Financed under specific grant agreement no. 2017/388-041 from the EU IPA II Multi-Beneficiary Programme for Albania, Bosnia and Herzegovina, Republic of North Macedonia, Kosovo*, Montenegro and Serbia

* This designation is without prejudice to positions on status and is in line with UNSCR 1244/199 and the ICJ opinion on the Kosovo* declaration of independence.

Western Balkans Investment Facility Infrastructure Project Facility Technical Assistance 7 (IPF 7) TA2017050 R0 IPA

WB18-MKD-TRA 01

Detailed Design and Environmental and Social Impact Assessment For Motorway A4, Skopje - Blace Section 2: Construction of motorway from Interchange with local road for village Blace (Interchange "Blace") to Skopje (Interchange "Stenkovec"), km 2+000 to ~km 12+250

NON–TECHNICAL SUMMARY

February, 2022

HILL INTERNATIONAL
IPF 7 CONSORTIUM

The Western Balkans Investment Framework (WBIF) is a financing facility launched in December 2009 by the European Commission, together with the Council of Europe Development Bank (CEB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), Bilateral Donors, and Western Balkans countries with the purpose to deliver funding for strategic investment projects in beneficiary countries. Eligible sectors include infrastructure development in the environment, energy, transport, social and digital sectors as well as private sector development. KfW and the World Bank subsequently joined the Framework. In July 2017, the KfW became a partner organisation.

REPORT ISSUE RECORD

NAME OF SUBPROJECT	Detailed Design and Environmental and Social Impact Assessment for Motorway A4, Skopje-Blace
SUBPROJECT REF	WB18 MKD TRA 01
BENEFICIARY	Ministry of Transport and Communications of Republic of North Macedonia - Public Enterprise for State Roads
SECTOR	Transport
COUNTRY	Republic of North Macedonia
LEAD IFI	EBRD
OFFICER RESPONSIBLE	Biljana Milosheska
SECTOR KEY EXPERT	Ioannis Koutras Menka Spirovska
DATE	February, 2022
VERSION	1
REPORT TITLE	Non-technical summary

Revision	1
Date	07.02.2022
Detail	Non-technical summary
Prepared By	Menka Spirovska
Checked By	Achilleas Parathiras
Approved By	Ioannis Koutras

Table of Contents

List of tables

List of figure

List of abbreviations

AQMP	Air Quality Management Plan
BAU	Business As Usual
BMP	Biodiversity Management Plan
CESMP	Construction Environmental and Social Management Plan
CHP	Chance Find Procedure
CHSMP	Community Health and Safety Management Plan
CWMP	Construction Waste Management Plan
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMP	Effluent Monitoring Plan
EQS	Environmental Quality Standards
EPRP	Emergency Preparedness and Response Plan
ERP	Emergency Resilience Plan
ESIA	Environmental and Social Impact Assessment
ESAP	Environmental and Social Action Plan
EU	European Union
GIIP	Good International Industry Practice
GHG	Greenhouse Gasses
HMLCMP	Hazardous Materials and Leak Control Management Plan
IFIs	International Financial Institutions
IUCN	International Union for Conservation of Nature
LARP	Land Acquisition and Resettlement Plan
LEPP	Local Employment and Procurement Plan
MCA	Multi Criteria Analysis
MF	Ministry of Finance
MoEPP	Ministry of Environment and Physical Planning
MP	Measuring Point
OESMP	Operational Environmental and Social Management Plan
OG	Official Gazette
OSHP	Occupational Safety and Health Plan
OSMP	Operational Soil Monitoring Plan
PERES	Plan for Evacuation and Rescue in Emergency Situations
PBF	Priority Biodiversity Features
PD	Preliminary Design
PESR	Public Enterprise for State Roads

PR	Performance Requirements
RLP	Rehabilitation and Landscaping Plan
RCMP	River Crossing Management Plan
RNM	Republic of North Macedonia
SEETO	South East Europe Transport Observatory
SEMP	Soil and Erosion Management Plan
SEP	Stakeholder Engagement Plan
SRMP	Site Rehabilitation Management Plan
TEN-T	Trans-European Transport Network
TSMP	Topsoil Management Plan
TMP	Traffic Management Plan
TOR	Terms of Reference
UN	United Nation
UP	Underpass
VRMP	Vegetation Removal Management Plan
WFD	Water Framework Directive
WMP	Waste Management Plan
GBVH	Gender-Based Violence and Harassment

1 INTRODUCTION

1.1 Overview

The Ministry of Transport and Communications and the Public Enterprise for State Roads (PESR) in the Republic of North Macedonia (RNM) are undertaking activities for preparation, completion and adjustment of the design documentation for construction of Motorway A4, section Border Crossing Blace - Skopje with a total length of about 12,427 km. The starting point of the project is at the Blace Border crossing with Kosovo, while the end point is the existing Stenkovec interchange, which is part of the Skopje A2/A4 Motorway.

This motorway section is divided in two sub-sections:

- **Sub-section 1 - Border Crossing Blace to the Village Blace** (km 0+085-km 2+213) for which PESR prepared the project documentation in 2018. This sub-section is currently under construction and is financed by the PESR Budget.
- **Sub-section 2 - Interchange with local road for village Blace (Interchange "Blace") to Skopje (Interchange "Stenkovec")** (km 2+000 to ~km 12+250 (hereinafter referred to as "the Project"). For this section a grant has been approved for preparation of Preliminary Design (PD), Environmental and Social Impact Assessment Study (ESIA) and tender documents (TD) for construction of the Project.

This Non-technical Summary provides a summary of the Project for sub-section 2 only (km 2+000 to ~km 12+250) and expected environmental and social (E&S) impacts and mitigation measures needed to structure the Project to meet the EBRD requirements. The purpose of this document is to provide summarised information to everyone that may be interested in the Project in a non-technical language. For more details, the reader should refer to the ESIA and its Annexes.

1.2 Project description

Project location: The Project is located in the Municipality of Cucer Sandevo, which belongs to the Skopje region in the RNM. The following figures show the geographical location of the Municipality of Cucer Sandevo and location of the Project.

Figure 1 Location of the Municipality of Cucer Sandevo and location of the project area

Figure 2 Geographical location of the project area

Currently, traffic between Skopje to Blace is performed via the existing national main road A4. As mentioned before, Subsection 1 is under construction. The corridor of the motorway that belongs to Subsection 2 in the North part passes along agricultural and forest areas on the left side of the existing national main road. In the South part, the route of the corridor passes and intersects the existing national road and interchange Stenkovec, where traffic activities are performed. Near the route of the motorway passes the existing national main road A4 Skopje-Blace Border with connections to local roads that provide access to the site. In addition, access to the site is provided from the motorway A2 (M-4)-ring road Skopje.

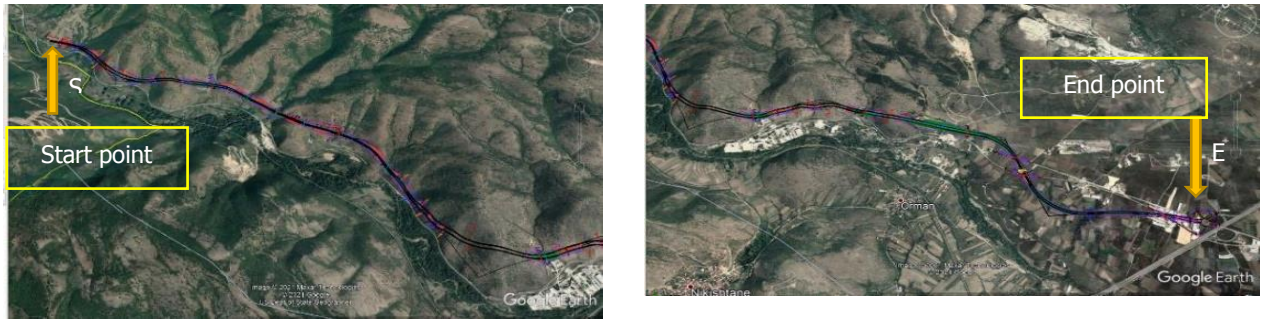

Figure 3 Alignment of the motorway for Section 2: Blace – Stenkovec

The applied typical cross section is 24.50 m wide (shoulders excluded), which breaks down in: traffic lanes (2 per direction), 3.50 m each, of total width 14 m; 2 emergency lanes (1 per direction) 2.50 m each, of total width 5 m; 2 marginal strips towards central reserve (1 per direction) 0.50 m each, of total width 1 m; 2 marginal strips towards emergency lanes (1 per direction) 0.25 m each, of total width 0.50 m, central reserve 4.00 m wide, shoulder formation is 1.50 m wide. The design speed is 100 km/h.

