 2018.

11.6 ASSESSMENT METHODOLOGY

11.6.1 ESIA METHODOLOGY

In order to assess the impacts, a baseline study was performed to describe the relevant environmental and social issues that are present in the area of the Project that could be potentially affected either during construction or operation. A scoping assessment was undertaken to identify potential environmental and social impacts. The scoping assessment considered the results of the Stakeholder Scoping Meetings and the scoping opinion and guidance provided by the MoEPP.

The assessment of the impacts has concentrated on identifying the likely significant residual effects of the Project. For this, impacts were first assessed without taking into account of mitigation measures, with the significance of the impacts being a function of several criteria including:

- The value of the resource or the sensitivity of the receiving environment/community/receptor;
- The magnitude of the impact;

- The type of the impact (direct/indirect/cumulative) and whether adverse or beneficial;
- The reversibility of the impact and the geographic extent of the impact;
- The time when the impact occurs and duration of the impact (short term/medium term/long-term); and
- Likelihood of the impact occurring.

Mitigation measures were then developed for each adversely affected environmental or social aspect identified, and an evaluation of the likely effectiveness of the measures to prevent, mitigate or compensate the adverse impacts undertaken. Finally, based on the significance of the effect (without mitigation) and the assessment of the probability of success of the proposed mitigation, the significance of the residual effect (with mitigation) was determined.

The ESIA has been prepared in line with relevant national, EU and international ESIA legal and policy requirements, although additional studies are required in relation to the preparation of necessary assessments under the requirements of Article 6 of the Habitats Directive (92/43/EEC), as indicated below.

11.6.2 ASSESSMENT OF EFFECTS ON EMERALD & NATURA 2000 SITES

Section 3 of the Project intersects the Emerald Network Sites (Pchinja-German and Osogovo) which are adjacent to the Bulgarian Natura 2000 sites (Osogovo SPA & Osogovska Planina SAC). The border tunnel at the end of Section 3 is approximately 1.7 km from these Natura 2000 sites. The assessment of the potential impacts and likely significance on these protected and designated sites, included an initial screening, based on the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC). The initial screening assessment was prepared using a modified screening matrix (see Section 6.2 ESIA) of the *European Communities (2002) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. During the next stage of project preparation in consultation with the national authority responsible for Nature conservation a full Screening Matrix will be completed and based on this an Appropriate Assessment undertaken. Based on the results of the current modified screening matrix it is likely that an Appropriate Assessment will be required. Section 3 works are part of Stage 2 and which are not proposed to commence until 2015, therefore all necessary assessments in line with Article 6 of the Habitats Directive will be undertaken before works are commenced in Section 3.

11.7 SUMMARY OF BASELINE ENVIRONMENTAL & SOCIAL CONDITIONS

Railway Corridor VIII - Eastern Section will cross the municipalities of Kumanovo, Kratovo, Kumanovo, and Kriva Palanka, and pass nearby the municipalities of Lipkovo and Staro Nagoricane; see figure below. The larger towns along the corridor are Kumanovo and Kriva Palanka. The line starts on a relatively flat plateau at Kumanovo and gradually climbs to higher altitudes, mainly following upstream the courses of the Pcinja and Kriva rivers, to reach the mountainous area along the Bulgarian border. The area of the corridor has been inhabited permanently for several thousand years, and, apart from the urbanised areas of Kumanovo and Kriva Palanka, it is generally populated with dispersed village settlements typical of the North-Eastern Region.

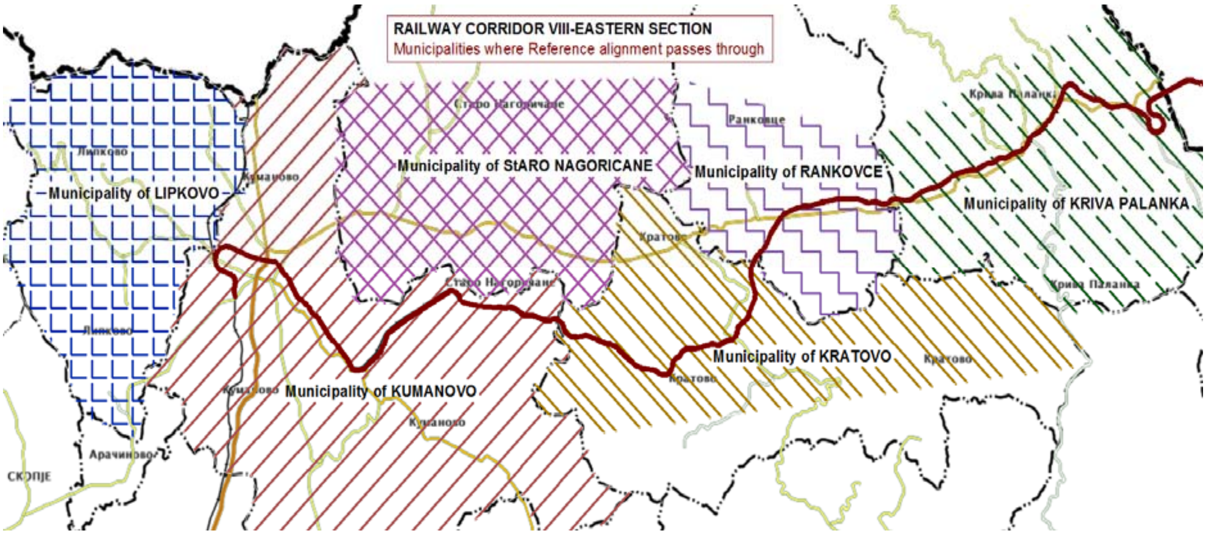


Figure 11-9 Municipalities along Corridor VIII -Eastern Section Project

11.7.1 ENVIRONMENTAL BASELINE

The climate in the North-Eastern Region ranges from predominantly moderate-continental to mountainous, with the temperature varying with the altitude. There are three main types of soil encountered along the alignment; rendzina soils or carbonate virgin soils on lime rocks in the higher altitudes; diluvial and coluvial soils on the hillsides; and alluvial soils or gleys in the marshlands and along the riverbeds.

The railway corridor runs along a series of river valleys, those of the Kumanovska and Pcinja rivers in Section 1, the Pcinja and Kriva rivers in Section 2, and the Kriva river in Section 3. The hydrology of the area is well developed and the Kriva river valley is a key element of the landscape, this river receives water from the watersheds of the Osogovo Mountains and Mount German. The water quality is generally good, except in the vicinity of the wastewater outfalls associated with the main population centres.

The stretch of the Kriva river between the confluences with the Pcinja and Kumanovska river is prone to flooding. This flooding area includes the stretches of the Pcinja and Kumanovska rivers upstream of Kriva river. Flooding episodes occur normally in spring during rapid snow melt and intense rainfall. There is no regulation of the flows in the Kriva river or management of the river banks at the confluences of the Pcinja and Kumanovska rivers, and therefore no ability to mitigate or manage flood events in this area.

In the railway corridor, there are two main alluvial aquifers related to the Pcinja and Kriva rivers. The drinking water supply for the main urban areas along the route is taken from the Lipkovo and Glaznja lakes, local springs, and groundwater abstractions, and in more rural areas from individual water pumps, individual wells, village taps, etc. None of the rivers interacting with the railway alignment is directly used for potable water.

Preliminary measurements of a noise along the railway alignment concluded that ambient noise levels are generally in compliance with national/EU standards. However there were noise level exceedances measured in the city of Kriva Palanka, and the village of Zidilovo due to traffic.

With regards to air quality, Kumanovo has one of the 15 monitoring stations which make up the National Air Quality Monitoring System (MoEPP). The air quality in the North-Eastern Region is monitored by a fixed monitoring station and a high volume sampler, measuring ozone, suspended particles, carbon monoxide and sulphur dioxide. Except for the city of Kumanovo, where exceeding limit values for ozone and suspended particles have been reported, there are no air quality data for other settlements along the railway line.

There are a limited number of municipal landfills along the route. In Section 1 there is only one Municipal landfill and one existing borrow pit close to Supli Kamen, which can be used if required by the Project. In

Section 2 there are two municipal landfills, in Kratovo and Rankovce and one existing borrow pit. Along Section 3 there is one municipal landfill in Kriva Palanka.

The railway will run through a low hilly urban area from Kumanovo, to the village of Dobroshane a stretch which is generally urban and densely populated. The route will then pass into open valley areas along the Pcinja and Kriva rivers. The land towards the Kriva river is generally low and flat with some gentle slopes down to the river and sparsely populated being dominated by dry grassland. From the village of Rudare to Rankovce there is a hilly narrow valley area with steep hill slopes, and is sparsely populated, with degraded to very degraded oak forests and dry grasslands. Moving along the route to the villages of Psacha and Petralica it runs across flat to gently sloped terrain with a densely populated agricultural area, as well as a number of abandoned fields. From the village of Psacha through to the town of Kriva Palanka and onto the Bulgarian border the terrain is generally hilly and mountainous with forested areas with steep slopes along the Kriva river and is very sparsely populated.

There are natural habitats along the route including areas of forests and shrub lands, grasslands, rocky sites and water habitats. The corridor also contains areas of manmade habitat including tree plantations, agricultural land, meadows, artificial ponds and urban areas.

With regards to sensitive animals that may be present along the railway corridor, there are large mammals like the bear and the wolf, and also smaller ones, like wildcat and marbled polecat. These species would be more likely to be present in Sections 2 and 3 of the corridor, where the richest and less disturbed habitats are present. As for the bat species, their shelters can be found in various habitats, including tunnels, natural or artificial caves, rock crevices, tree holes, roofs of houses, etc.

For birds, several nests of imperial eagle, falcon peregrine, black stork or long legged buzzard are recorded to exist in the proximity of the railway corridor. Moreover, most of the first half of the railway corridor runs within the IBA River Pcinja-River Petrosnica-River Kriva, and the other half between two Emerald sites, Pchinja-German and Osogovo, and within Osogovo, at the end of the corridor.

There are two Emerald sites in the North- Eastern region of Macedonia and both are intersected by the Section 3 of the Project, near the Bulgarian Border. These are:

- **Pchinja-German** (Code MK0000029): occupying the northern mountains Kozjak, German and Bilina Planina on the border with Serbia. Surface area: 63,490 ha.
- **Osogovo** (Code MK0000026): overlaps with Osogovo Mountains range. Surface area: 56,630 ha.

Both sites were designated as Type C[10], areas important for birds, other species and/or habitats. These sites are still not officially approved by the Council of Europe.

In Bulgaria there are the following two **Natura 2000** sites (see ***Error! Reference source not found.***), a Special Protection Area (SPA) and Special Area for Conservation (SAC) that overlap for the most of their area and which are contiguous with the Macedonian Osogovo Emerald site :

- **Osogovo**, with Code BG0002079 (Birds Directive Site, SPA) (Surface area: 24,125 ha)
- **Osogovska Planina**, with Code BG0001011 (Habitat Directive Site, SAC) (Surface area: 34,513 ha)

[10] In order to provide compatibility of the Emerald Network with Natura 2000, Emerald sites are categorized into three different types: Type A (Areas important for the protection of birds, which are in accordance with the Special Protection Areas (SPAs) of Natura 2000), Type B (Areas important for other species and/or habitats, which are in accordance with the Special Areas for Conservation (SACs) of Natura 2000), Type C: Areas important for birds, other species and/or habitats.

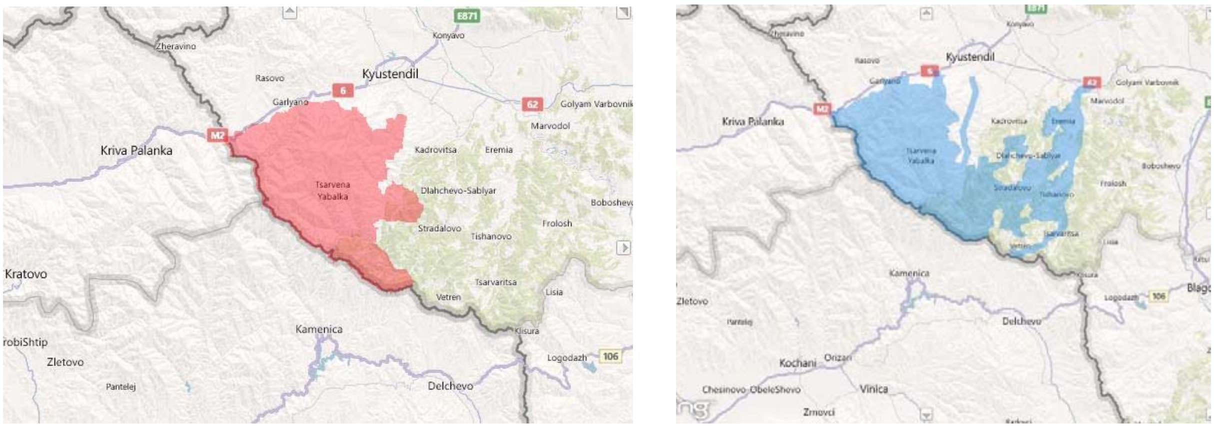


Figure 11-10 Osogovo Birds Directive (SPA) & Osogovska Planina Habitat Directive (SAC) Sites in Bulgaria

There are several other protected and designated areas along or in the vicinity of the railway corridor, including the protected area Monument of Nature Kuklica, the proposed protected areas Bislimska Klisura, Gorge on Pcinja river, Kiselicka river, and Osogovo Mountains, the Osogovo-Bilina Planina and Osogovo-German bio-corridors, Pcinja river - Staro Nagoricane village, Zubovce village, Kriva river – Beljakovce village, and Vetunica river Areas for the Management of Species and the Important Plant Area (IPA) Okonovo.

There are also recorded within the corridor amphibians, reptiles and insects along with aquatic species within the rivers including fish such as river trout. Among mammal species associated to the aquatic environments, otters are also known to be present within the area.

With respect to archaeological sites, during the works for the construction of Section 2 in 1995, five sites were identified and investigated that were in the close vicinity of the railway alignment, including Gradishte, Savin Rid, Gradishte, Mal Kamlesh and Crkvishte st. Marijana. Once these original archaeological investigations were concluded, the archaeological sites were preserved and the railway construction works continued with the authorization of the Republic Institute for Protection of Cultural Heritage. For Section 3, four sites have been identified, but they all are located more than 500 m away from the railway. Consultations with the Administration for Protection of Cultural Heritage of the Ministry of Culture, have confirmed there is no other known archaeological sites in the vicinity of the railway alignment in Section 3.

11.7.2 SOCIAL BASELINE

Excluding the towns of Kumanovo and Kriva Palanka which are urbanized, all other settlements (summarised below) along the railway alignment are rural in character

- Section 1: Proevce, Dobrochane, Suplji Kamen, Klecovce, Dovezence and Beljakovce;
- Section 2: Kratovo, Dimonce , Ketenovo, Krilatica, Pendak, Schopsko Rudare, Rankovce, Petralica, Ginovce, Ljubince and Opila, Rankovce; and
- Section 3: T`lminci, Konopnica, Koshari, Varovischte, Gradec, Lozanovo, Kiselica, Drenje, Zidilovo, Krklja, Uzem and Kostur

Most of these settlements can be characterized as having a very low standard of living in terms of physical and social infrastructure, which results in outward migration, an ageing population, low education and unemployment of rural population. For some settlements lack of alternative (off-farm) employment/income generation opportunities leads to over-dependence on agriculture as sole source of income, low wages and poverty. The North-Eastern Region has an extremely high proportion of children at risk of poverty, reaching over three fifths when measured in relation to household income.

The ethnic composition of the population in the North-Eastern Region shows greater variety than for the wider country, with 59.1% Macedonians, 31.1% Albanians, 6.1% Serbs and 2.9% of Roma origin. In Lipkovo, 97.4% of the population is Albanian. In Kratovo, Kriva Palanka and Rankovce over 95 % of the population is Macedonian.

Economic activity of the working-age population differs by gender, education level, age, ethnic origin and place of residence. The level of unemployment in North–Eastern Region is 43%. Due to very high unemployment levels most of the citizens from this region, go to Kumanovo and Skopje to look for temporary work, some of them go abroad working mainly as construction workers. Inhabitants from rural settlements are mostly older, they are characterized with typical rural way of life

The North-Eastern Region comprises 146,346 hectares of agricultural land, of which 79,800 hectares comprise tilled soil. Forests cover 49,295 hectares. The natural resources available in this region include: minerals such as copper, lead, chromium, arsenic, antimony and zinc, and rocks such as bentonite clays, quartzites and opal breccia. The Kratovo-Zletovo volcanic area is part of to a hydro geothermal system[11] present in karst or fractured marble or other Precambrian to Palaeozoic age rocks ; although there have been few detailed investigations of this resource. There are also reported to be several smaller systems such as at Proevce in the south margin of Kumanovo valley, Sabota voda near Veles, and Rakles near Radovish, which are karstic semi-open hydro geothermal systems within Palaeozoic marbles. The Kumanovo Spa is located near to the established Railway corridor within Section 1, with no recorded impacts. In section 2 and 3, based on available information gathered for design by PERI, there are no known thermal resources that would be affected by railway line.

In Section 1, the characteristic land uses are urban settlements, rural settlements, and agriculture land uses including farming, orchards, vineyards, grasslands and meadows. In Section 2 the land use is mostly pasture and to a smaller degree orchards, viniculture and farming. In Section 3 there are many areas of agricultural land use and orchards. Near the border the land use is forestry, and historically mining.

Kumanovo is the biggest urban settlement and municipal center with a population of 70,872. The whole North-Eastern Region gravitates towards this city. The municipal area of Kumanovo is the largest municipality in Macedonia with 509.48 km^2 and 105,484 inhabitants. Within Kumanovo the settlement Pero Čičo, which forms part of Baneva trla, is closest to the railway alignment and has houses which are less than 10 m from the railway alignment. Other Municipalities include Kratovo, which comprises an area of 374.44 km^2 and 10,441 inhabitants, and Rankovce which comprises 239 km^2 with 4,144 inhabitants.

The Municipality of Kriva Palanka is 481 km^2 with 20,820 inhabitants. Kriva Palanka as a border town recognizes the value of transboundary cooperation. There are many ongoing projects for increasing the transboundary business and economic cooperation between Kriva Palanka and Kustendil, the bordering town in Bulgaria.

11.8 ENVIRONMENTAL & SOCIAL BENEFITS & ADVERSE IMPACTS & MITIGATION

11.8.1 SUMMARY OF ENVIRONMENTAL & SOCIAL IMPACTS & MITIGATION

The potential environmental and social-economic impacts of the rehabilitation, construction and operation of the railway between Kumanovo to Deve Bair have been assessed within the ESIA. The decommissioning of the railway line has not been considered due to limited information at this stage being available with regards to the ceasing of operation of the railway and given the intention to continue to operate the railway indefinitely. In the event that the railway line ceases operation and needs to be decommissioned, relevant approvals will be sought and, if required, an ESIA produced for this.

The environmental and social impacts identified and assessed during the construction and operational phases are summarized in the table overleaf along with a summary of the key mitigation measures.

With mitigation the majority of the environmental impacts arising from the construction of the railway are not anticipated to be of a significant nature except for the removal of top soil and localized effects on noise levels. The operation of the railway may result in effects of a potentially significant nature on biodiversity due to the risks the railway may present to animals and from it bisecting sensitive habitats, including the

[11] Ref: "Inferred section of the main (low-temperature) geothermal systems in the Republic of Macedonia" – Proceeding World Geothermal Congress 2000, Kyushu-Tohoku, Japan

Macedonian protected Emerald sites in the Osogovo area which contiguous with the European protected Natura 2000 sites in Bulgaria.

The Project will require temporary land take during construction which will give rise to the temporary loss of some land. After construction this land will be reinstated, where possible, to its original condition. Permanent loss of land and property will occur in Section 3, as land is acquired for the railway alignment. Two communities, which include potentially vulnerable groups of residents, will be subject to direct effects, the first group is the local community of “Pero Cico” in Kumanovo where the railway alignment will be 7-8 m from 20 families. Vulnerable residents could also be affected in Section 3 where it is estimated that 25 families will lose their homes.

With the application of the mitigation measures during the operational phase, the majority of residual negative social effects are anticipated to not be of a significant nature, except for community disturbance and safety risks arising from the railway. PERI will need to carefully manage and monitor any issues related to community safety and on the safety of workers from the operation of a railway. Noise and vibration disturbance from the operation of the railway may affect the quality of life of communities who live along the route.

The Project is expected to have a positive, long-term and significant residual effect on the local, national and regional economies and improve access locally and across the region. The construction of the railway should stimulate economic growth at a local level and create local employment opportunities. Business opportunities may also potentially increase significantly for local contractors and especially subcontractors during construction works. Significant economic, employment and educational benefits are anticipated to arise as a result of the operation of the railway at a local, North-Eastern regional and national level and also on a south eastern European regional level potentially as part of the overall benefits the development of Corridor VIII will bring. These economic benefits should provide improvements in the quality of life of some communities along the route.

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
CONSTRUCTION PHASE			
Environment:			
Cultural Heritage	Destruction of archaeological sites during earth movements.	Archaeological monitoring will be undertaken for earthworks in previously undisturbed ground. Training of construction works prior to undertaking earthworks operations. Archaeological chance find procedure.	Slight Negative
Soils	Impacts on soil quality and soil erosion.	**Sediment and Erosion Control Plan**, **Waste Management Plan**, hazardous materials management and spill prevention measures.	Slight Negative
	Destruction of top soil.	**Soil Management Plan** shall be prepared for the controlled removal of top soil, appropriate storage and reuse.	Moderate Negative
Surface Water	Impacts on surface water.	Works near watercourses will be carefully managed and no occupation of the stream bed or the banks will be allowed unless no reasonable alternative available. Bridges will be designed and constructed so to limit effects. River & Stream Crossing Plans will be prepared for the management of works at any crossings. Retention/filtering of railway drainage, including sediment and pollution control facilities in areas which include sensitive habitats. Wastewater treatment systems, facilities and management for domestic wastewater generated in the construction camps and sites.	Slight Negative
Ground Water	Impact on ground water quality.	Intercepted groundwater will be sealed as soon as possible. Hazardous materials management and spill prevention measures to avoid groundwater contamination.	Slight Negative
	Alteration of ground water flow patterns.		Neutral
Air	Impacts on air quality during construction.	**Dust Management Plan**: measures to avoid/minimize dust emissions, including use of hoardings; wetting down/spraying of construction areas, accesses, materials stockpiles and during loading/unloading activities; covering of vehicles carrying dusty materials; wheel washing/spraying of vehicles; and management of spoil, etc. Measures will be taken to minimize construction emissions of combustion gases, including use of emissions compliant vehicles/machinery; maintaining vehicles/machinery etc. **Construction Traffic Management Plan** will be prepared and to optimize vehicle movements and plan vehicle movements to avoid peak times and heavily trafficked routes. Measures will be taken to avoid asbestos emissions during demolition of buildings and works of this nature would follow asbestos operational control procedures and require necessary risk assessments.	Slight Negative
Noise & Vibration	Impacts on noise levels from construction vehicles and machinery.	Noise screens/barriers for noisy works at night and those longer than one day in the same location/area. Noisy works/operations (e.g. blasting; pile driving; demolition etc.) will be carefully managed and noise minimized at source as far as possible. Construction equipment will where possible comply with relevant noise emission standards. All equipment will be fitted with appropriate noise reduction devices. Regular maintenance of vehicles and machinery. Restricted working hours for construction works 07.00 -19.00 h. **Construction Traffic Management Plan** will establish speed limits for construction vehicles and organize traffic to avoid as much as possible populated areas. Local residents will be kept informed of planned works. Noisy equipment will be located as far as possible from residential or other sensitive receptors.	Moderate Negative