Structures on the motorway: The Project includes 11 tunnels, 9 bridges, 10 underpasses, 10 retaining walls, Culverts for drainage infrastructure will be placed at 16 locations. The toll station will be constructed at km 10+400.

The planned disposal area for excavated earth material is located around km 3+900 on the left side of the future motorway. The location will be designed to accept an estimated amount of 500 000 m^3 excavated earth material.

The PD estimates that 150 000 m^3 of concrete and 40 000 m^3 of asphalt will be used in the construction. The quantities of the other required raw materials are not defined.

Associated facilities: Sub-section 1 is considered as an associated facility. This subsection will be finished when the construction activities start at Sub-section 2.

1.3 Project area of influence

In order to give an appropriate assessment of potential E&S impacts in the construction and operational phase, the ESIA team has defined the project footprint, project area of influence and ecologically appropriate area of analysis (EAAA) on the basis of assumed project activities, conditions on the site, guidelines, policies etc.

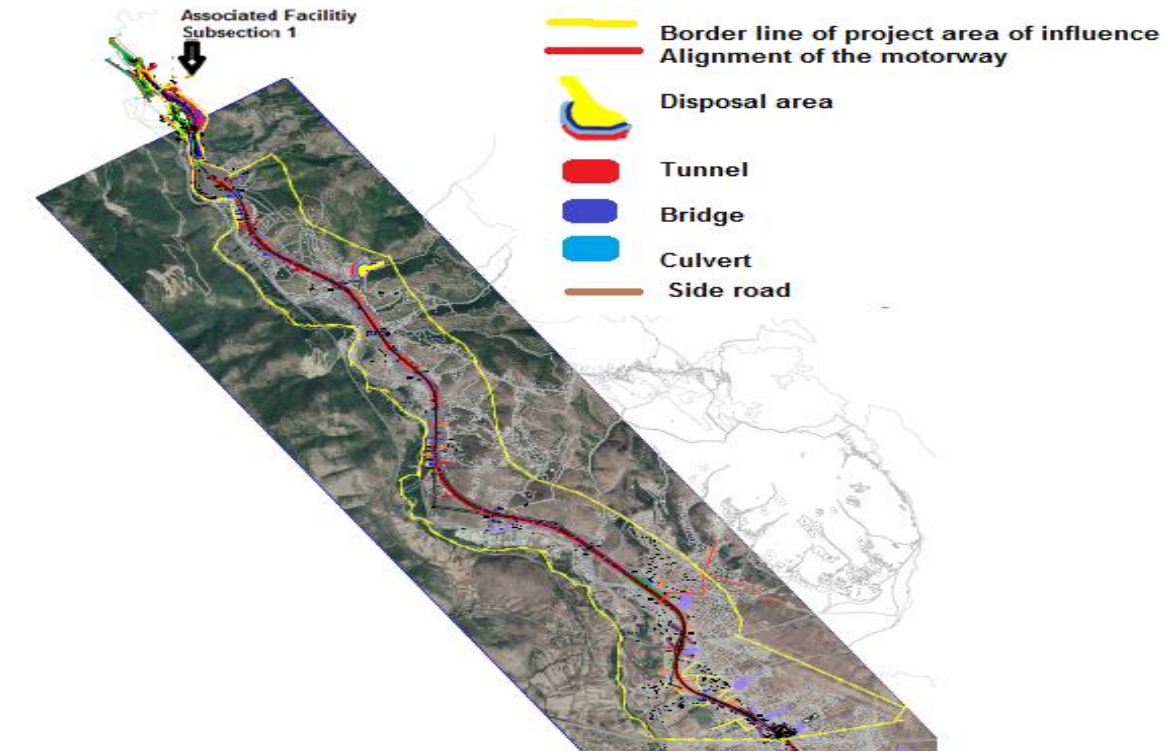

Figure 4 Project area of influence

Project footprint is the area of land directly affected by the Project. The estimated total project footprint is 28,875 ha.

Project area of influence is the area where significant E&S impacts caused by implementation of the Project are expected on physical, biological and socioeconomic components. The area has been set to include a buffer zone of 500 m at each side of the road route for most of the impacts. The following facilities are found in the Project area of influence: motorway A4 (Subsection 1 in total length of 2 km), existing national road Skopje-Blace Border, ring road of City of Skopje A2, River Lepenec and several intermittent streams, urban planning projects of Municipality of Chucher Sandevo (which are planned to start with implementation after obtaining construction permit for the motorway A4), the sport airport Stenkovec, existing industrial and commercial facilities, weekend houses and/dwellings, sheepfold, cattle farm and auxiliary objects. The total surface area affected by the project is ~1280 ha.

The research of biodiversity was carried out in the Project's area of influence. This area was used for mapping of habitats and calculations of the coverage of habitats and land use types. **Ecologically appropriate area of analysis** (EAAA) was determined separately for critical habitats (CH) and priority biodiversity features (PBF). The aggregated EAAA of the Project extends beyond the project's physical footprint and it is wider than the project's area of influence. It encompasses biologically important features such as bird nesting sites and takes biology of found species into consideration.

2 PROJECT BACKGROUND

2.1 Rationale of the Project

The Republic of North Macedonia, as part of its commitment to EU membership, aims to develop a sustainable transport sector by constantly developing and improving the network of state roads. This includes the construction of international road sections belonging to the Trans-European Transport Network.

Construction of the motorway Blace – Skopje (interchange Stenkovec) in length of 12 427 m is included in the Implementation Plan of the National Transport Strategy. The Spatial Plan of the RNM

(2004-2020) foresees construction of the motorway M-3 (SCG[1] - Blace-Skopje Petrovec-M-1). With implementation of this project, an integrated and multimodal infrastructure will be developed, which will meet current and future needs of the country and international road networking.

2.2 Legal aspects and compliance with relevant environmental and social laws

The ESIA is prepared in accordance with national legal requirements and the EBRD's E&S Policy (2019). The ESIA Study will be submitted to the PESR at which moment will start the national EIA procedure and work toward obtaining necessary permits.

The procedure for EIA is defined in the Law on Environment[2] which is aligned with the requirements of the EU EIA Directive (2011/92/EU as amended in 2014). In accordance with the *Regulation on determining the projects and criteria by which the need for conducting an Environmental Impact Assessment is determined*[3], the Project belongs to Annex I, point 7, under point (b) motorways and EIA procedure is mandatory.

In accordance with the established procedure, PESR in the role of developer of the Project, submitted a Notification Letter[4] with a scoping request to the Ministry of Environment and Physical Planning (MoEPP). In October 2021, the MoEPP issued a *Decision about the need of conducting EIA procedure* with the determined scope of the EIA Study, stating that an EIA procedure should be implemented.

In accordance with the EBRD E&S Policy (2019), the Project is classified as a Category A Project for which the environmental and social impact assessment is mandatory. In accordance with the requirements, a separate Environmental and Social Scoping Report has been prepared and submitted for EBRD's approval.

In order to meet all the relevant national requirements, the PESR and the Contractor should obtain the following consents/permits:

- Water management consent issued by MoEPP. This consent is also required for preparation of the project design documentation;
- Consent for implementation of the Project issued by MoEPP on the basis of submitted EIA Study (in accordance with the Law on Environment);
- Construction Permit issued by Ministry of Transport and Communication on the basis of submitted technical documentation and previously provided consent/permits.
- Prior starting of the construction phase, the Contractor is obliged to provide the following permits/consents/approvals:
    - Water right issued by MoEPP;
    - Discharge permit (waste water) issued by MoEPP;
    - Consent/approvals for storage/disposal of construction/demolition waste issued by Municipality of Cucer Sandevo or MoEPP, etc.