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
		Monitoring of vibration impacts will be undertaken and any material damage proved to have been caused to local houses, buildings and other infrastructure (including access roads) by the works will be compensated for and subject to repair on a timely basis. Earthmoving equipment will be located as far away as possible from vibration-sensitive receptors. Vibration inducing operations will be scheduled so as not to give rise to cumulative significant vibration effects.	
Landscape	Temporary change of landscape.	Screening of construction sites, camps and areas.	Slight Negative
Habitats	Loss of habitats. Temporary severance of bio-corridors (from railway & inert waste landfills (Section 3).	A **Biodiversity Management Plan** (BMP) will be prepared and implemented for Section 3 (and covering Section 2 if determined to be required) to ensure the integrity and conservation objectives of the Emerald Sites in Macedonia and the Natura 2000 sites on the Bulgarian side, and that works in these areas or close to them are carefully managed. The BMP shall include the necessary assessments need to fully comply with Article 6 of the Habitats Directive.	Slight Negative
Fauna	Decrease in animal populations due to habitat fragmentation effects, collisions and destruction of nests, burrows, and other animal sheltering/breeding structures	The BMP will be prepared and finalized in advance of and prior to any works in Section 2 and 3. The necessary assessments to meet the provisions of Article 6 of the Habitats Directive will be completed in consultation with national nature conservation authority and other relevant stakeholders. The BMP will be publicly disclosed. Works will be scheduled to avoid the breeding season and to avoid effects on sensitive species and habitats. Limiting the vegetation clearance. Haulage roads and other construction areas/facilities will avoid areas of sensitive species, habitat and vegetation. Training of construction workers with regards to the protection of animals, habitats and vegetation etc. Any animal collisions will be recorded in a logbook. Hunting by workers will be prohibited. For Sections 1 and 2 already established haulage roads, worker camps etc. from the previous works shall be reused as far as possible. Any new camps will not be constructed in protected/sensitive areas and any auxillary facilities as far as possible would not be located in areas containing sensitive habitats/vegetation. Any such facilities to be located within sensitive area would need to be fully justified. In the vicinity of sensitive habitats construction sites will be clearly delineated so as to avoid damage in non-working areas and appropriate protection measures implemented. Restoration and reinstatement of temporary affected areas to a state as close to the original conditions as possible and using native plant species from the surrounding areas. Prior to the works a fauna survey of the area and its surroundings shall be carried out by a qualified biodiversity expert. If active breeding sites of sensitive species are found, they will be transported to another appropriate location away from the railway area or other precautionary measures will be taken. For certain sensitive species, such as a female bear with cubs, if detected in the vicinity of the works, the works shall stop until the female and her offspring have left the area.	Slight Negative

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
Social			
Land & Property	Temporary land loss and effect on livelihoods. Loss of gardens and community land and effects on agricultural production (from temporary land loss).	**Detailed survey** & **Census** of land take in Section 3, taking into consideration those without legal rights over properties and belongings. **Resettlement Action Plans** will be prepared for each section. Affected people will be duly compensated in accordance with the Resettlement Compensation Framework.Additional assistance will be provided to the people who will be resettled. Temporary land loss owners will be compensated according to the Resettlement Compensation Framework. Temporary land take from sensitive land uses will be avoided as far as possible. Temporarily affected land will be reinstated/restored to its pre-construction condition. Appropriate mitigation measures will be identified and implemented for any additional temporary land take. When available and preferred by owners other land (state owned) will be utilized for continuation of agricultural production.	Neutral/Slight Negative
	Loss of housing (including physical displacement (Section 3)).		Moderate Negative
	Permanent land loss (Section 3).		
Community Health & Safety	Impacts from influx of temporary workers.	**Health & Safety Plan** and an **Emergency Preparedness and Response Plan** will be developed prior to construction works starting. **Traffic Management Plan** for safe access to construction sites and to minimise impacts on the existing roads. Information about the project activities will be announced through the local radio/TV. PERI and the Contractor/s will inform residents of activities quarterly. Separate study on pedestrian/vehicle crossings will be undertaken and any additional measures implemented. Community health and safety educational programme will be developed. Workers will receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct. Any material damage made by workers will be subject to fair compensation. Security arrangements for contractor facilities will be carefully designed and managed. Worker camps will be located outside the communities. Local Workforce Recruitment Plan to assure employment of as much as possible local.	Neutral/Slight Negative
	Impacts from increased community exposure to disease.		Moderate Negative
	Impacts from increased traffic and heavy vehicles on local roads during construction.		Slight Negative
	Safety issues associated to the entrance of non-authorized people.		Neutral
Community Tensions	Effects from the influx of workforce.		Neutral/Slight Negative
	Community reactions due to disturbance arising from the construction works.		Moderate Negative
Access & Severance	Impacts on access and severance effects.	**Traffic Management Plan** to include: Identification of all public roads and paths that will be affected and proposal for the travel routes during the construction period; Minimization of the traffic disturbance; Signing of the construction areas/diversions etc; and Public notification of any traffic-related issues (e.g. road closures).	Neutral/Slight Negative
Disruption of Utilities	Effects of utility cuts on local businesses and communities.	Underground cadastre from relevant service providers will be obtained. Consultation with local citizens regarding possible illegal connections. Managing consumption of water and electricity in order to decrease pressure on the utilities in the area.	Neutral
Economy	Stimulation of economic growth at local level.	Inform people in a timely manner about the possible impacts and opportunities on economic activity in surrounding areas and expected timings of impacts, which will enable them to plan and prepare.	Large Positive
Employment	Creation of local employment.	**Local Recruitment Plan**: employment of local workforce and engagement of women to be preferred where appropriate.	Large Positive

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
Education & Training	Capacity building through training	Supervisors and managers will be responsible for utilising available resources to train, qualify, and develop their employees including the local workforce.	Moderate Positive
Vulnerable Groups	Section 1 "Pero Cico": loss of space in front of their houses. Section 3: loss of land and properties.	Safe access solution for the "Pero Cico" community will be provided (i.e. an over pass) together with a new play area and place for storing plastic bottles in the vicinity of the settlement with access road. Illiteracy of some of the affected people will be taken into consideration with regard to the method of Project communications. Necessary strengthening due to vibration effects on structures in close proximity to the route. Anti-noise walls/barriers/house insulation/Triple glazing. Compensation in accordance with the Resettlement Compensation Framework. Mitigation will be reviewed in light of findings from the Census in the next stage of project preparation should any vulnerable people be identified in Section 3.	Moderate Negative
Workforce	Accidents. Impacts on Workforce.	**Human Resources Policies** in line with national legal framework and EBRD Environmental & Social Policy (2008) and will include Employer safeguards against discrimination. Workers camps will be constructed outside existing communities and developed and monitored in line with EBRD & IFC guidance on Worker Accommodation. **Social Facilities and Services Plan** for workers will be prepared to regulate matters such as Housing Standards, workers facilities and services, fire safety, security, grievance mechanisms etc. **Emergency Preparedness Plan,** will be developed prior to construction works starting for the management of cases of incidents during the transportation of raw materials/hazardous substances; **Occupational Health and Safety Plans** will be prepared in order to protect the safety, health and welfare of people engaged in work or employment. The goal of all occupational safety and health programs is to foster a safe work environment.	Slight Negative
Quality of Life	Dust/Noise/Vibration.	*(See above)*	
	Safety.	**Traffic Management Plan** to be developed and implemented.	Moderate Negative
OPERATIONAL PHASE (Stage 1) Operation of Section 1 Kumanovo to Beljakovce Only with Diesel Traction			
Environment			
Air	Impacts on air quality due to emissions of combustion gases of diesel trains.	Regular maintenance of diesel locomotives to keep them in optimal working conditions. Use of the cleanest fuels (e.g. on-road grade diesel) within technically feasible possibilities.	Slight Negative
Noise & Vibration	Impacts on noise levels due to train operation (diesel traction). Annoyance to residents and damage to buildings due to vibration from trains.	During operation of diesel trains on Section 1 noise abatement measures will be installed at affected communities along the route (e.g. Chereskoselo, Lopate, Rezanovce, Sredorek, Pero Cico, Proevce, Kumanovo spa, ShupliKamen, and Dovezance). **Detailed Railway Noise and Vibration Study** will be completed during the design stage to refine and optimize noise abatement measures.	Slight Negative

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
OPERATIONAL PHASE (Stages 2/3) Operation of completed Railway Corridor VIII – Eastern Section Project Section 1, 2 and 3 Kumanovo to Bulgarian border (Deve Bair) using Electric Traction			
Environment			
Soils	Impacts of soil quality and soil erosion	**Chemical Accident and Spill Management Program** (including **Emergency Response Plan**)to prevent/ mitigate negative impacts to soil, surface water and groundwater. Regular control and maintenance of drainage structures and retention. Domestic wastewater will be treated according to the relevant national legislation and EU standards. Untreated wastewater will not be allowed to be discharged into natural water courses. Treatment of cleaning water from the washing of the trains (unless discharged under permit to a municipal collection system).	Slight Negative
Surface Water	Impact on water quality. Wastewater. Alteration of flow patterns and sediment deposition.		Slight Negative
Groundwater	Impacts on groundwater quality.		Slight Negative
Air	Impacts on air quality.	*(The railway will be operated under electric traction and no major air emissions are expected in this stage.*	Neutral
Noise & Vibration	Impacts on noise levels (electrical traction). Annoyance to residents and damage to buildings due to vibration from train traffic.	In addition to the noise abatement measures installed in Section 1, abatement measures will be need installed in: Krilatica/Ketenovo, Odreno, Petralica and T'liminci in Section 2, and KrivaPalanka and Zidilovo in Section 3. **Detailed Railway Noise and Vibration Study** will be completed during the next phase of project preparation.	Slight Negative
Landscape	Alteration of landscape by the presence of the railway.	Landscape planting. Sympathetic design of the railway into the landscape (e.g. shaping of the terrain; careful design of viaducts, bridges and tunnel portals, use of construction materials that blend well with those of the surrounding landscape; designing the landfills so the final contours are integrated with surrounding landscape; vegetating the sealed landfills; reinstatement of any borrow pits and use of local architecture features.	Moderate Negative
Habitat	Habitat fragmentation.	A **Biodiversity Management Plan** (BMP) will be prepared and implemented in relation to managing the potential effects on Sensitive Habitats, Fauna & Flora. Any mitigation measures contained within the BMP will be implemented. Wildlife crossings to increase the permeability of the railway line including: • Drainage pipes to facilitate the passage of small animals; • Fenced areas will be vegetated with native plant species that are attractive to local fauna and planted to lead the animals towards the wildlife crossings; • Specific wildlife overpasses for the passage of large animals in the sensitive areas (i.e. Osogovo-German and the Osogovo-BilinaPlanina bio-corridors); and • Detailed study for Section 3 for stretches where there are more than 500 m without tunnels or bridges, to determine if additional wildlife crossings are required. The findings of this study will inform the BMP. Implementation of an integrated vegetation control and management program. Regular removal of any food and organic waste from the railway. Immediate removal of visible animal carcasses. Fences will be installed in areas of tunnels or bridges in forested areas and in non-populated open terrains to deter animals from crossing the railway and lead them towards adequate railway crossing sites. Escape devices will be provided to allow animals, which accidentally enter in the railway corridor, leaving the area. Overhead power lines and catenary shall be made more visible to birdlife and measures implemented to reduce risks	Moderate Negative
Flora	Impacts on flora due to the use of herbicides and unwanted growth of invasive plants from outside the area.		Slight Negative
Fauna	Decrease in animal populations due to collisions with passing trains and electrocution with electrified components of the railway.		Moderate Negative

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
		to birdlife from overhead power lines and catenary.	
Protected & Designated Sites	Loss of conservation value of the sites	A **Biodiversity Management Plan** (BMP) will be prepared and implemented in relation to managing the potential effects on Sensitive Habitats, Fauna & Flora Mitigation measures identified within the BMP for flora, fauna and habitats, as well as those identified for soils, water and groundwater, and landscape will be implemented to ensure the integrity and conservation objectives are protected of all the protected and designated areas in the railway corridor area, including Emerald sites and Natura 2000 sites.	Slight Negative
Cultural Heritage	Plundering of archaeological sites.	In the event of the discovery of archaeological sites, the relevant authorities will be informed and they will take responsibility for directing the investigation and protection of any such sites.	Slight Negative
Social			
Land & Property	Effects on livelihoods. Effects on residents from loss of gardens & community land & on agricultural production.	**Public Information notices** - communities along the railway will be informed about operation of railway and that there should be no crossing of the railway other than at the designated crossing points, and that unauthorised activities should not be undertaken within the railway corridor. **Public awareness initiatives**- for increasing the public awareness of the railway (through school visits, safety centres, diversionary activities and communications). Making information on the railway publicly accessible. Safety barriers and signage to prevent access to the railway corridor. Grade separated railway crossings (i.e. over and underpasses) and level crossings will be replaced with over and underpasses. Adequate warning devices to warn pedestrians that a train is approaching **Community health and safety educational programme** Information on safety performance (relating to both accident investigations and overall statistics) will be made publicly available.	Neutral/Slight Negative
Community Health & Safety	Impacts from better access to the larger towns and health services		Large Positive
	Safety issues from crossing of railway track.		Slight Negative
Community Tensions	Community reactions due to disturbance arising from operation of railway.		Moderate Negative
Access & Severance	Impacts on access and severance effects.		Moderate Negative
Disruption to Utilities	Effects of diversions of utilities on local businesses and communities	Adequate strengthening of the local electrical grid to support the electrification of railway and avoid any reduction in the availability of the communities/businesses to electricity in the area.	Neutral
Economy	Effects on local, North-Eastern Macedonian, National and European Regional economy.		Large Positive
Employment	Creation of employment at local, regional, national and trans-boundary and global level & Improvement in access to employment opportunities across the region.		Large Positive

Topic	Summary of Impacts/Benefits	Summary of Key Mitigation/Management Measures	Significance of Residual Impact
Education & Training	Education and training benefits from employment opportunities and from improved access to education and employment opportunities (e.g. increasing participation in skills and training amongst priority groups including those receiving social benefit and lone parents, and vulnerable groups increasing the percentage of secondary educated students who will continue with faculty education; Encouraging females to choose untypical profiles etc.		Large Positive
Vulnerable Groups	Effects on vulnerable people during operations	Operator of the Railway PERI will continue to inform general public and vulnerable groups residing along the track in order to increase their safety awareness	Moderate Negative
Workforce	Railway workers' safety during operation of railway.	Update Operational **Emergency Preparedness Plan** and **Safety Program.** Provision of adequate training, equipment, and safety conditions, as well as taking other steps which are necessary for railroad workers to do their jobs safely. Operations to include the segregation of stabling, marshalling and maintenance areas from running lines. Railway workers will have rest periods at regular intervals in line with international standards and good practice.	Slight Negative
Quality of Life	Noise	Measures to reduce the noise level from railway traffic including maintenance of rails, railroad switchgear and other material; sharpening of rail and the wheels; and noise reducing material on the wheels and the rails. All residences that will be exposed to a noise level which is greater than the maximum permitted levels will be offered noise protection measures. Anti noise walls/barriers, house insulation and triple glazing in the windows will be implemented for houses affected by noise caused by the railway.	Moderate Negative
	Vibration	There are only limited possibilities for reducing the vibrations, which are caused by railways. The vibrations from the trains can to some extent be reduced by ensuring continuously maintenance of wheels, track bed and rails.	
	Safety	*(Measures related with Community Health& Safety and safety issues associated with crossing of rail track).*	
	Electromagnetic fields	Only possible measure to reduce the risk from electromagnetic field is to ensure that newly constructed railway is at a distance of 10 meters away from residences.	Slight Negative

Table 11-2 Summary of receptors, impacts/benefits, mitigation/enhancement measures and residual values

11.9 CUMULATIVE & TRANSBOUNDARY IMPACTS

The cumulative and transboundary impacts of the railway project with the following other present and reasonably foreseen projects have been assessed within the ESIA:

- Existing KrivaPalanka, Kratovo, Kumanovo and Skopje natural gas pipeline and connecting pipelines;
- Planned construction of the Vakuf water reservoir in Kratovo Municipality;
- Planned construction of the new motorway/highway Kumanovo - Bulgarian border.

With regards to environmental impacts, the significance of the cumulative residual effects were found to be slight in all cases except for landscape, habitats and protected and designated areas. It was determined that the project that mainly contributed to the cumulative effects would be the Vakuf water reservoir.

As for the transboundary effects, the effect on protected and designated sites was found to have some significance (slight) due to the presence of Natura 2000 sites across the border in Bulgaria (Osogovo SPA and Osogovska Planina SAC), which are a continuation of Macedonian Emerald sites (Pchinja-German and Osogovo). Mitigation measures to minimize the impacts on flora, fauna and habitats will also protect the conservation values of these sites.

The Border tunnel at the end of Section 3 has a total length of 2,350 m. The Macedonian part of this tunnel will be 1,150 m long, and the reconstructed of this 1,150 m section forms part of this project. The remaining 1,200 m of the tunnel will be the responsibility of Bulgaria, and does not form part of this project. Given the practicalities of reconstructing this tunnel, the detailed design of this border tunnel will be prepared in coordination with the Bulgarian railway authorities during the design phase. The effects of the 1,150 m of the border tunnel in Macedonia have been considered as part of the assessment of the effects of all the tunnels and other railway structures which are present in Section 3Following ESPOO Convention requirements, a notification letter was provided to the Bulgarian side to inform them about the railway project, including the reconstruction of the Macedonian part of the border tunnel between Macedonia and Bulgaria. This first notification letter was sent in August 2011 in English, and a request was received for to be translated into Bulgarian. A second submission of the Notification letter in Bulgarian was made on 17 January 2012. No response has been received to date. The Bulgarian authorities should reply on which level of involvement in the project they are interested in, including the discussion around the potential transboundary impacts on their Natura 2000 sites

Positive cumulative economic and employments effects of a significant nature are anticipated from the projects. The Motorway project will potentially have positive cumulative impacts to education and training. Vakuf reservoir and the motorway will result in negative impacts on land and property. All three projects along with railway will potential give rise to both positive and negative effects on the Quality of life of communities living along the route.

Positive transboundary effects are anticipated on the economies of the regions and on employment, and education and training.

11.10 ENVIRONMENTAL & SOCIAL MANAGEMENT & MONITORING

An Environmental and Social Management and Monitoring Plan (ESMMP) for Railway Corridor VIII – Eastern Section Project has been prepared *(see Chapter 8)*. The ESMMP describes the environmental and social mitigation and monitoring measures, the criteria for their successful implementation and the organizational measures to be implemented during the pre-construction, construction and operation of the Project. The ESMMP involves a long term and phased process which will need to be regularly reviewed and updated as the Project evolves to reflect any changes in the Project implementation and organization as well as in regulatory requirements.

The ESMMP details environmental and social measures for the construction and operation of the railway, including the requirement to establish and implement an Environmental and Social Management System and monitoring plan along with a number of specific Environmental and Social Management Plans, including a Dust Management Plan, Biodiversity Management Plan and Traffic Management Plan.

For each identified impact a monitoring protocol will be established that will define the objective of the monitoring, the description and timing of monitoring activities, the indicator to measure the effectiveness of the measure, and any thresholds to be taken into account. Monitoring reports will be required from the Contractor/Operator during the construction and operational phases. These will be submitted to the relevant inspection authority. The monitoring plan is integrated within the ESMMP.

The goal of the ESMMP is to ensure that all necessary mitigation measures are carried out to counter any adverse environmental impacts, and that enhancement measures are used where feasible and practical. The ESMMP will allow for redesigning mitigation measures if from the monitoring it is observed that the mitigation measures are not working.

11.11 CONTACTS

Further information on the Project can be found at:

Ministry of Transport and Communication
Biljana Zdraveva
Svetlanka Popovska
Makedonka Dimitrioska

Address: “Crvena Skopska Opstina” 4
1000 Skopje, Republika Makedonija
http://mtc.gov.mk/
+389 2 3145 502
+389 75 375 024
+389 2 3118 144

Consultant representative

Tatjana Todoroska

+389 78 307 335
e-mail: rail8mk@eptisa.com

Chapter 12 Stakeholder Engagement Plan !

Describes the Stakeholder Engagement Plan, showing the communication channels with stakeholders, and the active public participation during the entire ESIA process.

12 STAKEHOLDER ENGAGEMENT PLAN

12.1 INTRODUCTION

12.1.1 BACKGROUND

This document is a Stakeholder Engagement Plan (SEP) describing the planned stakeholder consultation and engagement process being implemented within the framework of the project "Macedonian Railways: Feasibility Study for the Eastern Section of Corridor VIII and Environmental and Social Impact Assessment (ESIA)". The project has been initiated by the Railway Department, Ministry of Transport and Communication (further referred to as the Investor) based on the requirements of Republic of Macedonia legislation and those of the European Bank for Reconstruction and Development (EBRD) which is considering financing the project.

Stakeholder engagement is an ongoing process involving (i) the client's public disclosure of appropriate information so as to enable meaningful consultation with stakeholders, (ii) meaningful consultation with potentially affected parties, and (iii) a procedure or policy by which people can make comments or complaints. This process should begin at the earliest stage of project planning and continue throughout the entire life of the project.

In addition, a Non Technical Summary for the project will be prepared to address potential environmental and social impacts and mitigation measures to prevent, reduce or minimise environmental, occupational, community health & safety and social impacts, grouped for construction and operational phases of the proposed project

It is essential to carefully identify all affected stakeholders, as well as those interested in the project, and to take due consideration to their concerns, expectations and preferences. Attention should be given to the identification of vulnerable stakeholders whose lives and well-being may be dependant by the activities of the Investor. Additionally, it is imperative to maintain close interaction with the local community and identify opportunities to improve social performance.

This SEP is based on an initial identification of key project stakeholders. In the course of conducting the primary consultation with stakeholders additional stakeholders are identified and the SEP has been updated accordingly. If you would like to be added to the Stakeholder list to receive information about the project and opportunities to comment, please contact:

Ministry of Transport and Communication, Address: "Crvena Skopska Opstina" 4; 1000 Skopje, Republic of Macedonia; http://mtc.gov.mk/
Telephone: + 389 2 3145 497, + 389 2 3123 292
Fax: + 389 (0)2 3126 228
e-mail: contact@mtc.gov.mk
Biljana Zdraveva - Head of Railway Department
e-mail: zdraveva@mtc.gov.mk

During project implementation, a longer term stakeholder engagement programme will also be established and made publicly available.

12.1.2 SUMMARY OF THE PROJECT

12.1.1.1 DESCRIPTION OF THE PROJECT

The Republic of Macedonia with its geographic situation in the heart of the Balkan Peninsula is a natural crossroads between Northern, Central and Southern Europe, as well as between the Mediterranean and Eastern Europe, Asia and Russia. In this part of the world, the railroad plays an important historical role.

The railway corridor East-West, otherwise known as Corridor VIII, connecting Albania, Macedonia and Bulgaria, was defined at the Pan-European conference, held in Helsinki. The construction and operation of the Corridor VIII Railway have been identified as an integral part of one of five new European Transnational Axes by the newly adopted European transport strategic documents.

The Corridor VIII has a very important role for the Republic of Macedonia as well, particularly influencing the economic and social development of the country. The rehabilitation of already constructed railway parts and construction of missing parts of the Railway Corridor VIII are of very high governmental priority and they are pointed out within the National Strategy of transport, adopted in 2009.

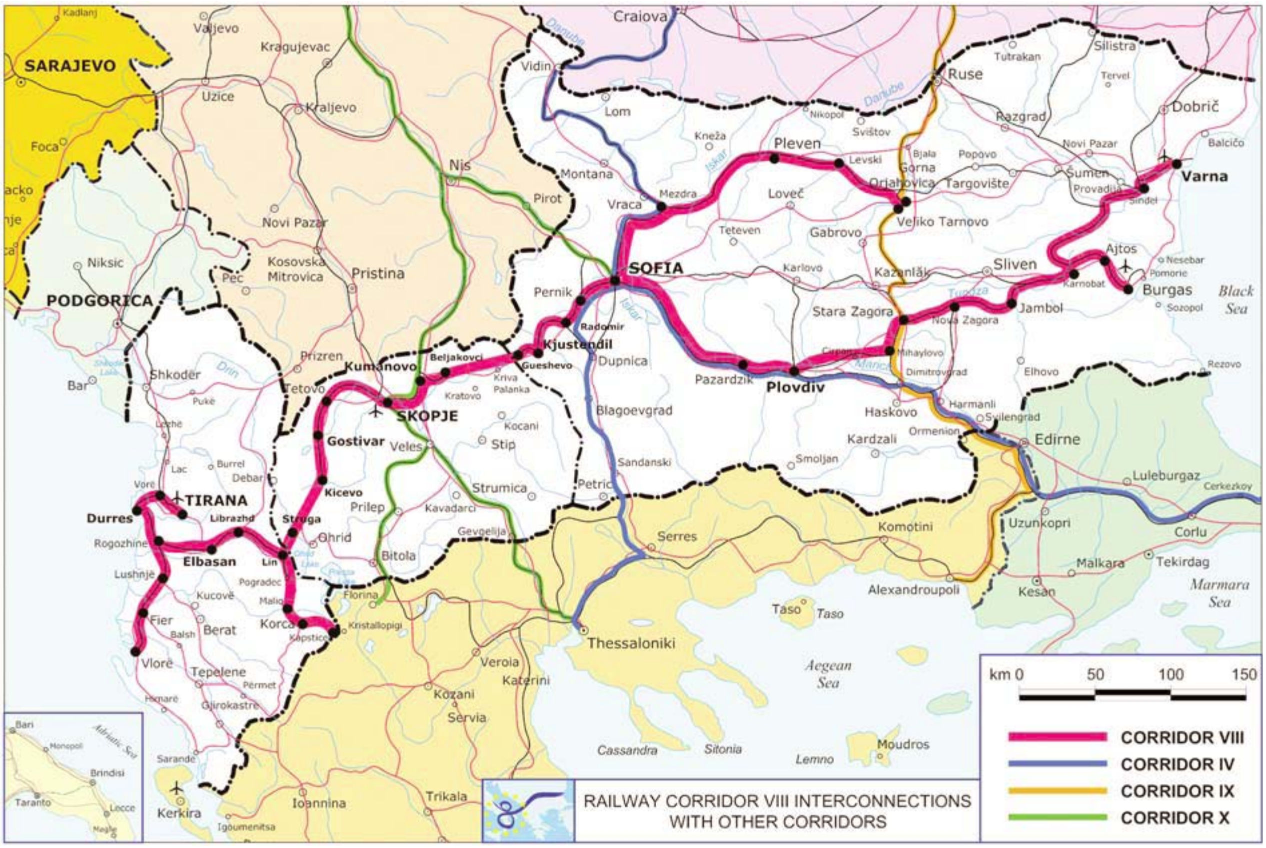


Figure 12-1 Route of Corridor VIII and Interconnection with other Corridors

Railway Corridor VIII, which passes through the territory of the Republic of Macedonia, has two unfinished parts: the first one, Western part, towards the Republic of Albania and the second one, Eastern part, connecting to the Republic of Bulgaria via a tunnel. The total length of the two sections is 312 km.