2.3 History of Project development

The activities for preparation of technical documentation for construction of the two-lane motorway started in 2000. Until now, many documents have been prepared by PESR, which were used as a basis for preparation of the project documentation as well as the ESIA Study. The main documents related to the project are presented in the following table:

Table 1 Existing documents related to the project

[1] Serbian-Montenegro Border
[2] "Official Gazette of the Republic of Macedonia" no. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15, 39/16, 99/18
[3] "Official Gazette of the Republic of Macedonia" no. 74/05, 109/09, 164/12 and 202/16
[4] Ref. no. 09-7112/2 from 13.07.2021

Time period	Prepared documentation	Description
2000	Preliminary Design for middle section, km 1+173 - 10+675, prepared by Granitproekt	The project includes construction of a motorway with two lanes of 3.5 m on each road, with stop lanes of 2.5 m and a sidewalk of 1 m on each side; projected speed-100 km/h; construction of tunnels, viaducts and underpasses. The detailed design was prepared, except for the section from km 0+000 to 1+173 (connection with the Bypass, Skopje) and the section from km 10+675 - 12+427 (connection with the border crossing Blace). These sections were designed in 2016, at the level of a preliminary design.
2002	Detailed Design for middle section, km 1+173 - 10+675, prepared by Granitproekt	
2002	Geotechnical investigations at Preliminary Design, prepared by Granitproekt	/
2002	Borrow pits and landfills, Book 12 Section: interchange "Stenkovec" - Border crossing "Blace" phase: Main design prepared by Granitproekt	/
2002	Ecology, Book 13 Section: "Stenkovec" - Border crossing "Blace" phase: Main design prepared by Granitproekt	/
2003	Environmental Impact Assessment prepared by Granitproekt	/
2015	Preliminary Assessment of Project Financing for the full section, from km 0+000 - 12+427, prepared by Mott MacDonald	/
2016	Traffic Study Report for the full section, from km 0+000 - 12+427, prepared by Mott MacDonald	/
2016	Feasibility Study for full section, from km 0 +000 - 12+427, prepared by Mott MacDonald	/
2016	Preliminary Design for two subsections of 3, 3 km: subsection Interchange Stenkovec and subsection Blace border crossing point, prepared by Mott MacDonald	/
2019	Detailed Design for Subsection 1 "Upgrading of the existing road A4 from BC "Blace" to Blace village to a highway level and construction of part of the highway with interchange to local road to village Blace", with length of 2 km, prepared by Hill International IPF 7 Consortium.	/
2019	Elaborate for environmental protection for the construction of Subsection 1: Upgrading of the existing road A4 from BC "Blace" to Blace village to a highway level and construction of part of the highway with interchange to local road to village Blace", prepared by Hill International IPF 7 Consortium.	In order to meet the National legal requirements for environmental protection, PESR submitted to the MoEPP a Notification Letter for implementation the project: In accordance with the submitted Notification Letter, the MoEPP issued a Decision in 2018, which instructed the PESR to prepare an Elaborate for environmental protection for construction of Subsection 1. PESR prepared an Elaborate for environmental protection, which was approved by the MoEPP in 2019 (presented in Annex 1).
2019	Technical assistance preparation of climate resilience design guidelines for PESR	/

2020	Infrastructure design for construction of A4 motorway, section BCP "Blace" - Skopje (interchange "Stenkovec"), Subsection 1 - Expansion of the existing road A4 from BCP "Blace" to village Blace to the level of the motorway and construction of part of motorway with junction for connection with a local road to the village Blace - Municipality of Cucer Sandevo (km 0+ 085 - 2+213, prepared by International IPF 7 Consortium.	/
2020-2021	Conceptual Design Report for Interchange Stenkovec-Blace Border Crossing Point, prepared by International IPF 7 Consortium.	Conceptual design report was prepared for Section: Interchange Stenkovec-Blace Border Crossing Point (12.5 km), Second Subsection from km 2+000 until approximately km 12+075 at Stenkovec interchange, including Stenkovec Interchange. In the Conceptual design are presented alternatives for Subsection 2 in order to select the best solution for technical, financial, E&S aspects etc. The first version of the Conceptual design was prepared during 2020, while in 2021 it was amended with additional alternatives.
2020-2021	Preliminary Assessment of E&S Impacts of the Proposed Alternatives (MCA), prepared by International IPF 7 Consortium	The Preliminary assessment of the E&S impacts of the proposed alternatives is a part of the Conceptual design report, which refers to the Section: Interchange Stenkovec-Blace Border Crossing Point (12.5 km), Second Subsection from km 2+000 until approximately km 12+075 at Stenkovec interchange, including Stenkovec Interchange. Also, during this assessment Subsection 1 was taken into consideration. The first version of this document was finalised in July 2020, and in February 2021 it was amended with additional alternatives and approved by the stakeholders.
2021	Draft Preliminary Design for the alignment for Section 2: Construction of motorway from Interchange with local road for village Blace (interchange "Blace") to Skopje (Interchange "Stenkovec"), km 2+000 to ~ km 12+250, prepared by International IPF 7 Consortium	This document is in still in the draft phase.
2021	Hydrological and hydro-technical Report, prepared by International IPF 7 Consortium	This document was prepared by the designing team for the project.
2021	Geotechnical investigation program, prepared by International IPF 7 Consortium.	This document was prepared by the designing team for the project.
2022	Draft Factual report for performed geotechnical investigations for Section 2, from km2+000 to km12+075,16 (Phase A), prepared by International IPF 7 Consortium.	This document was prepared by the designing team in January 2022.
2022	Geophysical Surveys for Site Characterization–Main Project on Motorway A4 Skopje-Blace, Results from Field Measurements and Cabinet Processing of Data, prepared by International IPF 7 Consortium.	This document was prepared by the designing team in January 2022.

2.4 Alternatives studied by the project developer

In the Conceptual Design for Subsection 2, the entire route of the motorway was divided into two sections, namely north and south sections, and for each section the following alternatives were considered:

Table 2 Analysed alternatives

Section North: Blace - Stenkovec (km 2+000 to km 10+000)	Section South: Blace - Stenkovec (km 10+000 to km 12+500)
Alternative BAU (Business as Usual) – Blace-Stenkovec North	Alternative BAU (Business as Usual) - Blace - Stenkovec South
Alternative Blace-Stenkovec North 1 (ALT1 North)	Alternative Blace-Stenkovec South 1 (ALT1 South)
Alternative Blace-Stenkovec DD 2002 (ALT DD2002)	Alternative Blace-Stenkovec South 2 (ALT2 South)
Alternative Blace-Stenkovec North 1 (ALT1 North)	Alternative Blace-Stenkovec South 1C (ALT1C South)
Alternative Blace-Stenkovec North 2 (ALT2 North)	
Alternative Blace-Stenkovec North 1C (ALT1C North)	

All proposed alternatives were analysed in the Preliminary Assessment of E&S Impacts of the Proposed Alternatives and on the basis of available technical documentation, i.e. Conceptual Design, site visits and investigation of current conditions in the project area/road corridor and its surrounding, desk study analyses, stakeholder consultations, through implementation of multi-criteria assessment the possible impacts are analysed for each proposed alternatives.

On the basis of the preliminary E&S assessment of the proposed alternatives, the preferable alternatives are:

- **Section North: Blace-Stenkovec**: For this part beside the Alternative BAU, the **Alternative 1 C North** has a lower score value, i.e. **this is the most preferable**.
- **Section South: Blace-Stenkovec:** For this part beside the Alternative BAU, the **Alternative 1 C South** has a lower score value, i.e. **this is the most preferable**.

2.5 Stakeholder engagement

This project has been in development since 2002 when the Detail Design was prepared and all related stakeholder engagement activities were completed for that design. From 2018 to 2021, a series of additional engagement activities with institutional stakeholders were undertaken by PESR to obtain relevant data for the selection of project options and the opinions of relevant institutions. The following institutional stakeholders were consulted: Ministry of Transport and Communication, Ministry of Finance, Ministry of Economy, Ministry of Environment and Spatial Planning, Ministry of Agriculture, Forestry and Water Economy, Ministry of Culture, Ministry of Interior, Ministry of Defence, Customs Administration, Municipality of Chucher - Sandevo, Secretariat for European Affairs and GNMR.

A Stakeholder Engagement Plan in line with EBRD requirements has been developed to identify relevant stakeholders and define a stakeholder engagement program to be implemented for the Project.

2.6 Land requirements

This project requires acquisition of some privately owned assets prior to the construction phase, which will lead to loss of material assets and loss of livelihoods/income. Land acquisition activities have not been initiated yet, as no design documentation or Final Expropriation Study have been developed to date, and therefore the exact scope of the land acquisition is not known.

A Land Acquisition and Resettlement Framework for the project has been developed in line with PR 5 and national legislation to guide the land acquisition process. A Land Acquisition and Resettlement Plan (LARP) based on the Framework will be developed and implemented by PESR prior to construction activities.

3 DESCRIPTION OF THE ENVIRONMENTAL AND SOCIAL BASELINE

3.1 Physical Environment Baseline

Land use: 59% or 748 ha of the land occupied by the motorway footprint is the agricultural land, mainly non-irrigated arable land (almost 420 ha). 32% or 406 ha is occupied by forests and seminatural areas, while 9% or 123 ha are artificial areas predominantly occupied by industry and commercial units. Agricultural area in the vicinity of settlements is divided in small parcels of fields with hedges, meadows and gardens. Excluding the periphery of Volkovo and the industrial/commercial part of Vizbegovo Pole, which can be characterized as a semi urban area, the motorway does not intersect with rural areas.

Tectonics: The alignment passes mostly through the Lepenec valley which tectonically belongs to the Vardar Zone. The Vardar Zone is near to the collision with West-Macedonian Zone from the west and Pelagonian Zone from the south. Because of the high tectonic pressure from these two zones, the entire terrain is cracked by the number of faults in NW-SE and NE-SW directions which makes it seismically unstable.

Lithology: Several lithogenic units of different geological ages and properties are foreseen along the alignment. Based on the available geological data, and according to the geological map the following soil and rock formations are foreseen to be encountered: Deluvial (d), Proluvial (pr), River terrace sediments (pct), Sandstones, claystones and marls (M3), Flysch series (K2), Serpentinites (Se), Gneiss (Gmb) and Amphibolites (A). The northern part of the alignment passes through solid and resistant rocks (total length of 6.6 km) while the southern part of the alignment passes through the terrain with erodible sands, gravels and colluvial material (total length of 3.3 km).

Hydrogeology: Regarding hydro-geological aspect, practically impermeable formations are characterized by fracture porosity, with very poor water permeability or practically water impermeable. However, due to the great number of fissures and fractures, locally they could be poor collectors. Permeable formations appear mainly at the last section of the alignment, from km 9+100 up to the end of the axis and locally at the intersections of the alignment with the watercourses.

Geomorphology: In terms of geomorphology, the project area extends mostly in the foothill of the Skopska Crna Gora Mountain and in a shorter part in the Skopje Valley bottom on south. In the mountainous area, the project area extends through the Lepenec gorge north of the village Orman.

Geodiversity: Within the project area, there is no noticeable geodiversity. The project area mainly covers the central and southern part of the Lepenec (Kačanik) gorge and slightly enters into Skopje Basin. In terms of geodiversity, most significant is the gorge section from the state border (village Blace) to Stenkovec hill which is 300-500 m deep.

Geoheritage: In the project area the two locations are distinguished: the 8 km long Banjanska (Vrazanska) Reka Gorge located upstream from the village of Banjane, which is about 4-5 km away to the east, and the deepest parts of the Lepenec Gorge. However, both gorges do not have significant values that would have an important effect on geo-environment.

Geo-hazards and other natural hazards and risks: Earthquakes, landslides, rock falls, and floods are being considered from the geohazards within the buffer zone of the project area. The project location is in a seismically active area between the Skopje and Kosovo seismic (epicentre) zones.

- **Earthquakes**: the project area is generally earthquake-prone, especially towards the southern foothills. According to the available seismic maps, the maximum expected magnitude here is 6M with recurrence of about 500 years and maximum expected magnitudes of 5M with recurrence of about 100 years.
- **Landslides and rock falls**: In terms of landslides and rock falls, part of the project area has a high potential, especially on steep hillslopes, incisions, cuts etc. According to the landslide susceptibility map, the highest risk of potential landslides is along the steep terrain composed of serpentinite and Miocene sediments near the village of Blace up to the Stenkovec hill.

- **Floods**: The combination of intense autumn rainstorms, the confluence of the rivers and intermittent streams in the project area and their drainage area which are offering little resistance to floodwaters from floods, have caused large and sudden floods in the Skopje area in the past. General observations are that in conditions of intense rainfall and melting snow, the water of river Lepenec overflows the riverbed at the location of Kachanica gorge up to the confluence to the Vardar River. The Lepenec River is erosively active and transports large amounts of sediment. In terms of the flood risk, the risk is the highest along the lower section of the Lepenec valley.
- **Soil erosion**: Due to the steep slopes in the Lepenec gorge, this part of the project area has significant soil erosion potential.[5] However, the lithology under the soils (bedrock) is not suitable for strong or severe erosion processes. There is a slightly higher intensity of erosion rate in the northern part of the project area near the village Blace, while the southern part of the project area in the Skopje Plain, which is very flat, is characterized by very low erosion and dominance of deposition.
- **Forest fire**: Forest fires in the period from 1999 to 2019, destroy an average of about 9,076.51 ha of forest per year. In the project area, the two major forest fires were recorded by the PE National Forests from Skopje in the period between 2015 and 2020; the first one on Stenkovec locality, cadastral municipality (CM) Gluvo-Brazda, where 5.61 ha of Austrian pine young forest was destroyed and the second one in the forest sections 25a, 26a, 27a and 28a of the forest management unit "Skopska Crna Gora" on Blace locality in CM Blace, where 220,00 ha of oak forest area was destroyed.
- **Drought**: Arid areas exist because the annual water loss (evaporation) exceeds the annual rainfall. Therefore, these regions have a permanent water deficit.

Soil (pedological characteristics and quality): Along the whole alignment of ~10,250 km, four types of soil have been identified: Complex of Rendzic Leptosol and Chromic Leptic Luvisol on hard limestones, Fluvisol (Fluvial), Rendzic Leptosols and Fluvisol (Colluvium). Those are middle to high productive capacity soil suitable for agricultural activities. The southern part of the alignment close to Vrazanska River and Lepenec River is covered with the national monitoring network set to determine the distribution of heavy metals and other elements in the soil in the city of Skopje and its immediate surroundings.

Surface water: Alongside or near to the corridor route of the motorway flows the River Lepenec. The course of the river Lepenec passes west of the route of the motorway. At the begging of project, the route of the corridor passes near or alongside of the River Lepenec, but they do **not intersect**. The motorway alignment intersects the intermittent stream Vrazanska river at km ~11+300 and several more intermittent streams: Intermittent stream (without name at ~km:2+200), Intermittent stream (without name at km 3+600), Morav Dol (at km ~3+900), Intermittent stream (without name at km ~4+300), Pesji Dol (at km ~4+700), Intermittent stream (without name at km 6+000), Intermittent stream (without name at km 6+400), Intermittent stream (without name at km 7+600), Intermittent stream (without name km ~ 8+200), Lopotenec (km ~ 8+700), Intermittent stream (without name at km ~9+200). Vrazanska River is a left tributary of the river Lepenec. This is the river that occasionally dries out throughout the year.

Surface water quality: The Lepenec River from the border with Kosovo to the Vardar River estuary (Skopje, under Zajcev Rid) is classified as a Category II watercourse, in accordance with the Decree on Water Classification ("Official Gazette of the Republic of Macedonia" No. 18/99). Water quality measurements in the river Lepenec at the measuring point - Border and at the place where Lepenec flows into the Vardar River, indicate a category of water from IV, and even V class, which far exceeds the prescribed class II. Based on the performed analysis and according to the WFD classification, the status of the water is from poor to bad for the period from 2018 up to 2020. This is a result of the diverse industrial activities in the project area, especially in the industrial zone Vizbegovo where some of the facilities are discharging their waste waters through the sewage into river Lepenec, without any treatment.

[5] In the ESIA is presented erosion map based on the modelling of Milevski (2015).

Ground water: During the drilling and sampling performed in March-August 2021 the ground waters are recorded at variable depths between 5,6 m (at km 2+238) to 68,8 m (at km 2+720). In the project area there is no public water supplying system. Dwellings and industrial facilities obtain water from springs and own wells, which are not registered with the competent Ministry, Municipality and Cadastre. Up to km 9+100 the alignment is located in the wider (3rd) protection zone of the Nerezi wells (belonging to the Skopje water supply system) and partially close to the 2nd zone, approximately distance of 300 m at km 10+400 of the alignment.

Climate characteristics: The RNM is characterised by two climate types – moderate continental and modified Mediterranean climate. The wind rose is stable and there are no strong winds in the project area. The temperature varied from -22.4 ^{0}C to +41.2 ^{0}C in the period 2001-2020. Regarding precipitation, dry period dominates in the project area. The average yearly precipitation, in the twenty-year period, amounted 480 mm/year.

Climate Change: Road transportation is in the top five categories with the highest values of Gg CO2-eq in the RNM. Climate change projections for the project area show that there will be a continuous rise in temperature in the period 2025-2100. Compared to the period 1961-1990, the projected changes are most intense in the warm part of the year. The summers would be warmer, and the temperature rise more pronounced. An increase in air temperatures in the cold part of the year is predicted, but with lower intensity. Regarding precipitation, in the period 2025 - 2100 there will be a continuous decrease in the amount of precipitation. The predicted changes are the most intense in the warm part of the year.