Republic of Macedonia initialised preparation of Feasibility Studies for outstanding parts of the corridor within Macedonian territory as step forward to the application for requesting the financial sources.

Reference project is Feasibility Study for Corridor VIII – Eastern part. The project location is the eastern section of rail Corridor VIII (north-eastern Macedonia), starting from Kumanovo – Beljakovce – Kriva Palanka – MK/BG Border (figures below). The length of the eastern section is 89.5km.

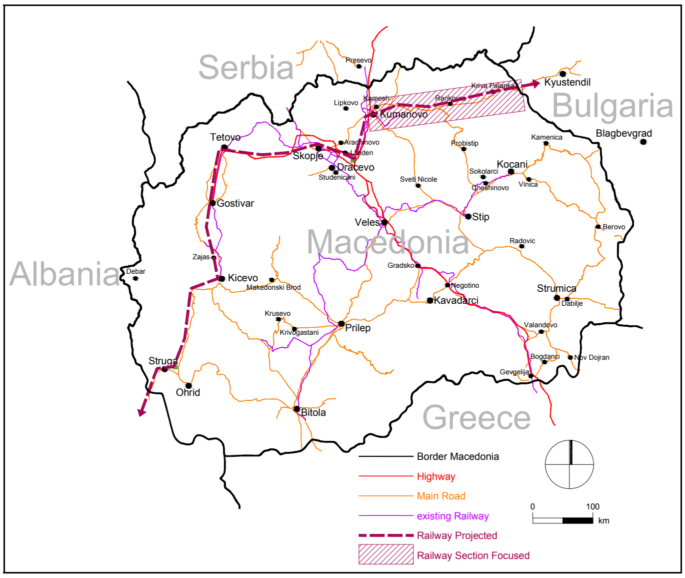


Figure 12-2 Location of the project within the region

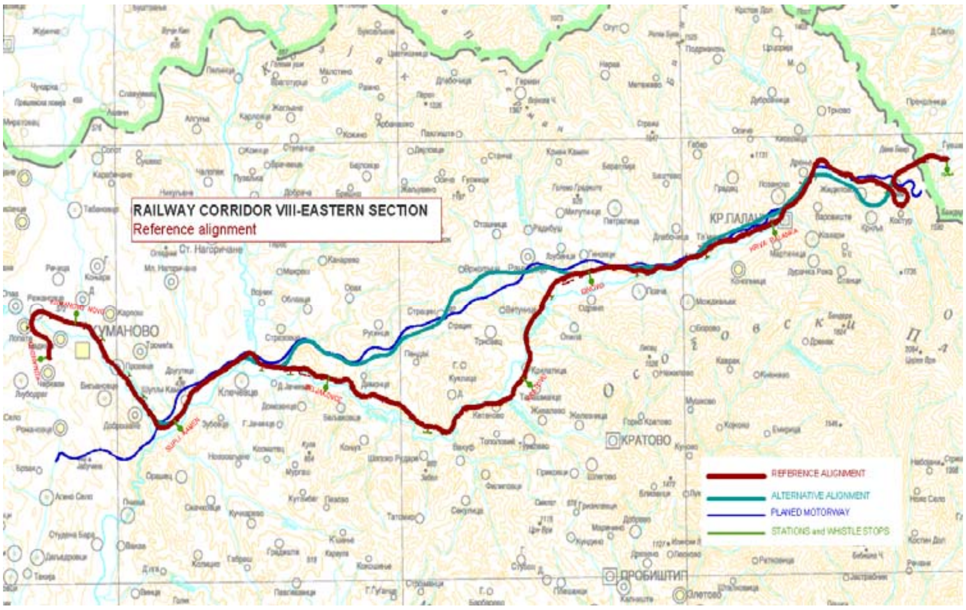


Figure 12-3 Location of the project within country

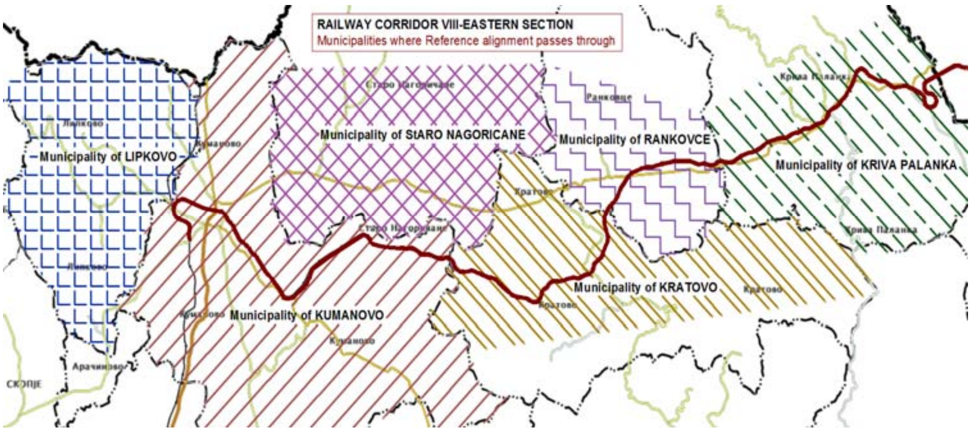


Figure 12-4 Affected Municipalities

In the period between 1994 and 2004, Government of Macedonian invested in construction of the rail line in eastern part. Works stopped due to lack of funds however the corridor was more or less established.

Established rail line and alternative solution (following planned motorway Corridor VIII) were evaluated based on multi analysis criteria. Established alternative was recommended as preferred. At this stage only preliminary assessment of environmental and social impact has been conducted. Government selected recommended alignment. After formal selection of alternative further elaboration of Environmental and Social Impact Assessment will follow in the upcoming stages of the project implementation.

For more detailed project description please refer to the public information leaflet.

12.1.1.2 HISTORY OF THE PROJECT - OVERVIEW

Plans for construction and operation of rail line Kumanovo – Bulgaria are very old, starting from XIX century (1873-1888). Continuously but with interruptions due to the wars and political situation works continued till middle of XX century when they were stopped in 1948 following the dispute between Yugoslavia and the states of the Warsaw Pact. On the project section only rail line alignment from Kumanovo – Beljakovce was operational starting from 1956 till 1994 when reconstruction and construction works undertaken by Government started. Starting from 2004 when works stopped due to the lack of funds the line is not operational.

In 1995, the Government decided to prepare new spatial plan for the country due to political, economic and strategic changes in the state as well as due to expiring of previous spatial plan. The basis for the development of the spatial plan was the National Strategy for Economic Development of Republic of Macedonia published in 1998. The spatial plan was adopted in 2004 with expiring horizon of 2020. The Spatial plan includes spatial arrangement of transport and other infrastructure. Development of the rail system is addressed as base for the need of modernization and extension of the rail network as well connection of the Macedonian rail network with Albanian and Bulgarian network. The alignment Kumanovo _-BG border remains nearly the same as designed 50 years ago but now takes into account a projected dam near Kratovo. In the planning period till 2020 it is expected that the rail lines Beljakovce – Guesevo and Kicevo – Kjafasan are completed.

Bulgaria as well is undertaking activities towards finishing of the corridor at their territory. A Feasibility Study for modernization has been done. It is expected that the project would be financed by EU Funds and might be completed in 2020.

12.2 REGULATORY CONTEXT

12.2.1 MACEDONIAN REQUIREMENTS FOR STAKEHOLDER ENGAGEMENT/PUBLIC CONSULTATION

According to the Macedonian legislation, the public should be involved in every stage of the EIA procedure and all decisions made during the process should be published in appropriate media. This applies for the following documentation:

- Notification of intention for project implementation;
- EIA screening decision;
- EIA scoping decision;
- Announcement of availability of ESIA study;
- Non-technical summary of ESIA study;
- Report on adequacy of ESIA study;

- Decision on granting consent to or rejecting the application for the project.

Public hearings and possibilities for submission of written opinions will be organised by the Investor and the Ministry of Environment and Physical Planning to allow the public to express its opinions. The Macedonian process for public hearing related to the draft ESIA Study is provided in Figure 4 below.

The International Convention on Environmental Impact Assessment in a Trans-boundary Context, ESPOO, Article 3, state that for the "construction of lines for long-distance railway traffic" ..."the party of origin shall, for the purposes of ensuring adequate and effective consultations under Article 5, notify any party which it considers may be an affected Party as early as possible and no later than when informing its own public about that proposed activity." As a signatory of the Convention since 1999, Macedonia has incorporated its provisions into the national legislation (Law on Environment) and has nominated national focal point for ESPOO Convention:

Ministry of Environment and Physical Planning
Bul. Goce Delcev b.b.
Mrs. Daniela Rendevska
e-mail: danielastefkova@yahoo.com
mob.tel: 00 389 76 44 69 14

The Macedonian Ministry of Environment and Physical Planning will inform (based on the Notification of Intention for the project and ESIA screening process) the Bulgarian governmental institution and Bulgarian ESPOO focal point about the start-up of the ESIA procedure, description of project and preliminary project environmental and social impacts. Thereafter, Bulgaria will have a period of 30 days to respond if they decide to participate in the ESIA process. If they respond that they do want to participate, the obligation is to have equivalent consultations with public in the affected country to that in the country where the project is located. The Macedonian Ministry of Environment and Physical Planning will send to Bulgaria as well the draft ESIA Study, the Report on adequacy of ESIA study (the consultations with Bulgarian governmental bodies about the mitigation measures will be performed) and the final Decision on granting consent to or rejecting the application for the project.

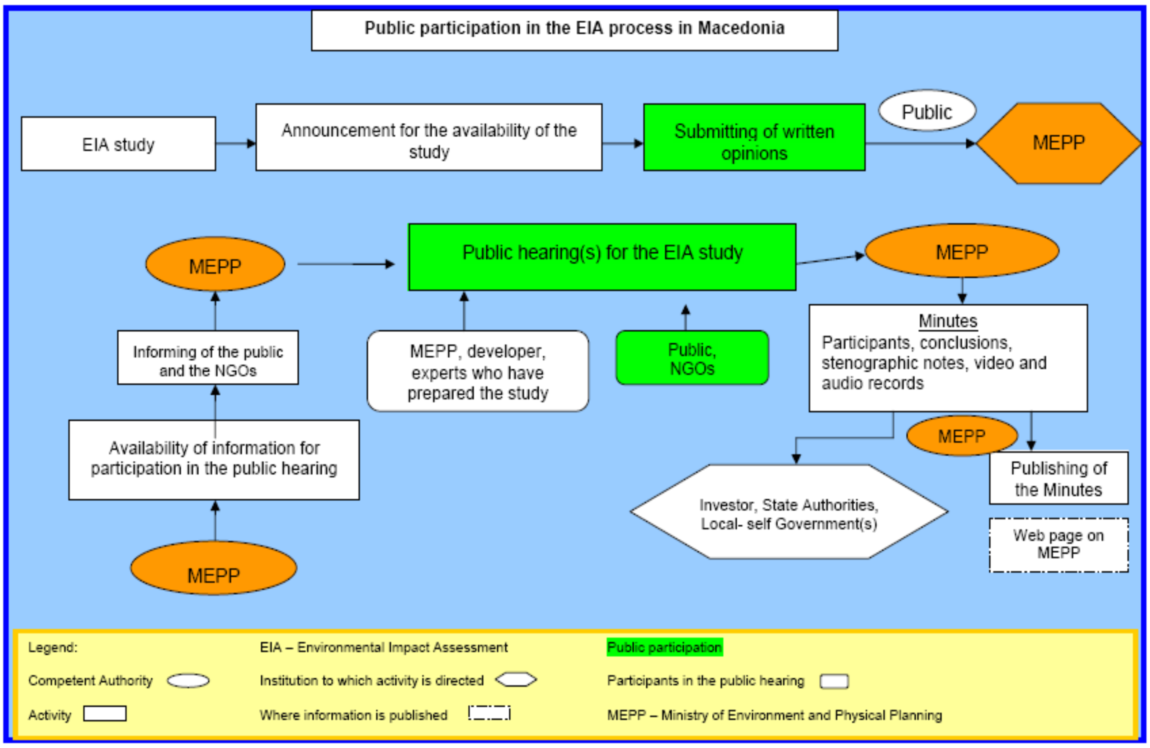


Figure 12-5 Public hearing on draft ESIA Study within the EIA process in Macedonia

12.2.2 EBRD REQUIREMENTS FOR STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION

Since EBRD may be involved in the further phases of the project, the project must meet best international practice and the requirements for stakeholder engagement and public consultations as specified in the EBRD Environmental and Social Policy of 2008. The EBRD considers stakeholder engagement as an essential part of good business practices and corporate citizenship and a way of improving the quality of projects. In particular, effective community engagement is central to the successful management of risks and impacts on communities affected by projects, as well as central to achieving enhanced community benefits. In summary, the following system of stakeholder engagement is applicable to the project:

- Identification of project stakeholder groups. Identification of stakeholders, including members of the public who could be affected by the project construction and operation.
- Stakeholder engagement process and information disclosure. During this stage, it is necessary to ensure that identified stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation.
- Meaningful consultation. The consultation process will be based on the disclosure of information relevant to the project activities and operations. The consultation process will be undertaken in a manner that is inclusive and culturally appropriate for all stakeholders.
- Grievance mechanism. Maintaining a grievance process by which the general public and other stakeholders can raise concerns, and which will be handled in a prompt and consistent manner.

12.3 STAKEHOLDER IDENTIFICATION

In order to define a communication process several stakeholder groups that may be interested and/or affected by the project development and implementation have been identified. However, all others who would like to be included in the mailing list in order to receive information on reporting, meetings or other consultation opportunities can contact at the telephone numbers mentioned on first page.

There are a number of groups of people and social groups who are interested in the project on different levels. These may be described as following:

- People and social groups who will be directly or indirectly affected by the project,
- People and social groups who may participate in the implementation of the project;
- People and social groups who may have a possibility to influence and make decisions on implementation of the project and/or may have an interest in the Project.
- Stakeholders who may be interested in the project

For each of the stakeholder groups the specific communication and tools were identified in order to ensure easy, transparent, direct, open and interactive communication with all stakeholders and to get as earlier as possible their feedback in the different phases of project implementation.

The matrix that contains identified stakeholders and most appropriate communication methods and tools is presented in table below.

Level of Stakeholder interest in/involvement to the project	Communication methods and tools										
	Public consultation meetings	Information and consultative meetings with drawings	Websites	Project leaflet/s	Submission of documentation	Notice board	Communication through the NGO`s	Articles in the newspaper for construction, architecture and design "Porta 3"	Correspondence relating to project	Public release	Exchange of information
Stakeholders who may be directly or indirectly affected by the project											
Residents of municipalities, villages and communities where railway line and associated infrastructure will be constructed	Y	Y	Y	Y		Y	Y			Y	Y
Land owners and users of infrastructure sites	Y	Y			Y				Y	Y	Y
Local and Regional businesses	Y		Y	Y		Y		Y		Y	Y
National, Regional and local freight Companies	Y		Y	Y		Y				Y	Y
Environmental and Social NGOs	Y		Y	Y		Y	Y			Y	Y
Public transport Users				Y		Y				Y	
Informal and seasonal land users	Y	Y	Y	Y		Y	Y			Y	Y
Railway workers											
Stakeholders who may participate in implementation of the project											
The Investor					Y				Y		Y
Construction companies e.g. Beton, Pelagonia and Granit	Y		Y					Y		Y	
Employees of construction companies, contractors and subcontractors	Y		Y	Y		Y		Y		Y	
Equipment and service Suppliers	Y		Y	Y						Y	
Union representatives	Y			Y		Y		Y		Y	
Users of the rail line				Y		Y					
Possibility to influence and make decision on implementation of the Project											
<u>Internal Authorities</u>											
Ministries of Transport and Communication			Y		Y				Y		Y
Ministry of Environment and Physical Planning			Y		Y				Y		Y
Ministry of Labour and Social Policy			Y		Y				Y		Y

Level of Stakeholder interest in/involvement to the project	Communication methods and tools										
	Public consultation meetings	Information and consultative meetings with drawings	Websites	Project leaflet/s	Submission of documentation	Notice board	Communication through the NGO`s	Articles in the newspaper for construction, architecture and design "Porta 3"	Correspondence relating to project	Public release	Exchange of information
Ministry of Economy			Y		Y				Y		Y
Ministry of Agriculture, Forestry and Water Economy			Y		Y				Y		Y
Crisis Management Center			Y		Y				Y		Y
Center for Regional Development of North Eastern Region in Kumanovo			Y	Y	Y				Y		Y
Local Government Administrations	Y		Y		Y				Y		Y
Local Inspectorates	Y		Y	Y	Y				Y		Y
Emergency services			Y		Y				Y		Y
External Authorities Bulgarian authorities											
Ministry of Foreign Affairs			Y		Y				Y		Y
Ministry of Transport			Y		Y				Y		Y
Ministry of Emergency Situations			Y		Y				Y		Y
Ministry of Environment and Water			Y		Y				Y		Y
Stakeholders who may be interested in the project											
General public			Y	Y						Y	Y
Religion communities			Y	Y		Y	Y			Y	
Media			Y	Y						Y	
Potential investors in Macedonia			Y					Y		Y	

Table 12-1 Stakeholders identification

12.4 STAKEHOLDER CHARACTERISTICS

12.4.1 MACEDONIAN STAKEHOLDERS

Stakeholders	Communities	Population	Communication method
Residents of towns and villages along the rail line in Macedonia	Kumanovo Town	70,872	• Public consultation meetings • Websites • Project leaflets • Targeted project leaflets • Notice boards • Information and consultative meetings • Community meetings as well as on-to-one meetings.
	Baneva Trla (Roma Settlement)	-	
	Proevce	2,311	
	Dobrochane	1,655	
	ShupljiKamen	81	
	Klechovce	573	
	Dovezence	123	
	Beljakovce	64	
	Dimonce	69	
	Ketenovo	216	
	Krilatica	141	
	Pendak	45	
	Sopsko Rudare	143	
	Vetunica	57	
	Rankovce	1,192	
	Odreno	131	
	Ginovci	311	
	Psacha	539	
	Ljubinci	164	
	Opila	269	
	Petralica	669	
	T'lminci	73	
	Konopnica	1,398	
	Kriva PalankaTown	14,558	
	Koshari	21	
	Varovishte	87	
	Drenja	90	
	Zidilovo	302	
	Krklja	227	
	Uzem	256	
	Kostur	38	
Land owners of infrastructure sites			
Local Businesses along the railway line			
NGOs			
National, Regional and local freight Companies			
Public transport Users			
Informal and seasonal land users			

Table 12-2 Stakeholder - directly or indirectly influenced by Project

Stakeholder	Communication Method
The Investor	Official letters, correspondence
Construction companies	Official letters, correspondence , interim reports
Employees of construction companies, contractors and subcontractors	Notice boards in the premises of the construction companies, newspaper specialized for construction sector "Porta"

Table 12-3 Stakeholder Identification – participate in implementation of project

Stakeholder	Communication Method
Ministry of Transport and Communication	Official letters / correspondence Submission of documentation
Ministry of Environment and Physical Planning	Official letters / correspondence Submission of documentation
Ministry of Labour and Social Policy	Official letters / correspondence Submission of documentation
Ministry of Economy	Official letters / correspondence Submission of documentation
Ministry of Agriculture, Forestry and Water Economy	Official letters / correspondence Submission of documentation
Center for Regional Development of North Eastern Region in Kumanovo	• Consultative meeting • Correspondence relating to project • Exchange of information • Submission of documentation
Crisis Management Center	• Meetings on emergency prevention and response planning
Local Government Administrations: 1. Kumanovo 2. Kratovo 3. Rankovce 4. Kriva Palanka 5. Lipkovo 6. Staro Nagorichane	• Consultative meetings • Correspondence relating to project • Exchange of information • Submission of documentation
Local Inspectorates and Emergency Service	• Consultative meetings • Correspondence relating to project • Exchange of information • Submission of documentation

Table 12-4 Stakeholder Identification – authorities and decision makers

Name	Communication Method
Kumanovo Municipality: • National Roma Centrum - Kumanovo • Vrama si (Roma issues) • Drom (Roma issues) • Roma Rights Forum Arka • Roma Women Organization "Daja" - Kumanovo • LIPA: Centre for Intercultural Dialogue	• Consultative meetings • E-mail • Web site
Kratovo Municipality: • 100 registered NGO's at the Regional NGO center but only a few are active • Romani Asvin – Kratovo	
Kriva Palanka Municipality: • No active NGO's in the municipality	
Rankovce*Municipality:* • No active NGO's in the municipality	
Staro NagorichaneMunicipality: • No active NGO's in the municipality	

Table 12-5 Stakeholder Identification – NGOs that may be interested in project

12.4.2 BULGARIAN STAKEHOLDERS

Stakeholders	Communities	Population	Communication method
Residents of towns and villages along the rail line in Bulgaria	Guesevo	xxxxx	Websites Project leaflets
	Kjustendil	44,416	

Table 12-6 Bulgarian stakeholder - directly or indirectly influenced by Project

Stakeholder	Communication Method
Bulgarian Ministries: 1. Foreign Affairs 2. Transport and Communication 3. Emergency Situations 4. Ministry of Environment & Water	• Consultative meetings • Submission of "Notification of intention for project implementation" by Ministry of Environment and Physical Planning • Discussion on cross-border response to emergencies

Table 12-7 Bulgarian stakeholder Identification – authorities and decision makers

Name	Communication Method
Bulgarian NGOs*:* • To be added later depending if there is an interest in participation in the ESIA process from Bulgarian side	• Consultative meetings • E-mail • Web site

Table 12-8 Bulgarian stakeholder Identification – NGOs that may be interested in project

12.5 COMMUNICATION PROCESS AND METHODS

The Railway Department will provide public information, participation and consultations during all stages of project implementation. This includes the phases of pre-ESIA consultations, ESIA study, ESIA disclosure, design and construction in addition to the construction and operation phases.

The overall method for collection of information during the ESIA period is through extensive consultations and meetings with the stakeholders identified. Besides careful identification of stakeholders to be consulted and ongoing consultations with these, mechanism for engaging the wider public will be established, i.e. project information available on the internet, a downloadable leaflet on the project in addition to a comment and a grievance form, on information board of local authorities (Municipalities, villages, communities). If you think that other method would be more appropriate please contact us.

12.5.1 STAKEHOLDER ENGAGEMENT STRATEGY

The engagement of stakeholders can be divided into 5 main phases. The full list of stakeholders to be consulted can be found below.

Phase 1: Pre-ESIA Consultations
Phase 2: ESIA Study Consultations
Phase 3: ESIA Disclosure
Phase 4: Detailed Design and Construction
Phase 5: Operation.

During phase 1 (August – October, 2010), the Consultant analysed the project background by obtaining the information from a great number of different and relevant sources. Aiming to have a clear picture of its complexity, current status and needed further interventions and in order to prepare firstly the methodology, which will accurately address the project's scope of works, and further, smooth and reliable implementation, the Consultant has addressed all relevant institutions in Macedonia. MoTC, MoEPP, PERI were addressed in the way that is possible at the tendering stage, mainly through request for clarification. Furthermore, the Consultant gather additional information from the local experts that are planned to work on the project in case of award and local experts that have already worked with the Consultant on previous projects in Macedonia.

During phase 2 (January – August, 2011), which at the moment is still on-going, the ESIA team has carefully identified the stakeholders who may be directly or indirectly influenced by the project, who may wish to comment on the project and its impacts and initiated a consultation process. The scoping meetings were held were the scope of the ESIA was define very detailed with different stakeholders and relevant documentation (Local Environmental Action Plans, Local Economic Development Plans, Environmental Reports on state of environment and others) were collected for developing the baseline within the ESIA Study.