Air quality: Ambient air in project area is polluted due to industrial activities, households heating and traffic. Short-term measurements of air quality in the project area have been performed at two locations close to the alignment in June, 2021. Concentrations of particulate matter (PM_{10} and $PM_{2.5}$) and gaseous pollutants (CO, SO_2, NO_2, TVOC) in the ambient air are within the air quality standards prescribed by national legislation. The 24-hour NO_2 concentrations are pretty closed to the hourly EQS limit.

Noise and vibration: Quarrying, stone crushing and separation activities in addition to road traffic are the main sources of noise throughout the project area. Short term measurements on noise level were undertaken at seven locations in the vicinity of sensitive receptors (inhabited or livestock houses). Although slightly, the southern part of the project area is noisier compared to the northern one mainly due to the vicinity to the existing road and terrain characteristics.

Waste: In the municipality of Chucher Sandevo, waste management, i.e. collection and transport of municipal waste is the responsibility of PUE "Skopska Crna Gora". Construction waste/demolition waste is usually dumped illegal to level uneven terrain (depressions) or left at locations close to the generation site, public areas or privately owned sites. Currently on the territory of the Municipality there is no designated space for disposal of construction waste.

3.2 Biological Environment Baseline

Biogeography: According to its biogeographical characteristics the area belongs to the biome of sub-Mediterranean, mainly deciduous forests and shrubs. This biome is widespread and the most dominant biome in the country. Small fragments of the biome of southern European, mostly deciduous forests are present in the highest parts of the investigated corridor, close to the border with Kosovo.

Climate – vegetation-soil zones: Majority of the area around the corridor belongs to the continental-sub-Mediterranean zone. In some places near the village Blace, elements of the warm continental area can be seen.

Diversity of habitats: Natural, seminatural and anthropogenic habitats were observed in the surveyed area.

The area is characterized by the following habitat types: forest habitats (pubescent oak forests, poplar and willow riparian belts), grasslands (hill pastures, meadows), aquatic ecosystems and different habitats with significant human activity (fields, vineyards, orchards, abandoned fields, ruderal housing). All-natural habitats in the analysed section are under strong anthropogenic pressure and therefore most of the habitats are strongly to moderately degrade. The most important of the

semi-natural habitats are the meadows and hilly pastures near the village Blace, along with anthropogenic agricultural areas (fields, orchards, abandoned fields and ruderal habitats).

The valorisation of habitats was performed on the basis of EU Habitats Directive. In general, four habitats can be identified as important:92A0 *Salix alba* and *Populus alba* galleries, 6220 *Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea, 3260 Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, and 6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) that the habitat of Hay meadows only partially corresponds to.

Diversity of flora: The list of plants registered during surveys contains 554 species. In general, the flora of the analysed area is composed of widespread species which are common for the present habitats. None of the species is listed in the red lists of threatened species on global or national level. None of the species is listed in the annexes of Habitats Directive or appendices of the Bern convention. None of the species can be considered as endemics. Five allochthonous species were recorded during the field work: Tree of Heaven, White mulberry, Canada fleabane, Canadian poplar, Black locust.

Diversity of fauna: The following vertebrate groups were analysed separately: mammals, birds, reptiles, amphibians and fish. Out of the invertebrate groups separate subchapters are dedicated to ground beetles and butterflies. Besides the presentation of the diversity of species, all of the faunistic groups were evaluated against national and international criteria in order to establish conservation status.

The number of recorded **mammal** species in the area is 24. Most of the species are common and widespread species. Two species - brown bear and Eurasian otter are categorized as vulnerable (VU) and one the wolf as near threatened (NT) according to the National Red List of mammals. Three species are included in Annex II & IV and four species are included in Annex IV of the Habitats Directive. The results of analysis showed that 105 **bird** species (88 recorded during the field surveys and 17 from the literature) are present in the Project's area of influence. Riparian poplar belts are habitat type with the biggest number of bird species.

A total of 18 **reptile** species are present in the project area. Almost all of them can be considered as important according to different valorisation criteria (global and national red list, EU Habitats Directive, Bern Convention, etc.).

Eight species of **amphibians** were registered for the project area. Three species (Greek stream frog, agile frog, European tree frog) are assessed as near threatened (NT) according to the National Red List. Only one species (fire belly toad) is on the Annex II while five species are on the Annex IV of the EU Habitats Directive.

Fish fauna is represented by seven species, all of them common for the Vardar River watershed. Only one species (spined loach) is listed in Annex II of the EU Habitats Directive.

The faunas of **butterflies** and **ground beetles** are rich in species but with no species of national/international importance for conservation.

Protected areas: There are no protected areas, internationally designated areas (e.g. important bird areas, key biodiversity areas, Emerald or Natura 2000 sites) nor important bio corridors in the project area.

Assessment of Key Biodiversity Features: Critical habitat assessment was done as per criteria given in the PR 6. Two habitats and eight species trigger criteria for priority biodiversity features, while one habitat triggers the criteria for critical habitat.

Landscapes: There are two landscape types in the area of the Blace-Stenkovec motorway corridor: Flatland sub-Mediterranean-continental agricultural landscape and Rolling sub-Mediterranean-continental rural landscape. Typical feature for these areas is the long lasting (from prehistoric times) permanent human presence which has left a strong anthropogenic footprint on the landscape structures. The visual aspect of the landscapes in the area are low.

Forests and forest community: The corridor of the motorway is mainly represented by natural broad-leaved forests, as well as smaller areas of artificially raised plantations of coniferous forests.

According to the division of forests by forest management units in the Republic of North Macedonia, oak forests and black pine forests are included in the forestry unit "Skopska Crna Gora", for which a Special Forest Management Plan has been prepared for the period 2014-2023. These forests are managed by the Public Enterprise National Forests.

Ecosystem services: Most of the ecosystem services in the project area are in the category of regulation ecosystem services (e.g. flood regulation, erosion control, water quality regulation), which is expected given the mosaic of ecosystem types in the area. Information gathered during field and desk studies show that there is no significant usage of provisional services in terms of secondary wood products, medicinal plants, fish, mushroom, game and others. Three locations of potential cultural heritage importance have been found in the vicinity of the project; however, they are rarely visited and have no value as cultural ecosystem services.

3.3 Social baseline

Administrative Organization of the Project Area: The project footprint is completely located in the municipality of Chucher – Sandevo, which is a rural municipality located in the wide Skopje Region, north of the City of Skopje. This municipality consists of 12 villages, with its administrative centre in the largest village in the municipality - Kuchevishte. To the north and northwest the municipality borders with Kosovo and Serbia as well the following municipalities: Gjorche Petrov, Karposh, Shuto Orizari, Butel (all four are part of City of Skopje) and Lipkovo.

Population and Settlements: The closest villages to the project area (up to 3 km) in the municipality of Chucher – Sandevo are Dolno Blace (Bardovska Maala) – registered as part of Blace, Gluvo and Brazda. The remaining villages in the municipality are significantly far from the project area. Although this project is located on the territory of the Municipality of Chucher – Sandevo, the closest settlements to the project footprint administratively belong to other four municipalities, which are part of the City of Skopje. These settlements are: Nikishtane, Orman and Volkovo (all in municipality of Gjorche Petrov), Gorno Orizari and Shuto Orizari (in municipality of Shuto Orizari), Vizbegovo (in municipality of Butel), and Bardovci (in Municipality of Karposh). The project footprint does not include populated settlements, though there are a few populated houses and active agricultural, industrial and business entities operating in the area. Between the nearest settlement Orman (located across the river Lepenec) and the closest part of the project footprint there are three sand separation plants and a sandstone quarry. The following table presents the relative distance of project footprint to the closest settlements:

Table 3 Overview of closest settlements to the project area

Settlement	Municipality	Relative distance of the settlement to the closest points of the Project footprint (km)	Population by Census 2002	Female
Blace	Chucher -Sandevo	3	972	476
Chucher -Sandevo	Chucher -Sandevo	3.3	299	137
Gluvo	Chucher -Sandevo	3	349	170
Brazda	Chucher -Sandevo	2.8	480	232
City of Skopje	**City of Skopje**	**1**	**467.257**	**237.772**
Vizbegovo	Butel (City of Skopje)	3	2.817	1.348
Bardovci	Karposh (City of Skopje)	3	1.472	722
Volkovo	Gjorche Petrov (City of Skopje)	2	6.750	3.296
Nikishtane	Gjorche Petrov (City of Skopje)	2.2	1.114	551
Orman	Gjorche Petrov (City of Skopje)	1	461	226
Shuto Orizari	Shuto Orizari (City of Skopje)	3.5	15.353	7.734
Gorno Orizari	Shuto Orizari (City of Skopje)	2.5	454	214

Demographic Overview: The population of the Municipality of Chucher - Sandevo numbered 10.197 residents. In the period since 2002, the total population increased by 20.1%. The migration processes in the municipality are not so evident due to the proximity of the city of Skopje which allows residents to travel on a daily basis using all the social benefits offered by the city. Ethnic structure of the population in the municipality is as follows: 39.4% Macedonians, 19.1% Albanians, 23.8% Serbs, and some minorities such as Roma, Vlachs, Bosniaks and other.