Meetings Held to Date

- Bulgarian representatives MoT
- Railway Infrastructure Company
- Radomir-Gueshevo Railway Line Modernization Project
- Ministry of Environment and Spatial Planning
- Municipalities along NorthEast Region
- Public Scoping Meetings 4-5 May 2011 in Kumanovo, Kratovo, Rankovce and KrivaPalanka

During Phase 3, which is planned to be initiated beginning of September, SEP and annexes to SEP, Comment and Grievance form, will be disclosed to the public for comments. Project leaflets will be widely distributed in hardcopy and available as PDF file on web sites till end of September. Information for public disclosure of SEP and project leaflets will be published in daily newspaper "Dnevnik".

SEP and project leaflets will be available in English and Macedonian on websites:

http://www.mtc.gov.mk , http://www.moepp.gov.mk and http://www.mz.com.mk.

These links will be inserted on the websites of Municipalities. Please refer to subchapter: 5.2 Information disclosures for more details.

Early March 2012 it is expected ESIA to be disclosed to the public. The comment period will be 120 days, ensuring that all stakeholders have an opportunity to express their views. Within first 30 days public meetings will be organized. Public will be informed duly for scheduled dates (notice boards in Municipalities). On completion of the disclosure and comment period, the ESIA Study will be updated to reflect the comments made by stakeholders and information about how comments were taken into account and the final decision will be made public according to the same media. In addition, the comments will be fed into the future work on detailed design and construction of the project. The final ESIA Study and the Environmental and Social Management Plan will then be published on the web sites of Ministry of transport and communication, Ministry of environment and physical planning and Macedonian Railways – Infrastructure and put in the main municipal offices where the draft ESIA was located.

The Report on adequacy of ESIA Study issued by the Ministry of Environment and Physical Planning and the Decision on granting consent to or rejecting the application for the project will be announced as well on the web site of the Ministry of transport and communication, Ministry of environment and physical planning and Macedonian railways - Infrastructure.

During Phase 4 and 5 that comprise the detailed design, construction and operation, the stakeholder engagement will be continued by the Railway Department and the process will run for the lifetime of the project. Stakeholder feedback will be a key component in monitoring the success of the mitigating measures. The methods for ensuring engagement will include the following:

- Quarterly Project updates and progress information for the local community available with the Municipalities within the North East Region and on the website of MoTC.
- Announcements and information for the local community on construction activities including any activities likely to cause particular disturbance (such as temporary road closures, particularly noisy activities etc.). These announcements will be made through press releases to local media, a community newsletter, information provided directly to affected households and businesses, and updates on the website of MoTC.

12.5.2 INFORMATION DISCLOSURE

Disclosure of relevant project information helps stakeholders to understand the project environmental and social risks, impacts and opportunities. Department of Railway aims to involve stakeholders and to keep good communication practices during the lifetime of the project through its PR Division. According to this approach, the target of the information disclosure and communication will be:

- Providing local communities a schedule and information on activities that will be arranged, together with mechanisms for their feedback

- To improve knowledge of what the project involves, with all stages and expected performance
- Ensuring best practice in terms of environmental protection and health and safety for workers and contractors
- To make available to the public a grievance procedure, in order to collect negative feedback and to act in correcting the causes that may lead to a negative opinion about the project

To ensure transparency and availability of information regarding project development the following actions will be implemented:

- **One page information leaflet** – the leaflet will comprise the most important information about the project as well as indicate the web site and telephone information lines for communication. Leaflets will be prepared and distributed in Municipalities Info Centers (that will assure availability to wide range of citizens), villages, rail stations and bus stations and center for North-east plan region. The leaflet will be posted/mailed together with the Comment Form to all stakeholders. Leaflet will be made available and can be downloaded (PDF) as well as the Comment Form and the Grievance Form from the websites:
- **Website information** – project information will be available in English and Macedonian on websites

  http://www.mtc.gov.mk , http://www.moepp.gov.mk and http://www.mz.com.mk.

When available, following documentation both in English and Macedonian, (some documents may also be translated into additional languages if identified as a need in the ESIA process) should be made obtainable to the public on the websites: http://www.mtc.gov.mk, http://www.moepp.gov.mk and http://www.mz.com.mk.

- Notification of intention for project implementation (already published on: http://www.moepp.gov.mk)
- EIA Scoping Document
- Decision from MoEPP
- Non-technical summary of ESIA Study
- Stakeholder Engagement Plan including grievance mechanism
- ESIA Study

To ensure that all stakeholders are aware of the documents availability on the web-site, the notification of intention for project implementation has been sent to all municipalities within the Region: Kumanovo, Kratovo, Rankovce, KrivaPalanka, Lipkovo and Staro Nagorichane. All municipalities will be duly informed about the information which can be found on the ministry's website and they will be advised to insert a link on their own websites:

http://www.northeastregion.gov.mk;
http://www.kumanovo.ca;
http://www.opstinakratovo.gov.mk;
http://www.rankovce.gov.mk;
http://www.krivapalanka.gov.mk;
http://www.opstinastaronagoricane.gov.mk

A pre-printed Comment Form (bilingual Macedonian and English) will be made widely available at all consultation venues which stakeholders can use to submit their comments. Comments can also be provided orally, by email or by telephone and will be logged by the consultation team. Comments from individuals can be provided anonymously if wished. The Comment Form is below.

Additionally, all the above information will be mailed to but also made available in hard copy to allow the public to easily read the documents (locations in presented below in Contact points)

12.6 GRIEVANCE MECHANISM

The Railway Department will implement a Grievance Mechanism to ensure that it is responsive to any concerns and complaints particularly from affected stakeholders and communities.

The grievance process to be followed is outlined in Figure 6 below. The following timeframe will be used:

- Written acknowledgement of receipt of the grievance: within 5 days of receiving the grievance
- Proposed resolution: within 30 days of receiving the grievance.

Initially, the EPTISA project office together with Ministry of transport and communication will handle all grievances received from the public during the life time of the feasibility study. Thereafter, the Railway Department from Macedonian Ministry of Transport and Communication will continue receiving and handling any grievances that may arise during any of the following phases of the project. The Department will allocate a responsible person to handle the grievance.

While the feasibility study is undertaken, the grievances shall be submitted to:

Consultant's office
Tatjana Todoroska
"Zeleznicka" 2/8,
1000 Skopje,
Republic of Macedonia
Tel.: +389 2 3178 168, +389 2 3178 204
Fax: +389 2 3178 205
e-mail: rail8mk@eptisa.com

Thereafter, the grievances shall be submitted to:

Ministry of Transport and Communication
Biljana Zdraveva
"Crvena Skopska Opstina" 4;
1000 Skopje,
Republika Makedonija ;
http://mtc.gov.mk/
Telephone: + 389 2 3145 497, + 389 2 3123 292
Fax: + 389 (0)2 3126 228
e-mail: contact@mtc.gov.mk
e-mail: zdraveva@mtc.gov.mk

The grievance form (in Macedonian and English) is presented below and it will be made available on the web side http://mtc.gov.mk and all the concerned municipalities will receive pre-printed forms to be readily available for the public. In due course, grievance forms will also be available from rail stations.

A workers' grievance mechanism will be established for the employees of construction companies as a separate system. Contractors of construction works will be informed by the Railway Department about necessity of implementation grievance mechanism for their employees. Contractors of construction works will be given the possibility to lodge grievances both through workers representatives and unions and independently, personally, regardless of the matter of the complaint. Anonymous lodging will also be made possible (grievance boxes). The details of this type of grievance mechanism will be established 3 months prior construction works.

Ministry of transport and communication will ensure that there is an independent, objective appeal mechanism. Ministry will inform the affected communities about the grievance process in the course of its community engagement activities, and report regularly to the public on its implementation, protecting the privacy of individuals.

Due to the above mentioned, management of grievances is a vital component of stakeholder engagement and an important aspect of risk management for a project. Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. Identifying and responding to grievances supports the development of positive relationships between projects, communities and other stakeholders. Monitoring of grievances will signal any recurrent issues, or escalating conflicts and disputes.

The grievance process will follow the following key steps:

1. Identification of grievance it will be through personal communication with the ESIA team, by phone, letter, grievance form, during meetings, or any other route. Grievance will be recorded on the Grievance Form and than it will be collected in Grievance Record which will be held at the Consultant office.

   Complaints submitted directly to Municipalities will be redirected to Consultant's office.

2. Grievance procedure starts with formal acknowledgment through a personal meeting, phone call, or letter as appropriate, within 5 working days of submission. If the grievance is not well understood or if additional information is required, clarification will be sought from the complainant during this step.
3. A response is going to be developed by the project team together with Ministry of Transport and Communication and JP MR Infrastructure - Skopje. Required actions are implemented to deal with the issue and completion of these is recorded on the grievance record.
4. The response is signed-off by the JP MR Infrastructure - Skopje. This sign-off may be a signature on the grievance log or in correspondence which should be filed with the grievance.
5. The response to the complainant is recorded to help assess whether the grievance is closed or whether further action is needed.

The Grievance Procedure will be free, open and accessible to all and comments and grievances will be addressed in a fair and transparent manner. Information about the procedures, who to contact and how, will be made available as described above. In particular all workers will be informed of the Grievance Process and new workers will be informed when they join the Project. Information on Contact Points will be posted on staff information boards and on site information boards.

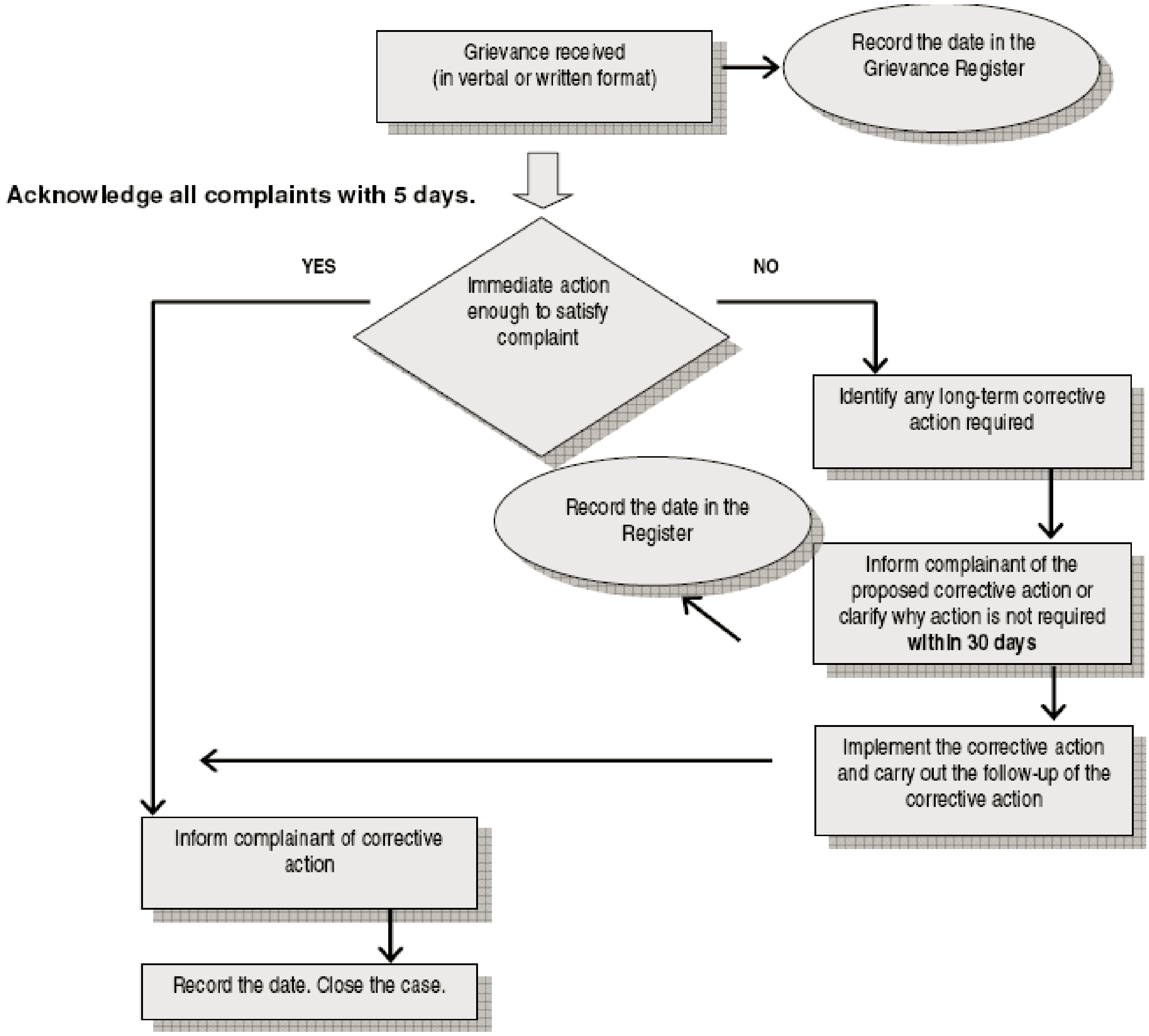


Figure 12-6 Flowchart for processing of grievances

Contact points

- **Consultant's office**

  Tatjana Todoroska
  "Zeleznicka" 2/8,
  1000 Skopje,
  Republic of Macedonia
  Tel.: +389 2 3178 168, +389 2 3178 204
  Fax: +389 2 3178 205
  e-mail: rail8mk@eptisa.com

- **Ministry of Transport and Communication**
  Biljana Zdraveva
  "Crvena Skopska Opstina" 4;
  1000 Skopje,
  Republika Makedonija ;
  http://mtc.gov.mk/

Telephone: + 389 2 3145 497, + 389 2 3123 292
Fax: + 389 (0)2 3126 228
e-mail: contact@mtc.gov.mk
e-mail: zdraveva@mtc.gov.mk

- **JP MR Infrastructure - Skopje** Address: “Zeleznicka 50b”; 1000 Skopje
  http://www.mz.com.mk
  Telephone: +389 2 3116-773
  Fax: +389 2 2121-079
  e-mail: mz65dir@t-home.mk
  Rade Sekulovski – Head of sector

12.7 LIST OF STAKEHOLDERS

No.	Name of stakeholder	Contact Person	Contact Details
INTERNATIONAL			
1	Bulgarian Ministry of Transport, Information Technology and Communications	-	http://www.mtitc.government.bg/ Address: Dakon Ignatia 9, Sofija +359 987 - 5750
2	Railway Infrastructure Company, Bulgaria	-	http://www.bdz.bg Address: 3 Ivan Vazov Street Sofia, 1080 Telephone: + 359 2 981 11 10 Executive Director + 359 2 932 41 90 Customer hot line + 359 2 932 55 60 Correspondence Unit Fax: + 359 2 8907188 Correspondence Unit E-mail: bdz@bdz.bg
NATIONAL			
1	Ministry of Transport and Communication	***Biljana Zdraveva,*** Head of Railway Department ***Svetlanka Popovska***, Head of Railway Infrastructure Unit **Makedonka Dimitrioska**, Adviser Railway Unit	http://mtc.gov.mk/ Address: "Crvena Skopska Opstina" 4, 1000 Skopje, Republika Makedonija Telephone: + 389 2 3145 497, + 389 2 3123 292 Fax: + 389 (0)2 3126 228 e-mail: contact@mtc.gov.mk zdraveva@mtc.gov.mk popovska@mtc.gov.mk makedonka.dimitrioska@mtc.gov.mk +389 2 3145 502 +389 2 3118 144
2	Ministry of Environment and Physical planning		http://www.moepp.gov.mk Bul. "Goce Delcev", MRTV building (10,11,12 floor) 1000 Skopje, R.Macedonia; Phone:+389 3 251-400; Fax:+389 3 220-165; e-mail: **info@moepp.gov.mk**
3	Macedonian railways - Infrastructure	**Vladimir Panovski**, Head of Infrastructure Department **Rade Sekuloski**, Chief of Sector **Svetoslav Manasijevic**, Deputy Chief of Sector	JP MR Infrastructure - Skopje" 50b; 1000 Skopje Telephone: +389 2 3116-773 Fax: +389 2 2121-079 e-mail: mz65dir@t-home.mk
REGIONAL			
4	Center for development of north-east plan region	**Atina Murgashanska**, Head Deputy of the center for development **Muhamed Selmani** – Coordinator **Gjorgji Petrusevski** -	http://www.northeastregion.gov.mk Address: Ilindenska nn 1300 Kumanovo Postal number182 Telephone/Fax: +389 31 424-878 +389 71 321 170

No.	Name of stakeholder	Contact Person	Contact Details
		Coordinator	+389 70 628 555 +389 31 424 878 info@northeastregion.gov.mk
5	Regional Chamber of Trade & Commerce	**Marjan Trajkovski** - President	http://www.mchamber.org.mk +389 71 710 215
MUNICIPAL			
6	Municipality of Kumanovo	***Elena Cvetanovska***, Junior Assistant for Local Economical Development ***Zoran Pavlovski***, Head of the department for administration of incomes, strategic planning, Local Economical Development ***Boban Bojkovski***, Authorized Inspector for environment protection	http://www.kumanovo.ca/ Address "11th October" nn, 1300 Kumanovoe e-mail: informacii@kumanovo.gov.mk Telephones: +389 31 475-800 + 389 31 438-633 Elena.cvetanovska1@gmail.com zoranpavlovskikum@yahoo.com bbojkovski@yahoo.com +389 70 341 813 +389 72 252 954 +389 70 757 510
7	Municipality of Staro Nagorichane	**Lazar Dimitrievic** – Head of the Department for urbanism, LED and environment **Sasha Kuzmanovic** - Junior assistant for issuing construction permit **Chaslav Maksimovic** – Authorized Inspector for communal services and environmental issues	http://www.opstinastaronagoricane.gov.mk Lazard78@yahoo.com sskuzmanovic@yahoo.com caslavmaksimovic@yahoo.com +389 31 495 333 +389 72 224 425 +389 72 224 435
8	Municipality of Rankovce	**Slavica Georgievska**, Head of the Department for inspection **Slavica Stefanovska** – Junior Assistant for Local Economical Development and education	http://rankovce.gov.mk/web/ Postal number 1316 Telephone: +389 31 380 444 Fax: +389 31 380 444 e-mail: rankovce@rankovce.gov.mk slavicagorgievska@yahoo.com slavicatrajanovska@yahoo.com +389 71 227 533 +389 71 581 536
9	Municipality of Kratovo	**Cane Anchov** - Head of Department for urbanism, environmental protection, communal services and Local Economical Development **Vanche Aleksosvski** – Communal Inspector	http://www.opstinakratovo.gov.mk/ Square Marschal Tito, nn - 1360 Kratovo Telephone: +389 31 481 202, Fax: +389 31 481 134 e-mail : opstina_kratovo@yahoo.com e-mail : opstina_kratovo@opstinakratovo.gov.mk cane_anchov@opstinakratovo.gov.mk kocevska.slavica@yahoo.com limonkag@yahoo.com +389 31 481 134

No.	Name of stakeholder	Contact Person	Contact Details
		Slavica Kocevska – Assistant in the Department for urbanism, environmental protection, communal services and LED. **Limonka Georgieva** - Independent Officer for LED	+389 71 364 404 +389 70 982 931 +389 70 739 006 +389 78 315 964
10	Municipality of Kriva Palanka	**Dobrivoj Nikolovski**, Head of Department for urbanism, traffic and protection of environment **Stojanka Mahgovska**, Volunteer in Department for construction and maintenance of communal infrastructure **Oliver Stojanovski**, Junior assistant for environmental protection	http://www.krivapalanka.gov.mk/ Address: "St. Joakim Osogovski" 175 e-mail: opkp@krivapalanka.gov.mk gradonacalnik@krivapalanka.gov.mk arsenco.aleksovski@live.com Telephone/Fax: +389 31 375 035 +389 31 376 480 +389 75 258 559 Mizar_st@yahoo.com +389 76 406 355
NGO´s			
1	NGO Vrama si (Kumanovo)	**Aneta Dodevska** - Representative	+389 70 964 152
2	NGO (Roma) Drom (Kumanovo)	**Ahmet Jasharoski**	+389 70 541 535
3	NGO Izvor (Kratovo)	**Milosch Dimitrovski**	+389 76 662 266
COMPANIES			
1	BETON Construction Company	**Director, Trajko Trpevski**	http://www.beton.com.mk/ Construction Company "BETON" Stock Co. Skopje Jurij Gagarin 15, 1000 Skopje Republic of Macedonia Tel. +389 2 55 13 700 ; +389 2 30 80 888 ; +389 2 30 80 205 Fax.+389 2 30 80 207 ; +389 2 30 80 215 E-mail: beton@beton.com.mk ; direkcija@beton.com.mk

12.8 COMMENT FORM

<table>
<tr><td colspan="4">Project: Macedonian Railways – Corridor VIII – Eastern Section:
COMMENT FORM</td></tr>
<tr><td colspan="4">INFORMATION ABOUT THE PERSON SUBMITTING THE COMMENT</td></tr>
<tr><td colspan="4">We would like you to provide your name, address and email if possible, so we can keep you informed about future developments with the Project. However, if you wish to remain anonymous this is not a problem - please just enter ANONYMOUS in the box below– your comments will still be considered by the Railway Department.</td></tr>
<tr><td colspan="3">Name:</td><td rowspan="3">Internal use only: how was the comment lodged:
□ In person
□ By Phone
□ At reading room
□ By Mail
□ By email
□ Other (please describe)
……………………………………………</td></tr>
<tr><td colspan="3">Date lodged:</td></tr>
<tr><td colspan="3">Address:</td></tr>
<tr><td colspan="3">Email address:</td><td>Do you wish to be kept informed of Project developments? □ Yes □ No</td></tr>
<tr><td colspan="4">Municipality/Village:</td></tr>
<tr><td colspan="4">YOUR COMMENTS ON THE PROJECT</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4">INTERNAL USE ONLY: STATUS OF COMMENT</td></tr>
<tr><td>Comment logged (Y/N):</td><td>Date:</td><td>Comment number:</td><td>Logged by:</td></tr>
<tr><td>Response required</td><td>Yes/No</td><td colspan="2">Person responsible for preparing response:</td></tr>
<tr><td>Response sent (date):</td><td></td><td colspan="2">Response logged (date):</td></tr>
</table>

12.9 GRIEVANCE FORM

<table>
<tr><td colspan="4">Project: Macedonian Railways – Corridor VIII – Eastern Section:
GRIEVANCE FORM</td></tr>
<tr><td colspan="4">INFORMATION ABOUT THE PERSON SUBMITTING THE GRIEVANCE</td></tr>
<tr><td colspan="2">Name:</td><td colspan="2" rowspan="4">Internal use only: how was the grievance lodged:
□ In person
□ By Phone
□ At reading room
□ By Mail
□ By email
□ Other (please describe)
……………………………………………</td></tr>
<tr><td colspan="2">Date lodged:</td></tr>
<tr><td colspan="2">Recorded by:
□ Person submitting grievance □ Other (please specify who)
……………………………….</td></tr>
<tr><td colspan="2">Address:</td></tr>
<tr><td colspan="2">Email address:</td><td colspan="2">Do you wish to be kept informed of Project developments? □ Yes □ No</td></tr>
<tr><td colspan="2">Municipality/Village:</td><td colspan="2" rowspan="2">Internal use only: Confirm that the Grievance has been acknowledged and a copy of this form provided to the complainant?
□ Yes. Date: ……………………….</td></tr>
<tr><td colspan="2">Signature of Complainant confirming receipt of completed Grievance Form copy:</td></tr>
<tr><td colspan="4">INFORMATION ABOUT GRIEVANCE</td></tr>
<tr><td colspan="4">Describe the Grievance:</td></tr>
<tr><td colspan="4">INTERNAL USE ONLY: RECORDING AND RESPONSE</td></tr>
<tr><td>Grievance Reference Number:</td><td colspan="3">Date logged in Grievance Log</td></tr>
<tr><td>Name of staff member recording the grievance:</td><td colspan="2">Tatjana Todorska</td><td rowspan="2">Copies provided to:
□ Consultant office, (Original)
□ Person lodging grievance/Complainant (Copy 1)
□ Ministry of transport and communication (Copy 2)
□ PE Macedonian Infrastructure (Copy 3)</td></tr>
<tr><td colspan="3">Action required (to be updated as needed as the grievance is progressed):</td></tr>
<tr><td colspan="4">Deadline for reporting back to Complainant on progress (to be updated as necessary):

Date: ………………………………………………………</td></tr>
<tr><td colspan="4">INTERNAL USE ONLY: STATUS OF GRIEVANCE</td></tr>
<tr><td>Date:</td><td colspan="3">Status of Grievance (add further rows as needed):</td></tr>
<tr><td>Grievance Closed:</td><td>Date:</td><td colspan="2">Signed off - MoTC/PERI:</td></tr>
</table>

12.10 CONTACT POINTS

- **Ministry of Environment and Physical Planning**, Address: Bul. "Goce Delcev", MRTV building (10,11,12 floor) 1000 Skopje, Republic of Macedonia; http://www.moepp.gov.mk
  Telephone: +389 3 251 400
  Fax: +389 3 220-165
  e-mail: info@moepp.gov.mk

  Zoran Boschev – Head of the department for ESIA
  Telephone: +389 76-445-894
  e-mail: z.boshev@moepp.gov.mk

  Husni Tachi
  Telephone: +389 76 455 448
  e-mail: h.thachi@moepp.gov.mk

  Vlatko Cvetanoski
  Telephone: +389 76 455 426
  e-mail: v.cvetanoski@moepp.gov.mk

  Sascho Sekulovski
  Ministry of environment and physical planning
  Public Relation Office
  Address: "III Makedonska brigada" 10a
  Telephone: +389 2 3289 260
  e-mail: s.sekulovski@moepp.gov.mk

- **Ministry of Transport and Communication**, Address: “Crvena Skopska Opstina” 4; 1000 Skopje, Republic of Macedonia ; http://mtc.gov.mk/
  Telephone: + 389 2 3145 497, + 389 2 3123 292
  Fax: + 389 (0)2 3126 228
  e-mail: contact@mtc.gov.mk
  Biljana Zdraveva - Head of Railway Department
  e-mail: zdraveva@mtc.gov.mk

- **JP MR Infrastructure - Skopje** Address: “Zeleznicka 50b”; 1000 Skopje
  http://www.mz.com.mk
  Telephone: +389 2 3116-773
  Fax: +389 2 2121-079
  e-mail: mz65dir@t-home.mk
  Rade Sekulovski – Head of sector
  Telephone: +389 75 282 893

- **Regional Center for Development,** Address: “Ilindenska” nn; 1300 Kumanovo; Postal number 182;
  http://www.northeastregion.gov.mk
  Postal number182
  Telephone/Fax: +389 31 424 878
  e-mail: info@northeastregion.gov.mk

- **Muncipality of Kumanovo**, Address: "11th October" bb, 1300 Kumanovo;
  http://www.kumanovo.ca/
  Telephones: +389 31 475 800
  Fax: + 389 31 438 633
  e-mail: informacii@kumanovo.gov.mk

- **Muncipality of Kratovo,** Address: "Square Marschal Tito", nn - 1360 Kratovo;
  http://www.opstinakratovo.gov.mk/
  Telephone: +389 31 481 202,
  Fax: +389 31 481 134
  e-mail: opstina_kratovo@yahoo.com
  e-mail: opstina_kratovo@opstinakratovo.gov.mk

- **Muncipality of Rankovce,** Address: Postal number 1316;
  Telephone: +389 31 380 444
  Fax: +389 31 380 444
  e-mail: rankovce@rankovce.gov.mk

- **Muncipality of Kriva Palanka,** Address: JoakimOsogovski"175;
  http://www.krivapalanka.gov.mk/
  Telephone/Fax: +389 31 375 035
  e-mail: opkp@krivapalanka.gov.mk
  gradonacalnik@krivapalanka.gov.mk
  arsenco.aleksovski@live.com

- **Muncipality of Staro Nagorichane,** Address: 1303 Staro Nagoricane,
  http://www.opstinastaronagoricane.gov.mk
  Telephone: +389 31 495 333
  http://rankovce.gov.mk/web/
  Fax: +389 72 224 425

- **EBRD**, One Exchange Square, LondonEC2A 2JN, UK,
  www.ebrd.com

- **EBRD, Soravia center, 7th floor**, 1000 Skopje;
  Tel: +389 2 3297 800

Chapter 13 Resettlement Compensation Framework !