Property, Dwelling, Infrastructure and Communication: Residents in the municipality live in individual houses, often as extended families with several generations live in a single household. These households are dominantly agricultural holdings and are attached to the land and farming activities. The situation has been changing during the past 2 decades with more households in rural parts consisting of a single family unit. Farming and animal husbandry are among common activities in the settlements of the municipality. All villages are supplied with electric power and all have access to internet.

Several roads that are of great importance for local economic development pass through this municipality, namely the motorway ring road that is bypassing the city Skopje and also serves as a border between the municipality and city of Skopje, as well as the road toward Kosovo and its capital city Prishtina. Within the project area of influence there is a road that goes from the village Orman over the river Lepenec and connects to the main A4 (or E-65) road, and this road serves as a secondary connection point for the villages Orman and Nikishtane, beside the main road that leads toward the city's neighbourhood Volkovo.

Within the corridor of the motorway and the immediate surroundings there is a permanent low and medium voltage network (above and below ground) and two substations, and a telecommunication network. There is no hydro-technical infrastructure within the project area of influence. Also, some 100-150 m from the motorway footprint, there is an active military training facility: shooting range set on open space. Also near to the alignment is the sport airport Stenkovec.

Land use: In general, the motorway alignment passes through areas that consist of barely used pastures and some fields also are partially used. In the upper part of the project footprint, there is a group of weekend houses and dwellings, mostly abandoned. Only 1 dwelling object is actively used on a daily basis, some 6 months throughout the year. Some free and available resources (water and pastures) are used in farming and livestock breeding. These are used by the farmers who operate sheepfolds. In the project area of influence there are four sheep pens and one cattle farm with their auxiliary objects and all of them use the grazing resources freely available in the project area of influence. The cow farm consists of dwelling objects with 4 apartments, cattle farm and three auxiliary objects. All belong to an extended family with at least 4 households, set informally on a governmental land, previously used by the army as a shooting range and still owned by the military. At the second half of the project area of influence, there are some fields actively used for agricultural (commercial) purposes. There is a catchment of water in the upper parts of the hills and the water is brought to the farms by a rubber hose. Sheep are taken to graze on the local hills. Sheep pens include different facilities among which a shepherd's house and auxiliary facilities.

Industry and business entities: Chucher - Sandevo is a rural municipality and agriculture is the main income source for most households. Most of the businesses are located in the lower part of the municipality, where the project footprint ends, next to the industrial zone Vizbegovo. Skopje's Industrial Zone Vizbegovo partially extends into the municipality of Chucher - Sandevo, along the existing road toward Kosovo, with a low-level impact onto the municipality's economy. The biggest company that significantly contributes to the economy of the municipality is the Banjani Mine. The exploitation of mineral resources is also present in the municipality through another Granit – Brazda mine which has surface pits for quarry and granulate separation, some located in the project area of influence. The following figure presents the locations of businesses set in the lower part of the municipality, all in the project area of influence.

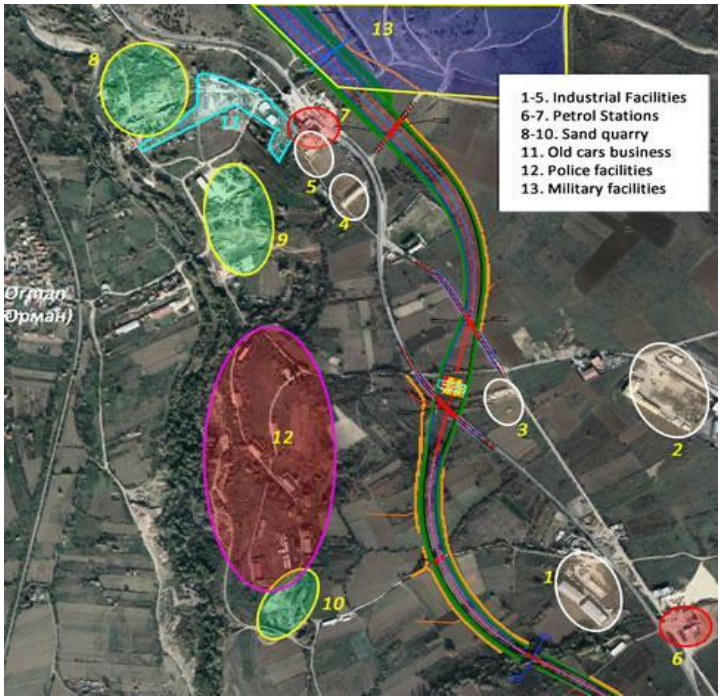

Figure 5 Businesses in the project area of influence (lower part of the municipality)

Between the nearest settlement Orman (located across the river Lepenec) and the closest part of the project footprint there are three sand separation plants and a sandstone quarry.

Agriculture, Forestry and Animal Husbandry: The Municipality of Chucher - Sandevo is dominated by agriculture, and due to its geographic conditions and location, it has good opportunities for development of the agricultural and forestry. The most common crops grown are vegetables. Actively used agricultural parcels are mainly privately owned. 30% of the population in municipality conducts agricultural activities.

Education: There are no schools or other educational facilities in the project area of influence.

Social Care: Social protection services in Municipality of Chucher - Sandevo are provided by the Intermunicipal Centre for Social Works, located in city of Skopje.

Vulnerable Groups: There might be vulnerable or disadvantaged individuals in the project area of influence that will be affected with the activities of this project and/or might require different channels of communication. These are: affected land owners/users and elderly people.

Health Care: A Polyclinic provides health care services for the inhabitants of Chucher - Sandevo. Also, there are private health practices in the municipality general practice - 4 in total, dentistry - 2 in total and 2 pharmacies. Travel time from the first location of social interest to the main City Hospital is 15-20 min (16 km distance).

Cultural Heritage: There are no protected cultural heritage site within the project footprint and project area of influence. Close to the motorway alignment are the Davina Kula archaeological site (at a distance of approx. 500-600 m east of the motorway) and the Blace cemetery (at a distance of 350 m from the starting point of the project footprint). The cemetery will remain reachable as it is accessible by road directly from the village Blace in addition to the existing road.

4 ASSOSIATED AND POTENTIAL IMPACTS

4.1 Environmental impacts

IMPACTS ON PHYSICAL ENVIRONMENT		
ASPECT	**IMPACTS IN CONSTRUCTION PHASE**	**IMPACTS IN OPERATIONAL PHASE**
Resource efficiency (energy, water, raw materials use)	The analysis of energy, water, and raw materials use in the construction phase was done. Although the project will need fuel for equipment, mechanisation, etc., water for sanitary and technical purpose and raw materials in construction it is concluded that these impacts are inevitable but that the use of these materials will not increase pressure on natural resources. Their rational consumption is advised including reuse of some waste fractions.	Due to the nature of the motorway operations, the consumption of electricity (lighting of the alignment, tunnels, operation of the tool station, electric vehicle charging station) is identified to have a minor impact on the environment.
Geology and geomorphology	In terms of engineering-geological phenomena and processes, implementation of project may cause: (i) activation of landslides and rock-falls in Lepenec gorge (motorway and accessible roads) especially if the embankments are not protected well., (ii) formation of new rills and gullies on the slopes of the cuts and embankments (on the motorway, access roads and on disposal area); (iv) local changes of the slopes and the intensity of erosion and deposition. Regarding the rock fall, the created model indicate that the most susceptible terrain is near 3+000, then between km 3+600 to km 5+300 and around km 7+800.	In the operational phase, the impacts are identified to be related to local changes of the slopes, intensity of erosion and deposition due to the natural processes occurring in the terrain
Soil	The construction activities may cause soil degradation, which is expected as a result of: removal of topsoil, accelerated erosion process and occurrence of excess sedimentation, soil contamination, soil compaction.	In the phase of the motorway use, the soil contamination can occur in case of failure of runoff drainage and treatment system as well as in case of large accidents that involve spilling of hazardous substances.
Hydrology, surface and ground water	The foreseen construction activities and presence of the worker camps may cause adverse impacts of the surface and ground water in the project influence area. The activities that create moderate impact are (i) preparation of the construction site which includes removal of vegetation, (ii) setting up the worker's camp, (iii) deep excavation and construction of the motorway and its structures, (iv) storage and handling of excavated soil, materials and waste, (v) incidental leaking of chemicals, fuels, lubricants, (vi) possible occurrence of soil erosion which can generate sediments that may affect physical characteristics of the surface water, (vii) presence of the machinery (including irregular maintenance), (viii) washing up the equipment and mechanisation near/within water body, (ix) possible discharging of sanitary, technical and storm water, etc. The pollution can be expected at Lepenec river, Vrazanska River and Morav Dol stream. Shallow groundwater level from 5 m up to 10 m depth are determined at several location where bridges and underpasses	Failure of runoff drainage and treatment system may cause untreated effluent to be discharged to environment. Storm water may be contaminated with rinsing deposited sediment from the air, fuel, oil, suspended materials and other pollutants released from vehicles. Possible adverse impacts may be expected in case of some accidents on the motorway on locations close to surface water bodies or locations where ground water levels are high. The use of different types of herbicides for maintenance of vegetation along the motorway may can cause adverse effects on surface and storm waters.