Describes the principles to be applied in the event of land acquisition leading to physical and/or economic displacement (resettlement), involuntary resettlement and land acquisition issues and measures.

13 RESETTLEMENT COMPENSATION FRAMEWORK PLAN

13.1 INTRODUCTION

This chapter provides the Resettlement Compensation Framework Plan for the project “Railway Corridor VIII - Eastern Section”. The Plan has been prepared to conform with the laws of the Republic of Macedonia in addition to the requirements of the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). The principles set out in the document shall be applicable to all Resettlement Action Plans (RAPs) prepared for the three sections of this Project.

13.2 PROJECT DESCRIPTION

The projected is divided into three sections:

Section 1**: Kumanovo to Beljakovce** – corresponds to the first 30.764 km of the line which had been previously operational. The section starts at Kilometer Point (K.P). 0.400 at the northern end of the station Kumanovo. This section requires rehabilitation.

Section 2: **Beljakovce to Kriva Palanka** – the middle section of the alignment runs from K.P. 31.164 to K.P. 65.091 just before the town of Kriva Palanka. In this section, around one third of all construction works have been completed.

Section 3: **Kriva Palanka to Bulgarian Border** – the last section extends from K.P. 65.091 up to the border of Bulgaria, in Deve Bair, at K.P. 88.514. This section is to be newly constructed.

Figure below illustrates the three sections of the overall project.

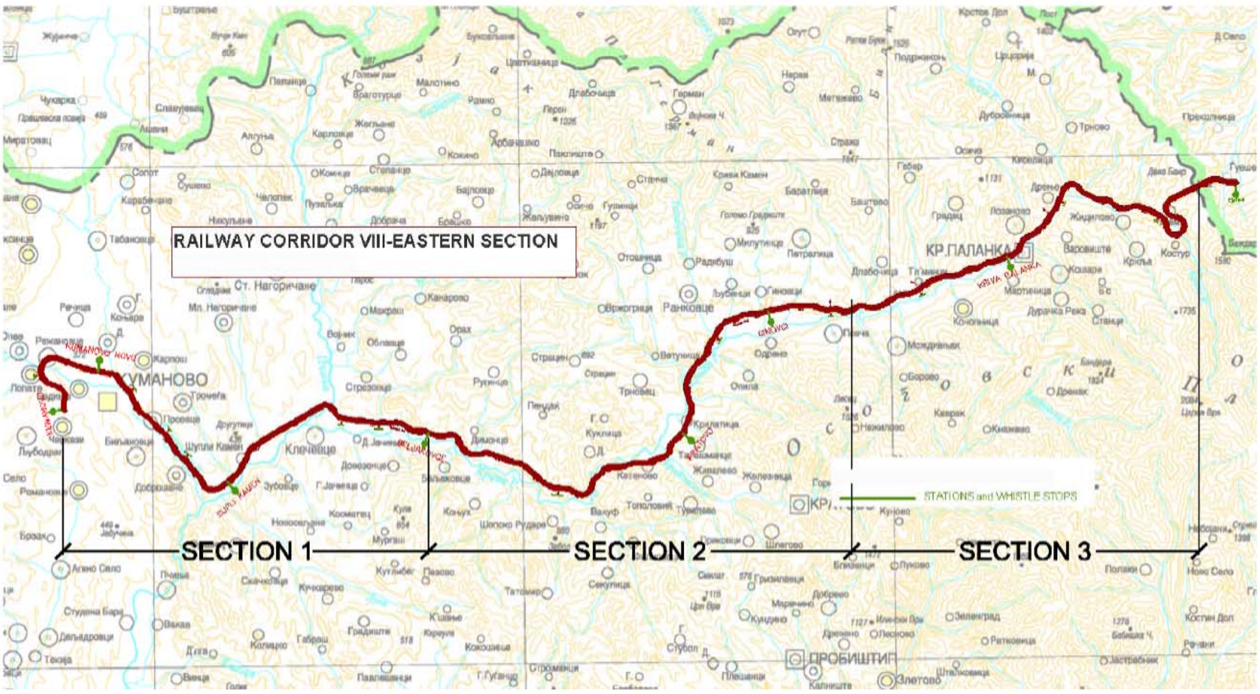


Figure 13-1 Sections of Project “Railway Corridor VIII - Eastern Section”

13.3 POLICY AND REGULATORY BACKGROUND

13.3.1 LEGISLATION GOVERNING RAILWAY SYSTEMS

The Official Gazette of RM. 48/2010, Article 59, states that a minimum distance of 10 m must be maintained between the end point of a national railway and the construction of the nearest property. In addition, a buffer zone of 1.0m must be maintained between the earth embankment of the railway and any physical structure; hence, the minimum distance for any construction is no less than 11m from the end of a railway. This legislation concerns new constructions.

13.3.2 MACEDONIAN EXPROPRIATION LAW

Macedonian legislation deals with involuntary resettlement and livelihood restoration under its legal framework for expropriation, with the basic notion that owners of properties are to be compensated for their losses, most often in monetary terms.

Under the terms of compensation, property owners are expected to be able to acquire new properties and resettle and/or re-establish their businesses in other locations. However, this is often not a straightforward process and people generally need additional assistance to restore and/or improve their living standards. A case in point is when the affected population includes vulnerable groups. The most difficult and challenging cases involve those who do not possess legal title to the land they occupy. The Law for expropriation recognises affected people who have formal legal rights; however, those without legal title are not entitled to compensation.

The Law on expropriation ("Official Gazette of Republic of Macedonia" No. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08, 76/10) regulates the procedure for the expropriation of property for projects that are of public interest and the connected rights for real estates (immovable properties). Construction of the railway line falls under a project of national/public interest. The legal justification of why the project is believed to be in the public interest is submitted together with the request for expropriation (as part of the same process), by the expropriation beneficiary. The justification is submitted to the relevant offices for legal and property affairs which govern the project.

According to the Macedonian Law on expropriation, compensation cannot be lower than the market value of the affected properties; compensation is assessed against recent market transactions in neighboring areas. According to the law, compensation can be provided in the form of either a replacement property or in cash. Macedonian law allows compensation for the loss profit/income for affected businesses, if this is incurred as a result of expropriation.

13.3.3 LAND TENURE AND PROPERTY RIGHTS

The following laws govern land tenure and property rights in Macedonia:

- Law on Property Cadastre (Official Gazette of the Republic of Macedonia 40/08, 158/10, 51/11)
- Law on Survey and Land Cadastre (Official Gazette of the Federal Republic of Macedonia 34/72, 13/78)
- Law on Ownership and Other Material Rights (Official Gazette of the Republic of Macedonia 18/01)

The EC Enlargement Strategy Progress Report for 2010 for Macedonia states that the land register has been established for over 97.5% of the country's territory. In addition, registration fees have been lowered, administrative procedures considerably shortened and an online registry developed. The principal laws regulating property registration are the Law on Property Cadastre and the Law on Survey and Land Cadastre.

The above-mentioned legislation defines the acquisition of property rights over land and/or structures erected on someone else's land. Macedonia is one of the signatories to the 2004 Vienna Declaration on Informal Settlements in South Eastern Europe. In accordance with the principles of the Vienna Declaration, the Macedonian government adopted a Law for the Treatment of Illegally Constructed Objects (on state-owned land).

13.3.4 INTERNATIONAL REQUIREMENTS

EBRD requirements

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

The main points of PR 5 are the following:

- All feasible alternative project designs should be explored to avoid or at least minimise physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits;
- Adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land should be mitigated by: (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- The livelihoods and standards of living of displaced persons should be improved or, at a minimum, restored to pre-project levels, through measures that can be enterprise-based, wage-based and/or enterprise based, so as to facilitate sustainable improvements to their socio-economic status;
- The living conditions among displaced persons should be improved through provision of adequate housing with security of tenure at resettlement sites;
- Persons who have no recognisable legal right or claim to the land they occupy are not entitled to compensation for land, but they should be compensated for the structures that they own and occupy and for any other improvements to land at full replacement cost. In addition, they should be offered resettlement assistance sufficient to restore their standards of living at a suitable alternative site. Options for resettlement assistance should be generated through consultation with the displaced persons;
- Affected persons shall be given the opportunity to participate in the negotiation of the compensation packages, eligibility requirements, resettlement assistance, suitability of proposed resettlement sites and the proposed timing;
- Special provisions shall apply to consultations which involve Indigenous Peoples as well as individuals belonging to vulnerable groups. Consultation will continue during the implementation, monitoring, and evaluation of compensation payment and resettlement so as to achieve outcomes that are consistent with the objectives of this PR.
- A grievance mechanism must be established as early as possible in the process in order to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons and/or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner.

Where involuntary resettlement is unavoidable, the client will engage a suitably qualified specialist to carry out a census and a socio-economic baseline assessment within a defined affected area, and assist in the preparation of the Resettlement Action Plan or Livelihood Restoration Framework. Resettlement Action Plan (RAP) covers, at a minimum, the applicable requirements of this PR, regardless of the number of people affected. The RAP should specifically take into account any individuals or groups that may be disadvantaged or vulnerable. In particular, the RAP should include measures to ensure that vulnerable and ‘at-risk’ groups and women are not disadvantaged in the resettlement process, are fully informed and aware of their rights, and are able to benefit equally from the resettlement opportunities and benefits, by ensuring in particular that the documentation for ownership or occupancy, such as title deeds and lease agreements, and compensation (including the bank accounts established for payment of compensation) is issued in the names of both spouses or women single head of households, as relevant to each situation, and that other resettlement assistance, such as skills training, access to credit and job opportunities are equally available to women and adapted to their needs. Under circumstances in which national law and tenure systems do not recognize the rights of women to hold or contract in property, provision should be made to ensure, to the extent possible, that the access of women to security of tenure is equivalent to that of men.

In the case of transactions involving economic (but not physical) displacement of people the client will develop procedures to offer to the affected persons and communities compensation and other assistance that meet the objectives of this PR.

When displacement cannot be avoided, the client will offer displaced persons and communities’ compensation for loss of assets at full replacement cost and other assistance to help them improve or at least restore their standards of living or livelihoods, as provided in this PR. Standards for compensation will be transparent and consistent within the project. Where livelihoods of displaced persons are land-based, or where land is collectively owned, the client will offer land-based compensation, where feasible. The client will make every effort to provide opportunities to displaced persons and communities to derive appropriate development benefits from the project.

<u>EIB requirements</u>

EIB social standards aim to protect the rights and enhance the livelihoods of people directly and indirectly affected by projects financed by the EIB. Social standards are intended to promote outcomes to the benefit of individual well-being, social inclusion and sustainable communities.

Within the EU and the Enlargement Countries, subject to any agreed phasing, the EIB assumes that EU social requirements, including international human rights conventions ratified by the EU, are correctly implemented within the framework of national law. However, where there is evidence that suggests otherwise, an appropriate social assessment is carried out by the Bank.

People whose livelihoods are negatively affected by a project should have their livelihoods improved or at minimum restored and/or adequately compensated for any losses incurred. As such, where physical or economic displacement is unavoidable, the Bank requires the promoter to develop an acceptable Resettlement Action Plan. The plan should incorporate and follow the right to due process, and to meaningful and culturally appropriate consultation and participation, including that of host communities.

All policies, practices, programmes and activities developed and implemented by the promoter should pay special attention to the rights of vulnerable groups. Such groups may include indigenous people, ethnic minorities, women, migrants, the very young and the very old. The livelihoods of vulnerable groups are especially sensitive to changes in the socio-economic context and are dependent on access to essential services and participation in decision-making.

13.3.5 PROCEDURE FOR LAND EXPROPRIATION

According to the Law on expropriation, the procedure for land expropriation starts with a proposal for expropriation. The proposal is submitted by the Beneficiary of Expropriation (in this case it would be PERI Public Enterprise Railway Infrastructure, Ministry of Transport and Communication) to the Property and Legal Affairs Offices in relevant Municipalities (expropriation body).

The proposal for expropriation contains data of the proponent of land expropriation, the real estate for which the land expropriation is proposed, the owner of the real estate and the purpose for which land expropriation is proposed. Enclosures to the proposal include the following:

1. Opening statement and requirements of land expropriation;
2. Definition of legal requirements;
3. Numerical data and other background data for the real estate for which the land expropriation is proposed;
4. Definition of the type and amount of compensation being offered for the real estate;
5. Evidence for assets secured for compensation of the expropriated immovable property (depending on the form of compensation i.e. cash or property);
6. Evidence for ownership of what is offered in compensation, if such an offer exists.

13.4 ORGANISATIONAL RESPONSIBILITIES

A Commission for Land Expropriation, with three members, will be established within PERI, for which PERI will be responsible. The commission will be established through a decision enacted by the Director of the PERI Based on a letter of attorney issued by the Director of the PERI, the commission members are authorized on behalf of the PERI to carry out the activities necessary for fulfilling expropriation commitments, i.e. to prepare, sign and submit the proposals for expropriation, to participate in the discussions with the property and legal affairs office and to sign the minutes and the agreements concluded with the expropriation body.

For the purposes of expropriation, a specialist land survey team will also be required; this will also be within PERI. Land surveys will be prepared in accordance with expropriation laws. Selection of surveying companies is in accordance with the Law on public procurement.

With the aim to determine the market value of the real estates (structures) which are subject to expropriation, as well as the compensation of any crops (fertile parcels), the beneficiary of expropriation engages additional experts from the relevant area. The selection of experts for land expropriation follows the same procedure as those for land acquisition. The findings and opinions of the experts are submitted to the expropriation body together with the proposals for expropriation.

The proposals for expropriation will be submitted to the authorized department within the Property and Legal Affairs Office, who again will forward the proposals with all enclosures to the real estate's owners and to the Agency for Real Estate Cadastre, where the expropriation will be registered. After this process, the expropriation body arrange for discussions with the real estate owner and the beneficiary of expropriation (i.e the Railway Department).

The discussion is concluded when the relevant parties reach agreement on the compensation package. The agreement is binding and the procedure for land expropriation and for the determination of the compensation is considered as completed. The agreement shall be signed by the commission members and the payments should immediately be transferred from the beneficiary of expropriation (the account of PERI) to the former owners.

If an agreement has not been reached during the discussions, the expropriation body decide how the expropriation proposal should be settled. Upon the decision for expropriation, *ex officio* or with the proposal of the former owner, a procedure for determination of the compensation for the expropriated real estate is initiated by the authorized court. The decision of the authorized court then forms the basis for the execution of payment of the monetary compensation to the former owners.

The expropriation body is responsible for submitting the final agreements as well as the final decisions to the authorized bodies responsible for managing the public records, to ensure that changes of ownership are properly documented.

Any arbitration or disputes in relation to expropriation are determined in the courts, this will hold up the expropriation process.

Stages of expropriation process are shown in a following chart:

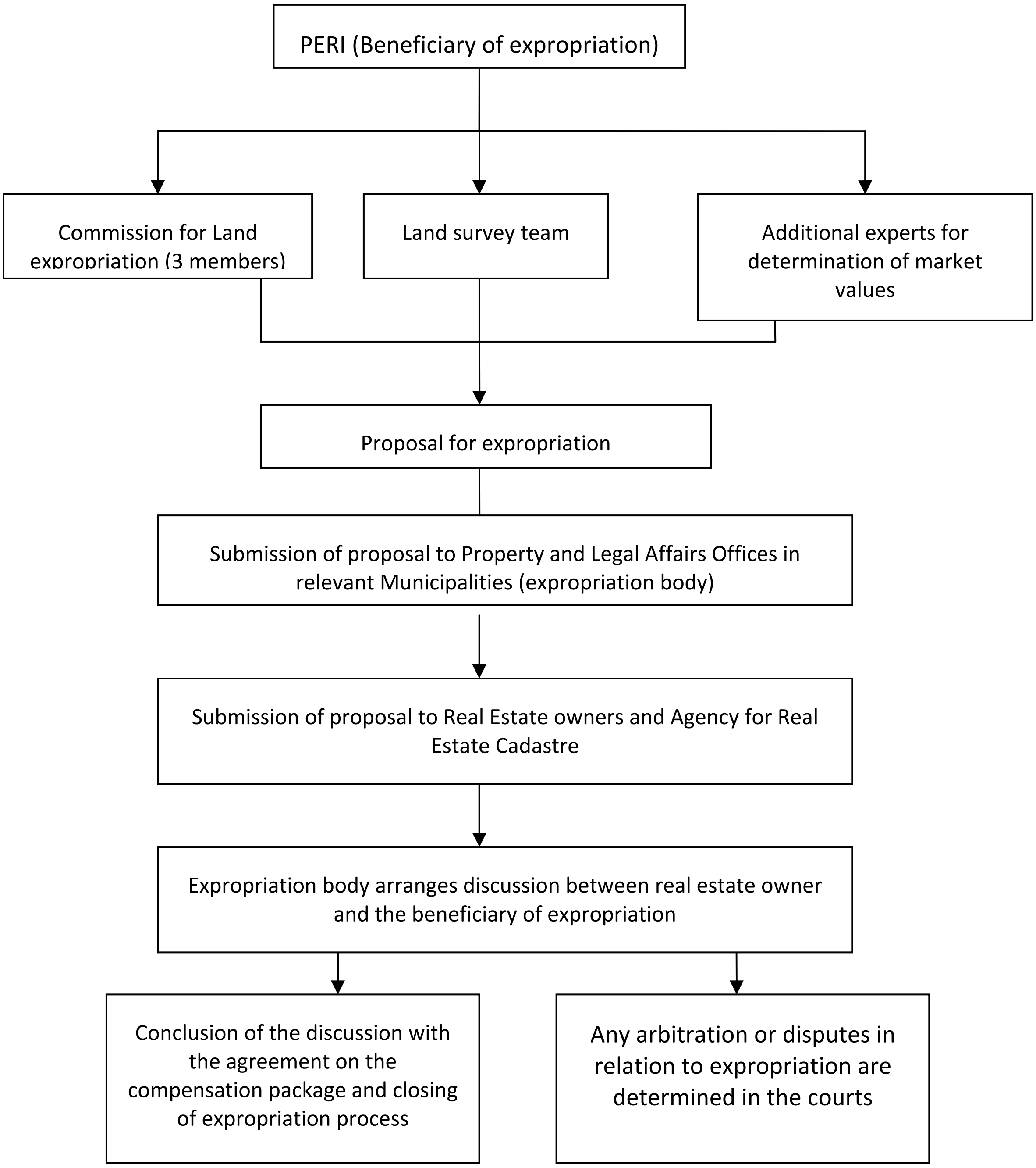


Figure 13-2 Expropriation Process

13.5 CUT-OFF DATE

The Cut-Off Date is the date after which persons found to settle in the Project area are not eligible to Project compensation or other resettlement benefits, while similarly immoveable assets or crops established after the Cut-Off Date are not subject to compensation.

The intent of the Cut-Off Date is to establish and confirm eligible properties, households or individuals thereby avoiding opportunistic attempts at maximising compensation through structures erected intentionally or crops established purely for the purposes of compensation. Potentially affected people need to be informed of the Cut-Off Date in order to minimise potential claims related to eligibility. Where opportunistic and/or fraudulent attempts at maximising compensation are assessed as a significant risk, caution must be exerted in disclosing the Cut-Off Date.

A “cut-off” date for eligibility shall be defined as:

- Either the date when the notification of the intent of expropriation is delivered to affected owners *where expropriation is applicable*; or
- The date of the performed census (date to be defined in further stages of the project).

13.6 GAP ANALYSES - LEGAL FRAMEWORK FOR EXPROPRIATION AND EBRD ENVIRONMENTAL AND SOCIAL POLICY

The main gaps between the national legal expropriation framework in Macedonia and EBRD’s Policy Requirement 5 are described below, together with some potential solutions developed through Eptisa’s experience in both developing and implementing resettlement /livelihood restoration programmes. A full Gap Analysis prepared by EBRD is presented in Annex 1.

The sections below outline the approach to the Resettlement Action Plan (RAP) in relation to both EBRD and Macedonian legal and policy requirements (source EBRD gap analysis).

13.6.1 POLICIES AND PRINCIPLES

a) Public Consultation

EBRD policy requires that all stakeholders are adequately informed and meaningfully consulted, including the host population, well in advance of any expropriate activities. The resettlement and compensation framework developed here includes consultation measures for affected people.

Macedonian law does not require public consultation with project affected people prior to expropriation.

Provision of information to the affected population in the expropriation process is typically limited, particularly with regard to those who have no legal title over properties i.e. they are generally not informed about expropriation at all.

Although a public consultation process, with regard to expropriation, is not required under local legislation, for major transport projects, local legislation (which is generally in line with the EU EIA Directive) does mandate public consultation as part of the EIA process, and some information on the project may therefore reach affected people through this channel. Experience, however, shows that meaningful consultations with directly affected people, as provided for under the EBRD Policy, can significantly improve resettlement activities, as affected people know best what they will need to overcome the difficulties which they could face as a result of involuntary resettlement.

Another key issue is the involvement of external agencies in the development and implementation of plans, which is not required under local legislation. Vulnerable people need to be addressed properly. This is discussed in more details under f) paragraph.

By agreeing and defining responsibilities of all sectors up front, once the plans are officially agreed and/or adopted by relevant institutions, resettlement / livelihood restoration becomes "everyone's business" and it also gives the involved stakeholders a legal basis to participate in the implementation.

b) Socio-economic Survey

Implementation of a socio-economic survey is not required according to Macedonian legislation. For each EBRD project which requires land acquisition (physical or economic displacement), the implementation of a survey and development of a RAP/LRF is necessary.

The legal framework in Macedonia foresees the development of expropriation 'studies' which are in fact inventories of affected properties and basic information about registered owners of those properties (i.e. names, addresses, ID numbers), so that they can be identified and compensated. There are no provisions for conducting an inventory of all affected properties (i.e. including those that are not formally registered), nor a survey describing the socio economic conditions of affected owners or residents, as required by the EBRD's PR 5.

The benefits of a census of affected parties, in line with the requirements of PR5, can be summarized as follows:

- Identification of exact numbers of people / properties existing in the project affected area, which will be either physically or economically displaced (regardless of whether their properties are formally registered or not);
- Setting a cut-off date, so that opportunistic squatters who have moved to the project area after this date, are not entitled to compensation;
- Enable initial consultations with affected people about their needs and preferences (initiating thinking on possible mitigation measures);
- Collection of data to be used as a starting point during monitoring, whereby the change in conditions in relation to baseline information shows whether or not resettlement/livelihood restoration has been successful in enabling people to restore and improve their socio-economic status; and
- More precise scheduling and budgeting.

c) Economic displacement

Macedonian legislation does not require specific resettlement/livelihood restoration plans. For each EBRD project which requires land acquisition (i.e. which involves physical and/or economic displacement; permanent or temporary), the development of a RAP/LRF is obligatory.

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

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

Experience shows that provision of compensation for lost net income for formal and informal economic activities, as required by the EBRD policy, can be minimized if the affected people are provided with appropriate commercial structures in a timely manner and in areas where agricultural practices can resume. This re-affirms the importance of proper and timely livelihood restoration planning.

The most important precondition for ensuring that a RAP/LRF is able to be implemented is to identify gaps between such a RAP/LRF and local legislation, and to identify measures, which do not contradict local legislation, for addressing them, during the development phase of the document. This also includes involving various institutions, agencies and organizations in the planning process, to ensure that they understand their roles and have the capacity and legal basis to perform them.

One important advantage is that by adopting the RAP/LRF, the government also recognizes that funds need to be allocated for its implementation, and a RAP budget prepared. Experience also shows that the allocation of funds accompanies the adoption of the document, usually in the same government session. Another important advantage is that all institutions / organizations and agencies which are expected to be involved in the implementation have a legal basis for completing the work that is expected from them and allocating appropriate resources for that work, e.g. appropriately skilled staff. This is particularly important if certain provisions of the RAP/LRF can be perceived as contradicting local legislation.

d) Compensation Entitlements

The law does not specifically mention compensation for the costs of any transfer taxes. Compensation must include the registration cost in the Cadastre Office, or other relevant register, any administrative fees and/or transfer taxes.

Relocation costs/transport is not compensated for those who do not have formal legal title. All categories of affected people should be provided with relocation costs.

e) People without Formal Rights

Macedonian law does not recognise persons who do not have formal legal title and therefore does not foresee the provision of adequate housing with security of tenure for this category of affected people. However, and in compliance with PR5, the census should take into account:

- Category 2 – those who do not have formal rights to the land but who have a claim to land that is recognised under the national law;
- and Category 3 – those who have no recognisable legal rights or claim to the land they occupy, and are not recognised by the law.

Assistance should be provided to category 2 to acquire a formal legal status before expropriation. For category 3, in case of physical displacement, some form of social housing must be provided.

e) Addressing Human Rights

One of the most difficult issues encountered on resettlement projects in the countries with similar legal framework as Macedonia has been the requirement to compensate and/or assist *bona fide* informal residents / occupants of properties. Expropriation law does not foresee compensation or assistance for this category. The right to adequate housing and improvement of living conditions is specifically required under PR 5 of the EBRD Environmental and Social Policy, which is consistent with the principles of the Universal Declaration of Human Rights (1948) and the International Covenant on Economic, Social and Cultural Rights (1966).

If affected people are evicted without any assistance or relocation solutions, their fundamental right to housing, as defined by the UN Declaration of Human Rights will be violated. For that reason, in such instances, as contemplated under the EBRD's PR 5, it is necessary to provide alternative solutions for the accommodation of affected people living in them. It is important to note that this does not imply the need to provide affected people with ownership of apartments or houses, which is sometimes the way it is interpreted. It is rather to provide them with adequate accommodation, with security of tenure so that they are safe from future evictions.

The EBRD's PR 5 stipulates that adequate housing or shelter can be measured by quality, safety, affordability, habitability, cultural appropriateness, accessibility, and location characteristics.

Adequate housing should allow access to employment options, markets, and basic infrastructure and services, such as water, electricity, sanitation, health-care, and education. The most appropriate and effective way of defining what adequate housing means is to consult project affected people.

f) Vulnerable Groups

The law does not include special requirements for organising consultations and relocation assistance for vulnerable groups. During the census, it is necessary to identify vulnerable groups and assess their needs related to resettlement and relocation assistance.

Vulnerable groups, as for all other affected people, must be engaged in meaningful consultations regarding resettlement options and assistance. However, consultation with vulnerable groups may require a special approach that will enable them to participate equally in the process (i.e. involvement of social workers, use of a different language, or carrying out the consultations in an accessible venue, for people with disabilities, at a particular time of day when e.g. affected single parents are available, etc.)

According to the Law on Social Welfare and Child Protection (Official Gazette of the Republic of Macedonia 50/97, 16/00, 17/03) all vulnerable citizens have the right to one-off financial payments if they find themselves in a situation of sudden and temporary need, administered through local Centers for Social Welfare or local self governments. Vulnerable citizens receive social welfare in the form of financial assistance or social services.

Rules and Regulations for the Accommodation of Socially Vulnerable Individuals, based on the Law on Social Welfare, regulate the provision of assistance to persons who are beneficiaries of social welfare and without accommodation, in the form of cash payments for rent or reconstruction of houses / apartments or placement in social housing. Macedonia has a set of laws under which vulnerable groups can be assisted to improve their living standards (health, education, employment, free legal aid etc.) and these laws should be used as a basis for developing resettlement programmes for vulnerable groups.

Once vulnerable groups are identified during the census, a needs assessment must be performed to be able to define the most appropriate measures for providing resettlement assistance.

g) Equal Rights

Men and women have equal rights in the Republic of Macedonia including formal legal rights over properties. This RAP will ensure that compensation is shared between spouses according to title documentation or the Family Law. In addition, all programmes including those related to livelihoods restoration will be made equally accessible to both men and women.

h) Grievance Mechanism

In Macedonia there is no specific legislative requirement for establishing an independent grievance mechanism. A project-specific grievance mechanism should be established and this should be culturally appropriate and transparent to promptly and effectively receive and address specific concerns about compensation and relocation that are raised by displaced persons and/or members of host communities.

However, expropriation laws and administrative codes in Macedonia do foresee rights of affected citizens (those with formal legal rights) to appeal to courts on various occasions during the expropriation procedure. Experience so far also shows that affected people usually communicate with the expropriation beneficiary (a designated person or department, i.e. PR manager/PR department), in connection with their specific grievances and with the aim of reaching a compensation agreement, before filing appeals with the relevant administrative authorities or courts. In some cases, these existing procedures could be built on, to develop appropriate grievance mechanisms, as required by EBRD.

It is important to ensure that affected people are informed about:

- How and where to submit grievances;
- The grievance process and specific information which is needed from the person with the grievance;
- When and where to expect a response;

- If they are unsatisfied with the response what is the next available channel for submitting a grievance.

In most cases, questions and grievances can be answered by staff involved in projects. However, in larger scale resettlement / livelihood restoration programmes, it is also necessary to develop a second level of grievance resolution, which would involve the participation of impartial persons. Experience shows that the most effective way of organizing such a mechanism is to form a committee which would include representatives of various stakeholders, including project affected people and independent agencies / organizations, e.g. NGOs, ombudsman offices. Grievance mechanisms must not impede access to existing judicial and administrative remedies.

I) RAP Structure

Three RAPs will be prepared for the Project on the base of Resettlement Compensation Framework. A Resettlement Action Plan (RAP) will be drafted by the client, specifying the procedures it will follow and the actions it will take to properly resettle and compensate affected people and communities. The RAP must identify the full range of people affected by the project and justify their displacement after consideration of alternatives that would minimize or avoid displacement. The RAP outlines eligibility criteria for affected parties, establishes rates of compensation for lost assets, and describes levels of assistance for relocation and reconstruction of affected households. The RAP's planning protects the client against unanticipated or exaggerated claims from individuals who have spurious eligibility for resettlement benefits. The mediation of such claims can cause significant delays in project implementation which can result in cost overruns for the sponsor.

The scope and level of detail of resettlement planning must ensure that the livelihoods of people affected by the project are restored to levels prevailing before inception of the project. This section describes a recommended approach to effective RAP preparation. The essential components of a RAP are the following:

- identification of project impacts and affected populations;
- a legal framework for land acquisition and compensation;
- a compensation framework;
- a description of resettlement assistance and restoration of livelihood activities;
- a detailed budget;
- an implementation schedule;
- a description of organizational responsibilities;
- a framework for public consultation, participation, and development planning;
- a description of provisions for redress of grievances; and
- a framework for monitoring, evaluation, and reporting.

The RAP will be designed to mitigate the negative impacts of displacement, identify potential development benefits and establish the entitlements of all categories of affected persons (including host communities), with particular attention paid to the needs of the poor and the vulnerable to document all transactions to acquire land, rights, as well as compensation measures and relocation activities establish procedures to monitor and evaluate the implementation of resettlement plans and take corrective action as necessary.

The scope and level of detail of the RAP will vary with the magnitude of displacement and the complexity of the measures required mitigating adverse impacts. In all cases, it will describe the manner in which the objectives of PR 5 will be achieved. At a minimum, the RAP should:

- State the resettlement objectives;
- Describe project impacts, identify all people;
- To be displaced and provide an inventory of affected assets;

- Demonstrate that displacement is unavoidable and has been minimized;
- Describe the legal framework for land acquisition and compensation;
- Describe the process of consultation with affected people regarding acceptable resettlement alternatives, and the level of their participation in the decision-making process;
- Describe the entitlements for all categories of displaced people;
- Enumerate the rates of compensation for lost assets and demonstrate that these rates are adequate, that is, at least equal to the replacement cost of lost assets;
- Describe the process for selection, allocation, preparation and land titles relating to housing replacement;
- Describe relocation assistance to be provided;
- Provide details of arrangements for improving or, at a minimum, restoring the livelihoods and standards of living of displaced persons;
- Outline the institutional/organisational responsibility for the implementation of the RAP and procedures for grievance redress;
- Provide a timetable and budget for the implementation of the RAP;
- Provide details of arrangements for monitoring, evaluation and reporting where the land acquisitions does not result in any loss of livelihoods or loss of income;
- Provide fair compensation for the acquired land and any lost assets on such land at their replacement cost.

Public meetings will be held on the draft RAP, where the principles outlined in the RAP will be presented to the affected persons and organizations. Local municipalities will organize these meetings, prepare and carry out presentations, prepare minutes of questions and issues raised and lists of participants.

Upon the completion of public consultations the draft RAP will be amended as necessary to reflect the results of public consultations and re-disclosed if necessary. An Executive Summary of RAP will be disclosed in Macedonian at the local municipalities' offices and contact points (to be established according to the provisions of the Stakeholder Engagement Plan). Any significant changes made in the course of implementation of the RAP will be disclosed to the public in an appropriate form.

For the implementation phase, list the chronological steps in implementation of the RAP should be prepared, including identification of agencies responsible for each activity and with a brief explanation of each activity. To prepare a month-by-month implementation schedule (using a Gantt chart, for example) of activities to be undertaken as part of resettlement implementation. Linkage between resettlement implementation and initiation of civil works for each of the project components needs to be described.

Resettlement action plan requires specialized expertise. It is essential that qualified and experienced personnel are engaged to design and implement resettlement action plans. However, it is equally important that client engage himself in the RAP design process. Client participation in the process is instrumental to coordinating.

13.7 DESCRIPTION OF PAST AND CURRENT EXPROPRIATION ACTIVITIES

Land has been acquired for the first 65 km of the projected railway starting from Kumanovo and ending at the first settlement, Mozdivnjak, within Kriva Palanka Municipality. Land of between 10-20 ms on both sides of the line was expropriated during 1994-2004. Land owners have been compensated and most have built new houses away from area of expropriation. In Section 1, 139 542m^2 of land were expropriated and within Section 2, 1 694 616m^2. Three houses in Section 2 were expropriated.

In Section 1, the line was designed during the Bulgarian occupation. Yugoslavian railways constructed the line based on that design *(Figure 13-3).*

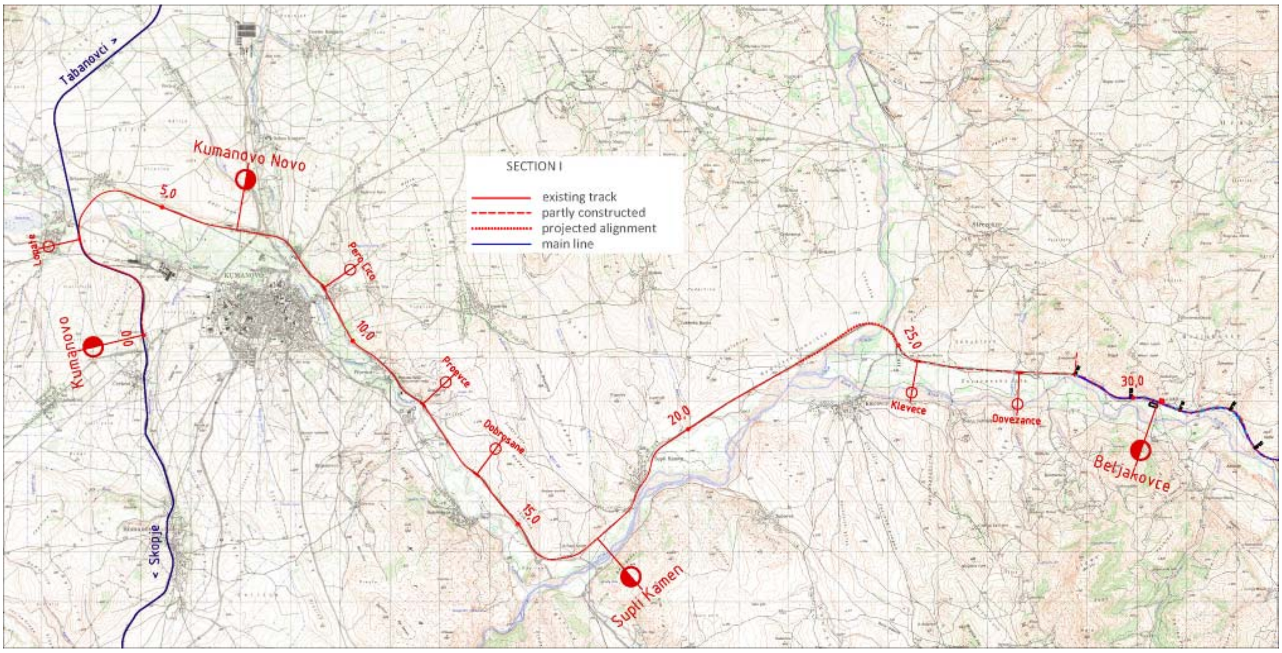


Figure 13-3 Layout of Railway Alignment Section 1

In Section 2, expropriation was done prior to the start of construction works. In Rankovce Municipality, there is an unsolved issue with a property owner where the line will divide the land into two parts. The owner wants the whole plot to be expropriated. Since 1995, no new building permits along the projected railway line have been issued *(Figure 13-4).* A Short RAP will be prepared for Section 2.

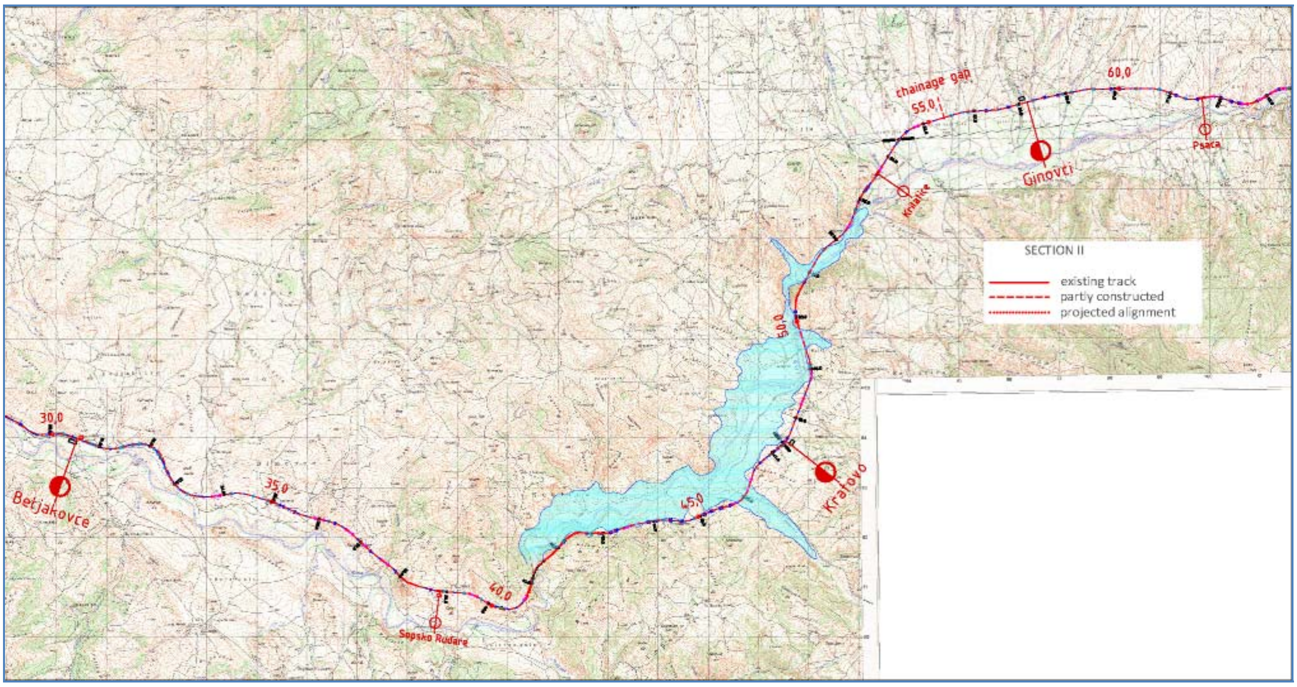


Figure 13-4 Layout of Railway Alignment Section 2

For Section 3, for the need of Macedonian Railways Infrastructure, the expropriation study was prepared in 2010. Approx. 25 houses need to be removed and agricultural land needs to be expropriated within the Municipality of Kriva Palanka. Permanent land take will directly affect around 465 owners (families). A detailed survey needs to be conducted *(Figure 13-5).*

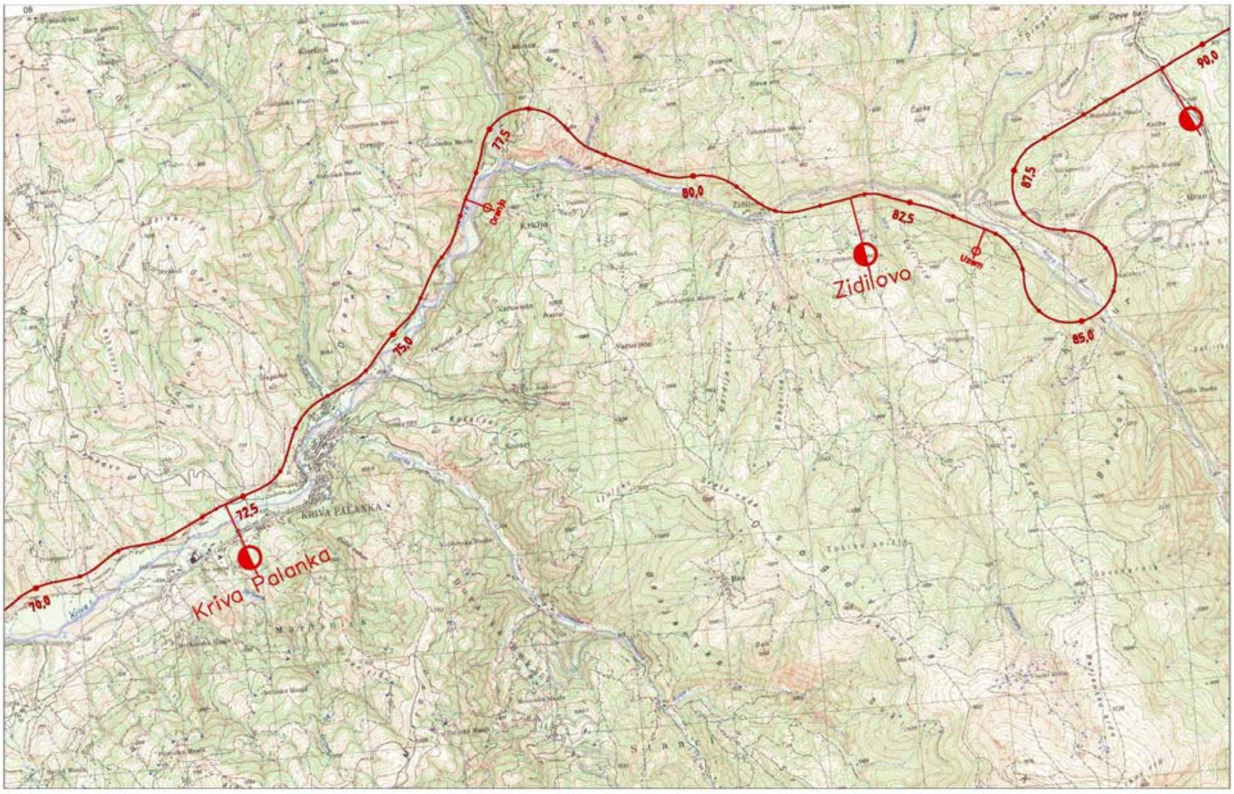


Figure 13-5 Layout of Railway Alignment Section 3

Land expropriation procedures need to be completed prior to the signature of the works contract.

13.8 DEFINITION OF AFFECTED PEOPLE AND PROPERTIES

A substantial amount of household-level socioeconomic data will be collected during the census and inventories of assets. However, low income households (those commonly affected by resettlement), particularly in rural areas, typically have diversified livelihood strategies that combine agriculture with wage labor and small-scale enterprise. Therefore, it is important to survey all income sources in order to calculate income loss from project land acquisition as a proportion of total income. For example, land loss for a household engaged in business or wage labor is likely to be less significant than for a household whose income is derived wholly from agriculture. For these reasons, the socioeconomic studies are needed to collect additional quantitative (supported by qualitative) information in two important areas: 1) household-level income streams and livelihood strategies that were not identified in the census and inventories of assets; and 2) the structure, organization, and economic inter- dependencies within the larger community affected by the project. Analysis of these data will help identify those households most at risk from physical or economic displacement. However, income stream analysis is not required in cases where land acquisition does not affect the income-earning capacity of a household (for example, in cases where only dwellings are displaced and the affected people can be relocated to near-by sites).

The socioeconomic survey should be linked closely with the census and inventory of assets to provide comprehensive information on household economic resources, including common property resources. The census and inventory of assets should have already identified the basic social unit of production or economic organization.

Socio economic survey and census will be prepared during preparation of proposal for expropriation, during design phase in close coordination between Commission for expropriation formed by PERI, Land survey team and experts for determination of market values.

13.8.1 SOCIO-ECONOMIC SURVEY

The North-eastern Region of Macedonia includes 192 inhabited settlements, 189 of which are rural settlements. The population density is 75 residents/km^2, evenly distributed, and with the average density of 81 residents/km^2.

The project area is characterized by a high level of ethnic and religious diversity. The ethnic composition of the population in the North-eastern Region shows greater variety than for the country as such with 59.1% Macedonians, 31.1% Albanians, 6.1% Serbs and 2.9% of Roma origin. In Lipkovo, 97.4% of the population is Albanian. The level of unemployment in the region reaches is 43%.

The average family size in the region is decreasing from 3.9 to 3.6 members. The gender proportion of current population constitutes 51% female and 49% male.

The Northeast region is characterized by an increased outmigration to other countries, which has intensified during the past decade. According to the official classification methods, criteria and indicators, this region is classified as the least developed planning region in the Republic of Macedonia and is relatiely isolated (in terms of development).

The socio-economic survey will include the following:

- Household characteristics (who is the owner of property/or lives in affected house), age, education level, principal language used in the household, activities and vulnerability (ill, old, disability and etc.);
- Description of economic status of household (inventory of main movable assets, furniture, appliances, employment, economic activities – both informal and formal, , categorization of incomes);
- Description of current economical and social dependence of the households from their land/usage of locations as critical factor to understand possible impacts of land acquisition and/or resettlement to other location;
- Preferred kind of compensation (cash or land, or where possible – assisted resettlement, and when resettlement is preferred option location, type of object etc.).