IMPACTS ON PHYSICAL ENVIRONMENT		
	are constructed (details about exact locations are given in the ESIA study).	
Ambient air quality	Project may have negative impact on air quality as a result of construction activities and use of construction mechanisation that generate dust, exhaust gases, VOC. During construction activities 6,286 tons of CO_2 will be released. Moderate impact is expected 100 to 150 m on each side of the motorway axis.	Traffic on the new motorway will result in emissions into air. Assessment of GHG emissions in operational phase shows that there will be increase in CO, HC, PM_{10} and $PM_{2.5}$ pollutants, while NO_x emissions will continuously decrease. The impact of traffic emissions to air quality will be limited to a very narrow area along the new motorway that is why it is consider as a minor one.
Project impacts on climate change	In terms of project impacts on climate change, assessment of GHG emissions generated during the construction activities is done as a part of the ESIA. It is expected that construction activities will have share of 0.94% in total national emissions. Increased GHG emissions during the construction phase are related to extraction and manufacturing of materials and fuel/energy consumption by transportation of construction materials. The significance is characterised as minor.	Use of the motorway will be by far the biggest source of GHG emission during the operational phase of the project. Minor emissions will result from regular maintenance, repairs, lighting etc. but due to lack of data and their insignificance, these emissions have not been incorporated in the assessment.
Climate change impacts on project	Climate changes may cause adverse impact during the construction phase such as: (i) drying and cracking of construction land and occurrence of forest fires; (ii) extreme heat can limit construction activities, which may increase the cost and duration of construction and maintaining activities; (iii) accumulation of water or complete flooding of the construction site and the access to it; (iv) excess erosion and sedimentation, landslides activation; (v) drainage of the piles of temporary stored excavated material; (vi) reduce visibility for the drivers of vehicles; (vii) ignition of equipment containing hazardous substances, (viii) damage of construction equipment (melting). The high vulnerability of project components during the construction phase is to storms and extreme rainfalls.	Climate changes may cause adverse impact during the operational phase of the motorway such as: (i) increase of GHG emissions and the rate of degradation of pavements; (ii) damage to roads from landslides, flooding, and ground movement; (iii) disruption to traffic flows and destroyed vehicles as a result of damage of the alignment, car fires, and injury or even death of road users; (iv) flooding of the road and surface damage and undermining of supporting structures; (v) drying the vegetation which will result with destabilization of the slope; (vi) closure of culverts with vegetation and stones. During the operational phase, the high vulnerability of road section is to extreme heats and storms/extreme rainfalls.
Noise and vibrations	It is expected that project activities will cause moderate impact on noise and vibration levels in the project area of influence. Main sources of increased noise and vibration levels as a result of construction activities are (i) drilling, (ii) blasting, (iii) earth moving, (iv) compacting and (v) use/movement of construction mechanisation.	The traffic on the motorway will generate noise and vibrations. The traffic noise levels have been calculated for three areas containing sensitive receptors. At the nearest properties, the noise levels caused by the road traffic on the proposed motorway exceed the limit values prescribed in the national legislation. Increased vibration impacts as a result of the movement of the vehicles along the alignment are assessed as negligible.
Waste	In the construction phase different types of waste will be generated as a result of the preparation of site, construction activities and, structures and infrastructure built (e.g., worker's camp, storage house, garage, concrete batching plant, laboratory, etc.) including both non-hazardous and hazardous waste. If the waste is not managed properly, including waste its segregation, reuse (when possible) and disposal, the	Different fractions of waste will be generated during the operational phase as a result of the following activities: maintenance of the motorway; operation of the pay tool station; transport of passengers and goods. It is assessed that this impact will be negligible knowing that the Waste Management Plan will be in place.

IMPACTS ON PHYSICAL ENVIRONMENT		
	contamination of environment is inevitable impact.	
Safe use and management of hazardous substances	During the construction phase as a result of predicted construction activities different types of hazardous materials and substances will be used. Possible risk and damages to the environment is related to poor storage and handling/disposal of these materials or their packaging.	Release/leakage of hazardous materials in the environment in case of traffic accidents involving vehicles for transport of these substances/materials Traffic accidents may also cause fires and explosions in case of leakage of explosive and/or flammable materials. Extensive use of herbicides may impact the soil and water quality. Transport of hazardous materials may cause fires and explosions and leakage/dispersion of explosive and/or flammable materials.

IMPACTS ON BIOLOGICAL ENVIRONMENT		
ASPECT	**IMPACTS IN CONSTRUCTION PHASE**	**IMPACTS IN OPERATIONAL PHASE**
Biodiversity (habitats, flora, fauna)	• Loss of terrestrial habitats - direct destruction and alteration of habitats, the largest area that will be lost belongs to hill pasture with shrubs (21.42 ha); • Loss of terrestrial flora and fauna, decrease in plant and animal populations due to habitat fragmentation effects, forest cut, collisions and destruction of nests, burrows, and other animal sheltering/breeding structures; • Disturbance of species (breeding, foraging, roosting) due to the presence of workers and construction works (noise, vibrations) by machinery and vehicles in the area; Illegal hunting/accidental killing of animals - road kills may occur which is associated especially with mammals, reptiles, and amphibians as well as invertebrate fauna; • Introduction of alien species as a result of spread of seeds of alien species by workers and machinery. • Dust deposition during construction has the potential to lead to changes to plant communities; • Changes in aquatic habitats and mortality of hydro-bionts due to sedimentation, pollution and eutrophication of the intermittent streams and the Vrazanska River.	• Fragmentation of habitats and impediment of animals' movement; • Inadequate maintenance of vegetation along the motorway; • Incidental leaks and forest fires that can cause impacts on the biodiversity; • Increased mortality of the animals due to collision with vehicles; • Disturbance due to increased noise and vibrations.
Landscapes	The introduction of the new structure in the landscape will inevitably lead to changes in the visual aspects of the landscapes. The construction works and associated temporary facilities will also have impact on the visual aspects. In addition, impacts may arise from vegetation removal and soil removal/excavation/stockpiling as well as from material storage and waste or spoil temporary disposal. Auxiliary facilities (e.g. worker camp, storage areas) may also cause temporary impact to the landscape.	The impacts on the landscape will be associated with the new corridor and the structures along the alignment. With implementation of the project there will be bridges with total length of 312 m (left branch) and 801 m (right branch) and tunnels with total length of 2509 m (left branch) and 1785 m (right branch) i.e. total length of permeable structures of 2829 m (left branch) and 2586 m (right branch). Furthermore, 10 underpasses are embedded in the road design. Landscape visual aspects of the area are already severely altered by the existing road and the number of industrial

IMPACTS ON BIOLOGICAL ENVIRONMENT		
		facilities along river Lepenec. However, the visual aspects of the area will be certainly affected due to the introduction of new structures in the area. Cuts and covers are one of the principal components that affect the visual aspects of the landscape, especially as sources of erosion. These are in length of 362 m (left branch) and 156m (right branch).
Forest and forestry	Construction activities can cause negative impacts on forests as a natural resource and forestry, as a result of permanent loss of forest area, trees, carbon sequestration capacity, wood mass and natural regeneration. Possibility of occurrence of erosion processes is higher in the areas with minimized tree coverage. Dust deposition may cause physiological weakening of the forest vegetation.	The use of the motorway can cause negative impacts on forests and forestry and forest ecosystems, as a result of motorway maintenance, increased risk of forest fires, unwanted leaks etc. Increased passenger and vehicles flow increase the possibility of forest fires and cause negative impacts on forest plantations.