13.8.2 CENSUS

In accordance with EBRD requirements, a census of directly affected households will be carried out. The survey will ensure that all categories of affected people (not only those with formal legal rights) are informed and consulted in a meaningful way including:

- Category 1 – those who have formal rights to the land;
- Category 2 – those who do not have formal rights to the land but who have a claim to land that is recognised under the national law; and
- Category 3 – those who have no recognisable legal rights or claim to the land they occupy

During the census, vulnerable groups will be identified in order to assess their needs related to resettlement and relocation assistance.

The census involves the collection of data relating to names, date of birth, and land ownership and occupation, the socio-economic survey and inventory of losses.

13.9 REAL-ESTATE FRAMEWORK FOR LAND ACQUISITION AND COMPENSATION (INVENTORY OF LOSSES)

This task will address the following:

- Cadastre identification and coordinates of the parcels and assets at the parcels,
- Identification of trees and objects on the affected parcels,
- Description of all objects (surface, materials, conditions),

- Description of the property status with regard to tenants: are there are tenants or users which have legal rights – if they have, on which base, ownership, rent or they use the premises on an informal basis,
- Estimation of the value of affected property based on defined compensation criteria.

13.9.1 AFFECTED LAND AND STRUCTURES

In Section 1, the railway line was designed during Bulgarian occupation and Yugoslavian railways constructed the line based on that design, undertaking the necessary expropriation. For the upcoming construction works no permanent land take is required. On temporary base 19,000m² of land will be affected in Section 1.

In Section 2 a strip of land of a varying width of 10-20 meters on both sides of the rail alignment was expropriated during the period 1994-2004. Land owners were compensated and most have built new houses away from the projected railway line. No additional permanent land take is required. On temporary base 103,200m² of land will be affected in Section 2. A short Resettlement Action Plan will be prepared separately for Section 1 and Section 2.

For Section 3, the expropriation study was prepared in 2010 by Macedonian Railways Infrastructure. Approximately 25 houses will need to be demolished and agricultural land expropriated within the Municipality of Kriva Palanka, total number of houses that will be affected in town of Kriva Palanka is 19. Additionally 1 house will be affected in the settlement of Gradec and 5 houses in the settlement of Uzem.

The area of the land, the m² from ground floor of the houses and the cadastre numbers have been listed as well. The houses are all two storeys and average size of the ground floor is 52.5 m².

In addition, 424,379 m² of land will need to be expropriated, of which most comprises forest and agricultural land. On temporary base 424,678m² of land will be affected in Section 3.

The following table gives overview of estimated permanent and temporary land take for the project in m² for the Section 1, 2 and 3:

	Section 1	Section 2	Section 3
Permanent Land Take for Project (m²)			
Total surface	0	0	**424,379**
Agricultural land	0	0	**225,380**
1.Grazing	0	0	160,616
2. Field	0	0	24,095
3. Vineyard	0	0	81
4. Orchard	0	0	
5. Residential (e.g. gardens, yards)	0	0	20,805
Forest	0	0	**185,800**
Commercial	0	0	0
Previous roads, gullies	0	0	**13,199**
Affected Structures			
No. Structures	0	0	
No. Residential Houses	0	0	25
Houses/ground floor m²	0	0	1,050
Estimate of Temporary Land Take for Project during construction			
Total surface m²	19,000	103,200	424,678

Table 13-1 Land Take per Section

The remaining 13,199.00m^2 comprises old roads, dry streams and open land and belongs to separate villages.

The location of houses which need to be removed and size of the land to be expropriated are presented in the following Table.

Settlements in 3rd section (66km to the border)	Land in m2	Houses/ground floor in m^2	Number of houses
Tlminci	33.760		
Gradec	70.041	35	1
Lozanovo	10.349		
Kriva Palanka	68.602	801	19
Drenje	24.943		
Trnovo	3.289		
Kiselica	18.451		
Zidilovo	29.440		
Krklja	64.711		
Kostur	3.590		
Uzem	97.203	214	5
Total	**424.379**	**1,050**	**25**

Table 13-2 Summary of Expropriation Needs as of 25th June 2010 carried out by PERI

13.9.2 PROCESS OF SURVEY

During the design phase, after defining methodology, the scope of the survey and the principles (which are enumerated) the data for the houses, flats, buildings and auxiliary facilities, orchards, wells, fruit trees in yards and gardens and other issues relevant to the survey, etc. needs to be collected from each affected household and person. A survey is to be carried out along the alignment. Maps from the cadastre, from main projects and from the expropriation study are to be used to define the affected properties. However all objects should be considered, not only those included in expropriation study or in cadastre. The survey will need to include both formal (legal) registered properties together with other 'informal' properties and/or structures which have been built within the potential impact area but without permission (i.e. properties whose owners do not have legal entitlement to residence or occupation).

13.10 EXPROPRIATION AND COMPENSATION COSTS

In general, the current price of the agricultural land is very low while the price of land in urban areas tends to be high. The validation of land is dependent on grade, usage, and accessibility/proximity, prevalence of water and future plans for irrigation within the area.

A preliminary estimation of land acquisition and compensation costs (equivalent to replacement values) includes:

- For agricultural land, the price is estimated to EUR 5 per m^2.
- The size of an individual homestead is estimated to be 320 m^2.
- The price for land in a town is estimated at EUR 30 per m^2.
- Houses are estimated to a size of 105 m^2 (two storeys). The price per m^2 is estimated to be EUR 650 per m^2.

These values need to be updated according to the market prices during expropriation process.

Project affected people includes any household who at the cut-off date of the project (i.e. at the date of conducting the census and baseline survey) are residing or deriving an income from the project area, and because of the project, would lose land, or any other movable or fixed assets, in full or in part, temporarily or permanently, or have their business, occupation, place of work or residence adversely affected. Lack of legal rights will not bar affected people from entitlement to compensation for their lost assets (improvements including structures, houses, crops, trees and other fixed assets).

Valuation of Affected Assets and Agreement on Proposed Actions

The valuation of land and assets to be acquired for the railway will be undertaken as required under MKD Expropriation Law and extended to address additional EBRD requirements of PR 5. It will define methods for establishing monetary compensation but also options for other types of action including assistance with finding new accommodation or premises, replacement of lost assets and resettlement of people.

The principles that will be applied are set out below:

- Monetary compensation or a replacement will be provided for land, dwelling houses and/or business premises acquired for the project or which must be abandoned;
- Monetary compensation or replacement will be provided for all other useful structures including stalls, storage buildings, sheds, pens, fences, etc;
- The affected person will have the right to salvage material for the building to be lost without a reduction in the amount of compensation. Compensation will also be provided for buildings damaged by the development. Buildings and other structures will be valued at their replacement value, at either the market cost of replacement or the cost of re-building to a similar quality, taking into account the provision of utilities and services. Costs of transporting materials to the new site and construction labour will be taken into account;
- Where illegal occupiers are resettled this will be to a resettlement scheme or to some other location where they may establish legal title;
- Where a dwelling/businesses are rented the owner will receive compensation for the loss. The tenant will be provided with assistance in finding an equivalent property, support for renting for an interim period, moving costs and a disturbance allowance or payment of the value of economic loss until the restoration of business elsewhere, to be determined by the business owner as the most favourable option. If required, assistance will be provided with job placement and skills training in the new location.

Businesses

When a business is displaced the affected person will be provided with monetary compensation or resettlement. If the affected person chooses resettlement, an equivalent parcel of land will be provided at an acceptable location and with similar commercial potential and secured tenant status. Compensation will include costs of moving and legal and transaction fees.

A disturbance payment will be made equivalent to net income for an agreed period (based on tax records from the affected or a comparable business). Where business premises are rented the owner will receive compensation for the building and the tenant will be provided with assistance in finding an equivalent location, support for renting for a period to allow the business to re-establish, and moving costs.

Informal street vendors will receive compensation equivalent to 2 months net income based on tax records or information from comparable businesses, assistance in finding a new site to re-establish the business and costs of relocation.

Cultivated Land

Compensation will be provided for land that is in cultivation or being prepared for cultivation or has been cultivated during the last season, recognizing the investment of labour made by farmers. Compensation for cultivated land will be based on a standard value per unit of area taking account average value and a rate for loss of actual or potential crops.

Where notification of proposed acquisition occurs after a critical date, when the grower will no longer have enough time to prepare other land without help (or at all), further assistance will be provided to hire additional labour or mechanical equipment so that replacement land is ready by the sowing date.

Where a person is prevented from growing food for everyday use, compensation will be provided to allow the purchase of food in the market until such time as new crops can be grown. The level of compensation will be based on the average amount a town dweller spends on buying the relevant items per person per year multiplied by appropriate number of people and the relevant period.

Trees

Trees will be valued at the cost of replacement or replacement trees will be provided. Compensation will be provided for the value of fruit lost over the period until new trees reach full production and the value of labour that has been invested in the trees lost. If trees have to be lopped (branches removed) compensation will be calculated on the basis of the reduction in surface area of the canopy. No compensation will be paid for minor pruning where this is required to avoid damage.

Other Assets

If other productive assets are lost or have to be moved (e.g. beehives) the keepers will be compensated for the loss of one season's production plus reasonable costs associated with relocating the hives.

General provisions

Where the loss forms only part of the assets of the affected person if the remainder of the asset is no longer viable or its value is reduced this will be taken into account in determining the level of compensation. Where people require assistance to put themselves back in the position they had before the expropriation this will be provided in the form of information, advice, access to credit or other means. Consideration will be given to opportunities to improve the livelihoods of affected people through training, assistance with finding alternatives jobs, etc. Affected people will be consulted to establish the form of compensation they prefer. Compensation in kind will include land, buildings, other structures, crops, trees, gardens, and other assets.

Landless people or illegal occupiers who may not be eligible for compensation for land and fixed assets will be entitled to compensation for any improvements made to the land (such as structures, shelters, crops and trees) and for any loss of access to resources they suffer as a consequence of the development. They may also be offered a new location to live and may gain additional benefit through regularisation of their status when resettled on new land.

Where losses cannot easily be valued or compensated for in monetary terms (*e.g.* access to public services, customers, and suppliers; or to fishing, grazing, or forest areas), every attempt will be made to establish access to equivalent and acceptable resources and earning opportunities. An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.

13.11 ENTITLEMENTS

Table below presents the Entitlement Matrix. This will be communicated to the affected stakeholders so that they are aware of their entitlements.

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
RESIDENTIAL/ACCOMMODATION RELATED LOSSES				
Owner	**Loss of residential land plot** **a) permanent**	The Law on Expropriation of MKD EBRD Policy	Replacement2 property: residential plot of land of similar size and characteristics Compensation for expropriated land is determined by giving replacement other land, which in size, quality and location is appropriate to the expropriated land or cash compensation for land plot at replacement value	Transfer of property right through amicable agreement or expropriation process.
	Loss of residential land plot **b) temporary**	The Law on Expropriation of MKD EBRD Policy	Cash compensation for temporary use of the land plot at market value	Transfer of compensation through amicable agreement
	Permanent Loss of residential structure			
	a) with building permit erected on own registered land plot	The Law on Expropriation of MKD EBRD Policy	Replacement property: residential structure of similar size and characteristics or Cash compensation for residential structure at replacement value + The costs of all expenses for moving and any legal documentation shall be covered.	Transfer of property right through amicable agreement or expropriation process.
	b) without building permit erected on own registered land plot	The Law on Expropriation of MKD Law on Legal Ownership Relations of MKD Law dealing with illegal buildings of MKD EBRD Policy	*Subject to successful legalization:* Same as formal owner *If legalization is not possible:* Compensation for land at market value + The right to take away the building materials or provision of cash compensation at construction value + The costs of all expenses for moving and any legal documentation shall be covered.	Legalization of the residential structure may be carried out first, and then expropriation in accordance with the Law on Expropriation of MKD. If legalization not possible, transfer of property and/or provision of compensation right through amicable agreement.

2 Replacement value indicates market value of the property plus legal costs of acquiring other property, such as taxes and fees related to purchase of other property, registration in land registry etc.

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
	c) without building permit erected informally on someone else's or state land plot	The Law on Expropriation of MKD Law on Legal Ownership Relations of MKD Law on Construction Land of MKD Law dealing with illegal buildings of MKD EBRD Policy	Cash compensation at replacement value for the private land plot to the owner or his/her successors + The right to take away the building materials or provision of cash compensation for residential structure at construction value to structure owner + The costs of all expenses for moving and any legal documentation shall be covered.	Expropriation can be carried out when the legal process reaches completion. The transfer of property rights and/or provision of compensation entitlements can be met through amicable agreement. In situations where there is no market value for the property, compensation is determined in accordance with the market value of the material and labour required for construction (tailored according to depreciation). Depreciation is calculated according to the age of the structures.
	Loss of apartment or flat within residental structure	The Law on Expropriation of MKD EBRD Policy	Replacement property: apartment of similar size and characteristics with entitlement (proof of ownership). or Cash compensation for apartment at replacement (market) value + The costs of all expenses for moving and any legal documentation shall be covered.	The compensation for the expropriated building or other object is determined by giving in exchange a building or other object which by size, quality, purpose and location is similar with the building or property expropriated. Transfer of property right through amicable agreement or expropriation process.
	Loss of annual crops **a) permanent**	The Law on Expropriation of MKD Law on Legal Ownership Relations of	The right to harvest crops or Cash compensation for annual crops at replacement (market) value. +	The former owner shall be entitled for compensation for the crops, forests and for the land, and fruits according to the

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
		MKD	Cash compensation for any developments on the land to the owner of these developments (may apply to irrigation or drainage structures, perennial plantations, structures, etc…)	market price, unless the compensation is integrated with the compensation of the land. Cash compensation for the crops possible only if the annual crops could not be harvested within the period of notice, in accordance with the Law on Expropriation of MKD
	Loss of annual crops **b) temporary**	The Law on Expropriation of MKD Law on Legal Ownership Relations of MKD	The right to harvest crops or Cash compensation for annual crops at replacement (market) value.	Cash compensation for the crops possible only if the annual crops could not be harvested within the period of notice, in accordance with the Law on Expropriation of MKD
	Loss of perennial crops **a) permanetly**	The Law on Expropriation of MKD	The right to pick fruits, vegetables, etc. + Cash compensation for perennial trees, plants at replacement value. If the perennial crops cannot be harvested, the owner is entitled to cash compensation for the expected crops, in accordance with the Law on Expropriation of MKD.	Compensation must include all trees and plants, and the court expert assesses their value depending on the age, type, etc. According the Law on Expropriation). Income restoration package (access to credit/ allowance until next first harvest/ alternative job training)
	Loss of perennial crops **b) temporary**	The Law on Expropriation of MKD	The right to pick fruits, vegetables, etc. + Cash compensation for the expected crops in the period of temporary losses, in accordance with the Law on Expropriation of MKD.	Compensation According the Law on Expropriation). or Income restoration package (access to credit/ allowance until next first harvest/ alternative job training)
Tenant	**Residential structure / apartment**	Law on Obligations of MKD EBRD Policy	Timely notification to enable tenant to find other accommodation The tenant will be provided with assistance in finding an equivalent property, support for renting for an interim period, moving costs and a disturbance allowance. If required assistance will be	As regulated by the Law on Obligations of MKD, the notification period may not be less than 8 days before the tenant has to vacate the residential structure / apartment, unless otherwise specified by the tenancy agreement.

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
			provided with job placement and skills training in the new location.	
Informal occupant	**Residential structure / apartment**	EBRD Policy	Provision of use of alternative accommodation by the competent authorities, with security of tenure, if the occupant has no or no stable sources of income and his/her family does not own other property or Where informal occupiers are resettled this will be to a location and building where they may establish legal title.	Support for informal occupants not regulated by local legislation, and to be dealt with through amicable agreement.
BUSINESS OR COMMERCIAL RELATED LOSSES				
Owner	**Loss of place of business** **a) permanent**	The Law on Expropriation of MKD	When a business is displaced the affected person will be provided with monetary compensation or resettlement. If the affected person chooses resettlement an equivalent parcel of land will be provided at an acceptable location and with similar commercial potential and secured tenant status. Compensation will include costs of moving and legal and transaction fees. A disturbance payment will be made equivalent to net income for an agreed period (based on tax records from the affected or a comparable business). or Same as for residential property	Transfer of property right through amicable agreement or expropriation process.
	Loss of place of business **b) temporary**	The Law on Expropriation of MKD	Cash compensation for any assets affected Or Where business premises are rented the owner will receive compensation for the building and the tenant will be provide with assistance in finding an equivalent location, support for renting for a period to allow the business to re-establish, and moving costs.	Transfer of property right through amicable agreement or expropriation process.

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
	Loss of business and/or rent **a) permanent**	The Law on Expropriation of MKD EBRD Policy	If the expropriated real estate belongs to the enterprise and the shop, determination of the compensation takes into the account the losses caused by discontinuation of activities, as well as damage due to change in location if such occurred. The amount of the damages is determined by MKD Law on Expropriation. Compensation for economic loss incurred as a result of permanent relocation including any discrepancies in livelihood, either to the amount of up to 30% increase in compensation for the structure (in accordance with the MKD Law on Expropriation) or payment of the value of economic loss until the restoration of business elsewhere (up to 1 year), to be determined by the business owner as the most favourable option+ An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.	Provision of compensation according to Article 31 of the Law on Expropriation of MKD Where losses cannot easily be valued or compensated for in monetary terms (*e.g.* access to public services, customers, and suppliers; or to fishing, grazing, or forest areas), every attempt will be made to establish access to equivalent and acceptable resources and earning opportunities.
	Loss of business and/or rent **b) temporary**	The Law on Expropriation of MKD EBRD Policy	Compensation for economic loss occurred as a result of temporary relocation including any discrepancies in livelihood, either to the amount of up to 30% increase in compensation for the structure (in accordance with the MKD Law on Expropriation) or payment of the value of economic loss until the restoration of business elsewhere (up to 1 year), to be determined by the business owner as the most favourable option An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.	Provision of compensation according to Article 31 of the Law on Expropriation of MKD

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
Tenant	**Loss of place of business and business/income** **a) permanent**	Law on Obligations of MKD The Law on Expropriation of MKD	Timely notification to enable tenant to find other accommodation The fee for the lease is determined according to the amount of the lease to be realized for same or similar land at free market. If on this base, losses to the owner of the real estate are caused, he is entitled to be compensated for losses. The remuneration to the damages is determined for each concrete case. An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.	Application of the provisions of lease agreement
	Loss of place of business and business/income **b) temporary**	Law on Obligations of MKD The Law on Expropriation of MKD	Timely notification to enable tenant to find other accommodation + An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.	Application of the provisions of lease agreement
Occupants with temporary permits for the business structure	**Loss of place of business and income/business**	The Law on Expropriation of MKD EBRD Policy	*Subject to successful legalization:* Same as formal business owners *If legalization is not possible:* Compensation for construction value of the structure and provision of adequate alternative location under lease as to enable the business to continue its economic activities elsewhere, if the owner has no same or similar business activity on other location + Compensation for economic loss incurred as a result of relocation including any discrepancies in livelihood, either for the amount of up to 30% increase in compensation for the structure (in	Compensation for economic loss and livelihood restoration for temporary business occupants not regulated by local legislation, and to be dealt with through amicable agreement.

Category of PAP	Type of Project affected right or property or loss	Applicable legal /policy framework	Entitlement	Process and specific conditions
			accordance with the MKD Law on Expropriation) or payment of the value of economic loss until the restoration of business elsewhere (up to 6 months), to be determined by the business owner as the most favourable option	

Table 13-3 Specific Compensation Entitlements for Project-Affected Peoples (PAPs)

13.12 GRIEVANCE MANAGEMENT

13.12.1 OVERVIEW

The following principles will apply to grievance management:

- Any grievance related to land acquisition or to any other matter will be registered, acknowledged within 7 working days and tracked until it is closed;
- The grievance management system will include at least one level of review/appeal, with the aim to reach an amicable settlement wherever possible without resorting to a judicial review;
- Grievances will be processed and responded to within 25 working days.

13.12.2 GRIEVANCE MANAGEMENT

Registers of grievances will be established in locations close to potentially affected people. The investor will be responsible for handling the grievances in a timely fashion. It should be possible to register grievances in headquarters, municipal and local offices, websites and grievance leaflet prepared to tell people about the process. The leaflet needs to be written in easily accessible language. Also bearing in mind the length of the corridor, some information will be placed in all affected municipal offices. Grievance mechanism is covered in Chapter 6 from Stakeholder Engagement Plan.

The existence of these registers, as well as avenues and procedures to lodge a complaint (where, when, to whom, etc.), will be broadly communicated to the public. The grievance is managed by a two tier system as described below:

First Tier of Grievance Management

PERI needs to establish a registry of grievances. PAPs will be able to submit grievances directly with the Railway company (a sample Grievance Form is attached as Annex 2). All grievances will be recorded in a register and assigned a number, and acknowledged within seven (7) days.

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

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

The Railway company will make all reasonable efforts to address the complaint upon the acknowledgement of grievance. Responsible person from PERI will be Mr. Rade Sekulovski, Head of sector. If the railway Company is not able to address the issues by immediate corrective action, a long-term corrective action will be identified. The complainant will be informed about the proposed corrective action and follow-up of corrective action within 25 working days upon the acknowledgement of grievance.

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

Second Tier of Grievance Management

If the complainant is not satisfied with the implemented corrective action and/or a justification on why the corrective action is not required, the complaint will be directed to the Grievance Commission. The

Grievance Commission will be established for the Project by an internal act of the Railway Company and comprised of:

- One representative of the railway Company (other than the person directly involved in resolving the grievance described in the previous steps);
- And one representative per each municipality affected by the Project and selected by the municipality officials;
- Additionally, the Commission may include a representative of Ministry of transport and Communication, if found necessary.

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

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

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

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

13.12.3 DISPUTE RESOLUTION

According to the Law on expropriation ("Official gazette of the Republic of Macedonia" no. 33/95, 20/98, 40/99, 31/03, 46/05, 10/08, 106/08, 76/10), the Law on general administrative procedure ("Official gazette of the Republic of Macedonia" no. 38/05, 110/08, 118,08) Law of administrative disputes ("Official gazette of the Republic of Macedonia" no. 62/06,27/08,117/09), any unresolved grievance may be appealed by the affected party through the secondary commission of the Government of R. Macedonia, against the decision brought by the expropriation body, within a time limit of eight (8) days from the receipt of the decision. Against the decision of the secondary commission of the Government of R. Macedonia a law suit can be submitted to the Administrative court. The decision of the Administrative court is mandatory and executive.

In the judicial procedures for determining the amount of the compensation, the unsatisfied side has the right to appeal against the Decision of the Primary Court to the Court of Appeals. In addition the overall grievance mechanism put in place in the Stakeholder Engagement Plan will be available to the affected people. (Annex 2 from Stakeholder Engagement Plan).

13.13 MONITORING AND REPORTING

13.13.1 MONITORING

Monitoring measures should be designed to endure that, at a minimum; the livelihood and standard of living of displaced persons are restored to pre-project levels. Monitoring will be carried out in accordance with PR 1 and may involve the participation of key stakeholders such as affected communities. The following table presents a list of indicators to be gathered during the first three years.

Indicator	Source of Information	Frequency
Input Indicators		
Overall spending on expropriation and compensation	Financial records	Quarterly
Number of project affected people by categories	Census and grievance management	Quarterly

Indicator	Source of Information	Frequency
Output Indicators		
Number of project affected people having moved into their new dwelling in the period	Data management system	Monthly
Number of project affected people having moved from their previous dwelling in the period	Data management system	Monthly
Number of people having received cash compensation in the period with distribution by compensation type and by classes of amounts	Data management system	Monthly
Number of individual compensation Agreements in compliance with PR5 signed in the period	Data management system	Monthly
Number of vulnerable households/individuals resettled, the type of vulnerability and type of assistance provided	Monitoring Reports on Resettlement Activities	Monthly
Number of individual compensation agreements signed in the period	Monitoring Reports on Resettlement Activities	Monthly
Number of businesses where income restored or improved from pre-resettlement levels.	Monitoring Reports on Resettlement Activities	
Qualitative indicators which will serve to assess the satisfaction of the affected people with the resettlement initiatives and, thus, the adequacy of the initiatives. Information on these indicators will be obtained through direct consultation with the affected population (meetings, focus group discussions, questionnaires)	Monitoring Reports on Resettlement Activities	Monthly
Degree of satisfaction with the new dwelling	Monitoring Reports on Resettlement Activities	Monthly
Degree of satisfaction with the compensation agreement	Monitoring Reports on Resettlement Activities	Monthly
Degree of satisfaction with performance of resettled business	Monitoring Reports on Resettlement Activities	Monthly
Getting information on things like whether the resettlement process was easy or not (e.g. it involved lots of paperwork, communication was poor	Monitoring Reports on Resettlement Activities	Monthly
Establishment of Grievance Mechanism and tracking of grievances including quantitative (tangible) and qualitative complaints	Evidence that grievances are being addressed and closed out	Ongoing

Table 13-4 Monitoring indicators

13.13.2 REPORTING

The Investor shall provide an Initial Monitoring Report on the implementation of the RAP at the time of the Loan condition effectiveness. Periodical Monitoring Reports will be provided annually thereafter for three years as part of the Annual Reporting to EBRD. The Investor will also report annually to EBRD on any similar issues falling under its responsibility.

It should be noted that the Investor may need to publicize some of the above-mentioned indicators as a response to a formal information request filed in line with the relevant information access legislation.

At times, the client's ability to achieve social or environmental outcomes consistent with the PRs will be dependent on third party activities. A third party may be, *inter alia*, a government agency, a contractor, a supplier with whom the project/client has a substantial involvement, or an operator of an associated facility. EBRD seeks to ensure that projects it finances achieve outcomes consistent with the PRs even if the outcomes are dependent upon the performance of third parties. When the third party risk is high and the client has control or influence over the actions and behaviour of the third party, EBRD will require the client to collaborate with the third party to achieve outcomes consistent with the PRs. Specific requirements and actions will be determined on a case-by-case basis.

13.14 ROLES AND RESPONSIBILITIES

The following table presents the proposed distribution of roles and responsibilities between the Investor and the Concessionaire for each of the main tasks. All parties involved in the Project, including the Client and the Concessionaire, are required to implement the requirements of this RCF.

Task	Responsible Entity
Main expropriation exercise prior to construction commencement	Investor PERI
Supplemental land acquisition required for construction or operation needs	Investor PERI
Temporary land occupation required for construction or operation needs, if required	Contractor/s
Grievance management	Investor PERI
Monitoring and reporting in respect of expropriation carried out prior to construction commencement	Investor PERI
Monitoring and reporting with respect to land acquisition and/ or temporary land occupation carried out after construction commencement, if required	Contractor/s
Information disclosure to all project affected people	Investor PERI
Assistance to legalise properties if necessary	Investor PERI
Negotiations prior to expropriation	Investor PERI
Payment	Investor PERI
Provision of compensation packages	Investor PERI
Provision of resettlement assistance	Investor PERI
Grievance management	Investor PERI

Table 13-5 Roles and Responsibilities

13.15 PUBLIC CONSULTATION AND DISCLOSURE

As part of the ESIA public consultation and disclosure process the Resettlement and Compensation Framework (RCF) will be subject to public consultation to be conducted in the first and second quarter of 2012.

13.16 CONCLUSION

Involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out.

The objective of preparation of this Resettlement Compensation Framework is to give directions for further measures and to ensure that the population displaced and affected by a project receives benefits from it. Involuntary resettlement should be treated as an integral part of project design and should be dealt with from the earliest stages of project preparation by responsible entities, in accordance with the national, EBRD and EIB legislation.

13.17 GAP ANALYSIS PREPARED BY EBRD

Issue	EBRD policy requirements	Provisions of Macedonian law	Gap / Comment	Proposed response
Involuntary resettlement	The term involuntary resettlement refers to physical displacement and economic displacement. Displacement can be full, partial, permanent or temporary.	Macedonian legislation in general, including the Expropriation Law of the Republic of Macedonia, does not recognize the term involuntary resettlement. Issues related to land acquisition in the public interest are regulated by the Expropriation Law of the Republic of Macedonia.	The law focuses on properties and assets which may be expropriated and restrictions which may be placed on property rights, in the public interest. The law indirectly covers physical and to a certain extent economic displacement (i.e. access to land based incomes), but only for affected people who have formal legal rights.	Gaps regarding physical and economic displacement, as well as displacement of those who do not have formal legal rights to the land and structures which they occupy are discussed further in the table.
Land acquisition / restriction of access	Involuntary resettlement occurs as a result of: 1. Land acquisition, which includes: • outright purchases of property • purchases of property rights (i.e. rights of way) 2. Imposition of restrictions that result in people experiencing loss of access to physical assets or natural resources.	Outright purchases of immovable property (land, residential and other structures - Article 1) are defined by the Expropriation Law as "complete" expropriation (Article 4). "Incomplete" expropriation includes the instigation of an easement over the immovable property or a lease of land for a defined period of time (Article 4). Temporary occupation of land (up to 3 years) is also possible when needed for construction or other works associated with the project for which expropriation is being sought (accommodation of workers, materials, machines, etc.) (Article 7). In addition, if it is determined that the expropriation of a part of the owner's property would result in the owner having no economic interest in using or not being able to use the remainder of the property, that remaining part of the property will also be expropriated, at his request (Article 12).	Restrictions that result in people experiencing loss of access to physical assets or natural resources are not covered by Macedonian legislation.	Solutions for overcoming restrictions that result in loss of access to physical assets or natural resources, have to be considered and defined, on a case by case basis, for a particular project.
Scope of impact (project design)	Consideration of feasible alternative project designs to avoid or at least minimize physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits.	There are no legal requirements in Macedonian legislation for avoiding or at least minimizing physical and/or economic displacement. However, the Law on Spatial and Urban Planning states that the aim of such planning is to improve living and working conditions for citizens (Article 4).	In practice, resettlement and expropriation are avoided or minimised during project design, in the context of minimising costs.	Ensure that minimisation of physical and /or economic displacement is investigated during project design and maximised to the extent practically possible. Whenever possible, integrate the consideration of resettlement issues in the EIA process.
Planning process	Implementation of a census and a socio-economic baseline assessment within a defined affected area, to identify the persons who will be displaced and determine who will be eligible for compensation and assistance. Preparation of the Resettlement Action Plan or Livelihood Restoration Framework. During the development of the RAP/LRF, affected persons (including host communities) should be informed and consulted on the development of compensation packages, eligibility requirements, resettlement assistance, suitability of proposed resettlement sites and the proposed timing. Special provisions should be made for consultations with vulnerable groups.	According to the Expropriation Law, the request for determining public interest and subsequently the proposal for expropriation, have to include a detailed list of properties to be expropriated, their location, information about individuals who have formal legal rights on these properties. The proposal for expropriation also has to be accompanied by extracts from the Cadastre or other public documents (land registries) specifying all rights on the affected properties (Articles 14, 15). Ownership or other formal legal rights on land and structures are recorded in the Real Estate Cadastre. All issues regarding property rights have to be resolved before the expropriation payment is made; in case of disputes, the affected parties turn to the court to decide who will receive compensation.	Macedonian legislation does not require the development of specific resettlement / livelihood restoration plans, nor the implementation of a census / socio-economic survey. Only those with formal legal rights are informed about the expropriation process and have the right to appeal, while all other categories of affected people are not informed or consulted. In addition, there are no requirements for making special provisions for informing / consulting vulnerable groups.	The implementation of a census / survey and development of a RAP/LRF for each project which requires land acquisition (physical or economic displacement) is necessary. This process needs to ensure all categories of affected people (not only those with formal legal rights) are informed and consulted in a meaningful way. If vulnerable groups are identified during the survey, it may be necessary to make special provisions to include them in the consultation process.
Cut off date	In the absence of national government procedures, the date of completion of the census and assets inventory represents the	According to the Expropriation Law all persons who have formal legal rights on land and structures, as registered	All persons who do not have formal legal rights on land and structures located in the	The date when the census is carried out should be agreed with the implementing agency

Issue	EBRD policy requirements	Provisions of Macedonian law	Gap / Comment	Proposed response
	cut-off date for eligibility. Individuals who move into the project affected area ***after the cut-off date will not be eligible*** for compensation and other types of assistance. Information regarding the cut-off date will be ***well-documented and disseminated*** throughout the project area.	by the Cadastre and/or Land registries, are entitled to compensation. Valuations (inventory) of properties / assets, have to take place before the request for expropriation is submitted (so that this request can include a bank guarantee for the amount needed for compensation – Article 15).	project area are not eligible for compensation or resettlement assistance according to the Expropriation law and therefore there is no cut off date for eligibility.	and specified in the RAP/LRF as the cut off date for eligibility for compensation and resettlement for all persons who do not have formal legal rights on land and structures located in the project area. Affected people must be informed about the cut off date.
Negotiated settlements	Negotiated settlements are encouraged to help avoid expropriation and eliminate the need to use governmental authority to remove people forcibly.	Negotiated settlements are explicitly encouraged by the Expropriation Law (Article 17) and the last instance in which they can be concluded is within 8 days after the final decision on expropriation has been issued. During this period, the municipal authorities are obliged to facilitate negotiations and to encourage the conclusion of a compensation agreement; if such an agreement is not reached, the case is referred to the relevant court to pass a decision on compensation (Article 38).		Negotiated settlements, even before expropriation is initiated, should be explicitly encouraged in the RAP/LRF.
Compensation at replacement cost	Compensation for lost assets will be provided at replacement cost, usually calculated as the market value of the assets plus the transaction costs related to restoring such assets (registration and transfer taxes). Depreciation of structures and assets should not be taken into account.	Compensation under the Expropriation law is determined in accordance with the prevailing market price (Article 10) after taking into account the value of land (agricultural or land in urban areas), cost of structures (residential and business) & installations, crops, forest land and timber (Article 24 to 27 and 32). Compensation is also provided for instigation of an easement, a lease and for temporary occupation of land (Article 33 to 35).	The law does not specifically mention compensation for the costs of any registration and transfer taxes. All costs associated with transfer of property rights to the beneficiary of expropriation are borne by that entity. In practice, when replacement property is provided, the beneficiary of expropriation bears these costs for registering the new property in the name of the affected person. However, when compensation is paid in cash, these costs are not included in the compensation package. Although the law only mentions taking into account depreciation of structures whose market value can not be determined (walls, fences, etc.) (Article32), depreciation is also typically taken into account during valuations of all affected properties and assets.	THE RAP/LRF must describe the valuation method in detail and specify that compensation will include the registration cost in the Cadastre Office, or other relevant register, any administrative fees, and/or transfer taxes. Depreciation of structures and assets should not be taken into account during valuations.
Compensation in kind / cash	Compensation in kind will be offered in lieu of cash compensation where feasible.	According to the Expropriation law, compensation to those who have formal legal rights is provided in kind or in cash for agricultural land or for residential and business structures, on request of the person who has formal legal rights and if a suitable property can not be identified (Articles 23, 24).		
Provision of adequate housing / shelter with security of tenure	Adequate housing is measured by quality, safety, affordability, habitability, cultural appropriateness, accessibility and locational characteristics. Should offer access to infrastructure and services. Security of tenure exists if resettled persons are protected from forced evictions, to the greatest extent possible. New resettlement sites built for displaced persons will offer improved living conditions with security of tenure.	For persons with formal legal rights, compensation for residential or business structures, provided in kind has to correspond to the value of the expropriated property (taking into account location, structure and size, quality, etc. – Articles 24 and 27). Property rights on the new property are formally transferred based on the final decision on expropriation and the final decision / agreement on compensation, providing security of tenure (Article 42).	The law does not recognise persons who do not have formal legal title and therefore does not foresee the provision of adequate housing with security of tenure for this category of affected people. The expropriation law does not include any provisions about resettlement sites. However FYR Macedonia has a developed system of rules / regulations /	During the development of the RAP, affected people should be consulted in defining standards for adequate housing. Those that do not have formal legal rights to properties have to be resettled to appropriate accommodation and have to have security of tenure, i.e. through signed contracts. Such contracts must include all members of the affected household, to ensure that they are all protected from forced

Issue	EBRD policy requirements	Provisions of Macedonian law	Gap / Comment	Proposed response
			standards for construction of residential and other structures, as well as standards pertaining to resettlement sites (access to infrastructure).	evictions.
Other resettlement assistance	Relocation costs (moving allowances). Specific resettlement assistance for vulnerable groups.	Provision of compensation for transport costs (moving allowance) is foreseen by the Expropriation law for those who have formal legal rights (Article 36). Specific resettlement assistance for vulnerable groups is not foreseen by the Expropriation law. However, according to the Law on Social Welfare, all vulnerable citizens have the right to one-off financial payments if they find themselves in a situation of sudden and temporary need (Article 34). This need is assessed based on existing circumstances and administered through local self governments and CSWs.	Relocation costs / transport is not organised or compensated by the beneficiary of expropriation for those who do not have formal legal title.	Arrange for relocation costs to be compensated in cash or organise transport for people and all of their belongings / assets, for all categories of affected people (specify in the RAP). Vulnerable groups should receive assistance in accordance with their specific needs. This should be done in cooperation with social service departments (municipal or state). At a minimum, vulnerable groups should have access to documentation, education, health and social services. Specific assistance has to be defined on a case by case basis for a particular project.
Eligibility for compensation / resettlement and entitlements in case of physical displacement	**Category 1** - those who have formal legal rights to the land **Category 2** - those who do not have formal legal rights to land at the time of the census, but who have a claim to land that is recognised or recognisable under the national laws should receive: • Compensation for land at full replacement cost • in the case of physical displacement, replacement property of equal or higher value, with equivalent or better characteristics and advantages of location or cash compensation at full replacement value and relocation assistance. **Category 3** - those who have no recognisable legal right or claim to the land they occupy should receive: • Compensation for structures that they own and occupy and for any other improvements to land at full replacement cost • in case of physical displacement, a choice of options for adequate housing with security of tenure and resettlement assistance	The Expropriation law foresees cash or in kind compensation for land, improvements to the land and structures (residential or business), for those who have formal legal rights (Category 1). The owner of illegally constructed structures (Category 3) is not entitled to compensation (explicitly stated in the law). The owner can tear down the structure and salvage the materials, if not, he/she will bear the costs of clearing the affected land (Article 45). In line with the Rules and Regulations for Accommodation of Socially Vulnerable Individuals, adopted based on the Law on Social Welfare, assistance is to be provided to persons who are beneficiaries of social welfare and without accommodation (Article 2), in the form of cash payments for rent or reconstruction of houses / apartments or placement in social housing (Article 9).	Those who have a claim to land that is recognised or recognisable under the national laws (Category 2) and those who have no recognisable legal right or claim to the land (Category 3) are not recognised by the Expropriation law. FYR Macedonia is about to adopt the Law for the Treatment of Illegally Constructed Objects, which will specify terms and conditions for legalisation of objects constructed without building permits, as part of the commitments made through the signing of the Vienna Declaration on Informal Settlements in SEE. The provisions of the Rules and Regulations for Accommodation of Socially Vulnerable Individuals, adopted based on the Law on Social Welfare, should be used as a basis for ensuring that those who are adversely affected by resettlement (usually belonging to Category 3) receive appropriate accommodation. The Ministry of Transport and Communication is implementing a nation wide programme of building and allocating social apartments, beneficiaries are: children without parental care, single parents and families with many children, single headed households, persons with disability, Roma and members of other vulnerable groups.	Provide assistance to persons in Category 2 to acquire a formal legal status before expropriation (over land and structures), in which case they move into Category 1 and are entitled to compensation as per the Expropriation law. At present the only applicable law is: • Law on Property Rights (acquiring property rights over land and/or structures erected on someone else's land) Once the Law for the Treatment of Illegally Constructed Objects is adopted, it should be used as a basis for the legalisation of structures erected by the owner of the land. In case of physical displacement, at a minimum, provide some form of social (low rent) housing for Category 3. Calculate the construction value of their structures and reduce their rent to correspond to the value of the structure they owned or pay cash compensation. This category is typically the most vulnerable, therefore resettlement assistance must be provided (see below).
Vulnerable	The RAP should specifically take into account	Rules and Regulations for	There are no special	During the census, it is

Issue	EBRD policy requirements	Provisions of Macedonian law	Gap / Comment	Proposed response
groups	any individuals or groups that may be disadvantaged or vulnerable – consultations and relocation assistance. Vulnerable or 'at-risk' groups include people who, by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage or social status may be more adversely affected by displacement than others and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits. Special measures in terms of consultation and development assistance may be needed to allow such groups to participate in resettlement planning meaningfully and to benefit from development opportunities.	Accommodation of Socially Vulnerable Individuals, adopted based on the Law on Social Welfare, specify that beneficiaries of social welfare, without accommodation are entitled to social housing assistance.	requirements in Macedonian legislation for organising consultations and relocation assistance for vulnerable groups. However, persons who are homeless are entitled to social welfare assistance, which includes placement in shelters and access to other services available under national and local social welfare laws.	necessary to identify vulnerable groups and assess their needs related to resettlement and relocation assistance, including access to specific services. Consultations can be held in the form of focus groups to consult with and address the needs of specific groups. Social welfare and other appropriate services should be involved in resettlement planning and implementation to ensure that vulnerable groups have access to all services available to them under Macedonian laws (Law on Social Welfare, Law on Education, Law on Health Care).
Joint property	Ensure that the documentation for ownership or occupancy and compensation is issued in the names of both spouses or women single head of households, as relevant to each situation, and that other resettlement assistance, such as skills training, access to credit and job opportunities are equally available to women and adapted to their needs.	Men and women have equal rights in the FYR Macedonia (Article 9 of the Constitution of the Republic of Macedonia), including the possibility to have formal legal rights on properties. According to the Family Law, if formal legal rights over properties / assets have been acquired during the marriage, the law assumes they are shared equally between the spouses, unless a different agreement is formally registered with the court (Article 203-206).		Specify in the RAP/LRF that compensation must be shared between spouses according to title documentation or the Family Law in the silence of title documentation. Ensure that all programmes, including those related to livelihoods restoration are equally accessible to both men and women (specify in the RAP/LRF).
Legal assistance	Displaced people should be provided, where possible, with legal assistance to enable them to complete administrative requirements prior to land acquisition and, if needed, to seek redress from the courts.	There is no requirement for providing free legal assistance to persons affected by expropriation or resettlement, under the Expropriation law. However, each court or administrative decision must contain instructions on available legal remedies. The Government of the FYR Macedonia adopted a Law on the provision of free legal aid to citizens, through municipal offices and certified associations. Services include provision of legal advice but also court representation.		Affected people should be informed about and provided with access to free legal aid, either through municipal departments or through associations / NGOs (specified in the RAP/LRF).
Timing of compensation	Compensation (alternative housing and/or cash compensation) has to be provided prior to relocation.	According to the Expropriation law, a condition to start expropriation is a bank guarantee with a commercial bank (or, in the case of government authorities, proof of funds allocated in the budget), in the assessed total sum for payment. Compensation has to be paid / provided within 15 days from the day when a compensation agreement has been signed or the decision on compensation has become final (Article 40).		
Loss of public amenities	Where a project involves the loss of public amenities, the client shall undertake meaningful consultation with the locally affected community to identify and agree upon a suitable alternative where possible.		There is no specific requirement in Macedonian legislation for consulting affected communities regarding loss of public amenities.	The institutions tasked with setting up and maintaining specific public amenities which are affected by land acquisition, should consult local communities on how to replace them (specify in the RAP).
Eligibility for compensation / livelihood restoration and entitlements in case of economic displacement	If land acquisition causes loss of income or livelihood **Category 1**[25] and **Category 2**, should receive: • compensation for loss of assets or access to assets, at full replacement cost • replacement property of equal or greater value, or cash compensation at full	The Expropriation law foresees cash or in kind compensation for land (including agricultural land, orchards and vineyards, crops, forest land and timber) and business structures / physical assets, for those who have formal legal rights (Category 1).	Those who belong to Category 2 and Category 3 are not entitled to any compensation or livelihood restoration assistance, including lost net income and moving allowance (transfer of equipment) by	Provide assistance to persons in Category 2 to acquire a formal legal status before expropriation (over land and structures), in which case they move into Category 1 and are entitled to compensation as per the Expropriation law. At present the

[25] For definitions of Category 1, 2 and 3, see "Eligibility for compensation / resettlement and entitlements in case of physical displacement", earlier in the table.

Issue	EBRD policy requirements	Provisions of Macedonian law	Gap / Comment	Proposed response
	replacement cost **Category 3**, should receive: • Loss of assets, other than land, at full replacement cost All three categories should receive: • compensation for the cost of re-establishing commercial activities elsewhere • compensation for lost net income during the period of transition • compensation for the costs of the transfer and reinstallation of the plant, machinery or other equipment • transitional support based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living • additional targeted assistance (credit facilities, training, or job opportunities) and opportunities to affected persons whose livelihoods or income levels are adversely affected (owners of businesses and employees are eligible)	The owner of illegally constructed structures (Category 3) is not entitled to compensation (explicitly stated in the law). The owner can tear down the structure and salvage the materials, if not, he/she will bear the costs of clearing the affected land (Article 45). According to Article 31 of the Expropriation Law, those who have formal legal rights (Category 1) are also entitled to compensation for any damages (i.e. lost income) incurred until they were able to re-establish their economic activity. The rate of compensation is to be determined separately in each case. Provision of compensation for transport costs (moving allowance) is foreseen by the Expropriation law for those who have formal legal rights (Article 36). The FYR Macedonia is about to adopt the Law for the Treatment of Illegally Constructed Objects, which will specify terms and conditions for legalisation of objects constructed without building permits	the Expropriation law. In addition, all three categories are not entitled to costs of re-establishing commercial activities, transitional support, or other targeted assistance. Assistance to off-set any loss of a community's commonly held resource is also not specifically regulated by Macedonian legislation.	only applicable law is: • Law on Property Rights (acquiring property rights over land and/or structures erected on someone else's land) Once the Law for the Treatment of Illegally Constructed Objects is adopted, it should be used as a basis for the legalisation of structures erected by the owner of the land. In case of economic displacement, provide those belonging to Categories 2 and 3 with access to adequate commercial space, with security of tenure, to restore their economic activities and livelihoods. Ensure that all categories are promptly compensated in cash or in kind (before they loose access to their properties / assets), so that lost net income and the need for transitional support are minimized / avoided. Arrange for relocation costs to be compensated in cash or organise transport of equipment and other assets for all categories of affected people. Facilitate access to existing services which could assist the affected persons whose livelihoods or income levels are adversely affected to restore their living standards. This could be done in cooperation with the Macedonian Employment Service Agency.
Grievance procedure	The grievance mechanism will be set up as early as possible in the process, to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons and/or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner. The grievance mechanism, process, or procedure should address concerns promptly and effectively, using an understandable and transparent process that is culturally appropriate and readily accessible to all segments of the affected communities, at no cost and without retribution.	There is no specific requirement for establishing an independent grievance mechanism, according to the Expropriation Law or other Macedonian legislation. The law does foresee rights of affected citizens (those with formal legal rights) to appeal at many stages of the expropriation procedure to relevant administrative authorities and courts.	In practice, affected people communicate with the expropriation beneficiary (a designated person / department), in connection to their specific grievances and with the aim of reaching a compensation agreement, before filing appeals with the relevant administrative authorities or courts.	Define a project specific grievance mechanism in the RAP/LRF. Depending on the scale of the project or the general vulnerability status of affected families, involve any available institutions in the process, e.g. the ombudsman, human rights groups, etc.
Information disclosure and public consultation	The client should summarize the information contained in the RAP and/or the LRF for public disclosure to ensure that affected people understand the compensation procedures and know what to expect at the various stages of the project (for example, when an offer will be made to them, how long they will have to respond, grievance procedures, legal procedures to be followed if negotiations fail). Consultations will continue during the implementation, monitoring and evaluation of compensation payment and resettlement.	Those who have formal legal rights are informed throughout the expropriation process (i.e. that a request for expropriation has been submitted (Article 16); before the decision on expropriation is passed, the municipal office in charge of expropriation has to invite the affected person with formal legal rights to a meeting to present any facts which may be relevant for expropriation (Article 17)).	The Expropriation law does not require public consultations to be held with any categories of project affected people, prior to expropriation. Once the expropriation process is initiated, only those with formal legal rights are informed and consulted through a one on one negotiation process.	Plans for consultations with all project affected people, including host communities, should be agreed with them and incorporated in the RAP/LRF.
Monitoring	Monitoring of the RAP / LRF will be carried out in accordance with PR 1.		There are no requirements for monitoring the expropriation / resettlement / livelihoods restoration process, under Macedonian legislation.	Define indicators and monitoring mechanisms in the RAP / LRF.

13.18 GRIEVANCE FORM

Resettlement Action Plan Public Grievance Form

Reference No:	
Full Name	
Contact Information **Please mark how you wish to be contacted** **(mail, telephone, e-mail)**	**Address:**______________________________________ **Telephone:**_________________________________ **Email:**_____________________________________
Description of Incident or Grievance:	
What happened? Where did it happen?	
Who did it happen to?	
What is the result of the problem?	
Date of Incident/ Grievance	
One time incident/ grievance(date----------------) Happened more than once (How many times--------) Ongoing (Currently experiencing problem…………)	
What would you like see happen to solve the problem?	
Signature: **Date:**	
Please return this form to: to define this later	

Chapter 14 Comments on Draft ESIA Study & List of Introduced Changes !

Will include the comments received on the draft ESIA during the public disclosure/comment period, and a list of the changes introduced in the final version of the ESIA Study.

Chapter 15
References !

Presents a list of the references used during the preparation of the ESIA Study.

15 REFERENCES

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