4.2 Social impacts

IMPACTS ON SOCIAL ENVIRONMENT		
ASPECT	**IMPACTS IN CONSTRUCTION PHASE**	**IMPACTS IN OPERATIONAL PHASE**
Positive social and socio-economic impacts	• Increased engagement of local mining and transport companies as possible suppliers for the contractor; • Positive development of the local road network near and around the part of the industrial zone Vizbegovo that belongs to this municipality; • Increased local employment.	• Positive economic development on a national level; • Some dirt roads passing beneath the motorway in order to reach fields will be asphalted; • Traffic safety on the local E4 (E-65) road will be significantly improved (current road is very insecure and in bad condition); • Travel time towards/from Kosovo will be shorter; • Increased employment opportunities for maintenance of the motorway; • More companies will approach the current area (extended economic zone Vizbegovo) to build production capacities and other facilities due to the improved local road network; • Improved accessibility for residents of the village Blace to the city of Skopje, and accordingly better access to educational, health and social facilities.
Community Health, Safety and Security	• Potential health and safety impacts in case of unauthorised access of people and animals to construction sites; • Risk to health and safety of the drivers and passengers (A4 road) due to the increase of construction related traffic (increased number of traffic accidents on the existing A4 (E65) road).	• Traffic safety risks during operation in case of illegal crossings over the motorway, etc. • Endangered traffic safety during performing military exercises at the shooting range.
Labour, Working conditions, Occupational health, Safety	• Risks for workers' safety related to construction activities (injuries, diseases etc.) • Extended time of travel for the Emergency Service to the construction site.	• Risks for workers' safety related to maintenance/operation activities (injuries, diseases etc.)

IMPACTS ON SOCIAL ENVIRONMENT		
and Security		
Property, Housing, Communication & Infrastructure	• Loss of agricultural land and property (weekend houses, cattle farm and commercial/residential auxiliary facilities); • Construction related nuisances (noise, dust, etc.) for nearby local communities (such as businesses located at the ending part of the route or weekend settlement users); • Increased time of travel from Skopje to Kosovo, and vice versa; • Impeded traffic flow and decreased communication; • Hindered access to land and property due to traffic diversions;	• No identified adverse impacts.
Economy, Use of natural resources & Livelihood provision	• Loss and/or limitation of access to free natural resources (pastures and spring water) used for keeping livestock; • Loss of income from growing crops on arable land that will be acquired for Project needs; • Temporary income losses for businesses due to construction related disruption.	• No identified adverse impacts.
Cultural heritage	• Potential damage and loss of undiscovered archaeological site or items.	• No identified adverse impacts.

4.3 Cumulative impacts

Table 4 gives the list of facilities that are found in the project area that can together with the construction of this motorway contribute to the cumulative E&S impacts.

Table 4 List of facilities that can contribute to the cumulative E&S impacts

No.	Project	Status
1.	Quarry and separation plant owned by Company Transmet	Existing
2.	Concrete plant owned by Granit and its administrative buildings	Existing
3.	Sand separation plant	Existing
4.	Two sheepfolds	Existing
5.	Two cattle farms and auxiliary objects	Existing
6.	Gas station Diesel	Existing
7.	Sport airport Stenkovec	Existing
8.	Industrial facilities close to interchange Stenkovec	Existing
9.	Motorway A4 Subsection 1 (Border crossing Blace - Village Blace)	Existing
10.	Existing regional road A4	Existing
11.	Local urban-planning documentation for a facility with a purpose E2- Gas station and service centres with accompanying facilities on KP 1283/1, KP 1283/5 and KP 1284	Planned
12.	Local urban-planning documentation for a building with purpose E1 - Infrastructure project for local road, KM Gluvo Brazda	Planned

The summary of identified cumulative impacts in the construction and operational phase is given in the table below.

Table 5 Summary of cumulative impacts resulting from construction and operational activities

Aspects	Potential Impacts	Description of potential impacts in construction phase	Description of potential impacts in operational phase
Air quality and climate changes	Emissions of dust, exhaust gasses and GHG	All the above-mentioned projects are sources of air pollution. The construction of the motorway A4 will increase air emissions in the area (mainly dust) and will increase the transport frequency which will result with increased emission of exhaust gasses in the atmosphere. The similar emissions will come from the construction of Subsection 1 which will be finalised before start of construction of Subsection 2, and the quarry and separation plant. Mitigation measures that are proposed for this impact will significantly reduce the impact from the motorway construction. Therefore, impact is considered to be minor.	Traffic emissions generated on Subsection 1 and Subsection 2 will jointly contribute to the GHG emissions. Based on the air emissions calculation conducted as a part of the ESIA, there will be an increase in CO, HC, PM_{10} and $PM_{2.5}$ emissions, while NO_x emissions will continuously decrease. On the other hand, the traffic on the alternative road will decrease reducing emissions, while the speeds maintained at the motorway will contribute to the more efficient fuel ignition also reducing the emissions. With additional modernisation of cars and improvement of fuel quality, it is expected that this impact will be negligible.
Noise and vibrations	Increased noise and vibration level	As a result of the engagement of mechanization and vehicles for transport and performance of construction activities, the combination of the above defined projects will increase the noise and vibration level in the project area of influence. However, knowing that the construction activities on linear projects progress in space, the source of noise will move with the progress of the construction activities. On the	The motorway traffic will increase noise level in the operational phase. The operation of the concrete, quarry and sand separation plants also will contribute to the increased noise and vibration level in the project area of influence. However, considering the fact that installation of noise barriers will be performed and that the other sources of noise are distant from the motorway, it is expected that this impact is not significant.

Aspects	Potential Impacts	Description of potential impacts in construction phase	Description of potential impacts in operational phase
		other hand, such impact is temporary and reversible and thus is of minor significance. The impact will be additionally reduced with proposed mitigation measures.	
Surface and ground water	Deterioration and pollution of surface and ground waters	Impacts on water quality and aquatic ecology as result of construction works are possible in case of major pollution accidents. Cumulative effects on water quality from motorway construction are observed in conjunction with municipal wastewater discharge from surrounding facilities, as well as run-off discharge from local roads. Discharges or leakages from the construction site are not expected to be large in quantities, they are reversible and unlikely to occur.	The untreated effluent discharge to surface and ground water quality in the operational phase is not likely occur. Impacts on water quality and aquatic ecology as result of operational activities are possible in case of major pollution accidents. The likelihood of these accidents is small, and the appropriate emergency and preparedness situations will be in place. In conclusion, no cumulative impacts are expected in the operational phase.
Geology and soil	Pollution of soil and deterioration of the geology structures	All activities in the project area will have negative cumulative impacts on soil. The occupation of the land is the permanent impact. Soil contamination from the motorway construction will be prevented by mitigation measures and appropriate selection of disposal site, therefore the contribution to cumulative effect is minor, except for the permanent occupation of land.	All activities in the project area will have negative impacts on soil. All projects permanently occupy land for their activities and there is also possibility of soil contamination from different activities. Accidental leakages from the motorway may contribute to this cumulative effect. However, the discharge of untreated effluent is unlikely to happen as well as the accidental situation with spillage of hazardous material. Therefore the impact that is coming from the motorway activities is considered negligible, therefore not contributing to the cumulative impact.
Waste	Negative impacts on environmental media and areas	All activities in the project area generate waste, however the construction waste generated from the two sub-sections will require the selection of appropriate disposal site thus creating cumulative pressure to environment. With appropriate site selection, management and closure of the two sites, this impact is considered to be minor.	No cumulative impacts are expected in the operational phase.
Biodiversity (flora, fauna, habitats, protected area, forest)	Loss and fragmentation of habitats as a result of construction activities	Impacts on biodiversity are expected only at those projects which are in construction phase (Motorway A4 subsection 1-from Blace crossing point to village Blace). Some habitats will be lost as a result of construction of roads extension of sand separation plant. No increased cumulative impact is expected on ecosystems of the river Lepenec (aquatic and riparian communities).	In the operational phase of the project there is a possibility of cumulative impacts on biodiversity. The regional road and the new highway and side roads, can have a cumulative impact on the fauna, as a result of maintenance activities i.e. cleaning and removal of vegetation. Increase of fragmentation and impediment of the movement of animals is expected, as well as mortality of wild animals from collisions, disturbance etc.
Landscape	Deterioration of visual aspects	The cumulative impacts caused by the construction of the alignment, as well as the construction of Motorway A4	In operational phase the cumulative impacts on the landscape are associated with the new motorway

Aspects	Potential Impacts	Description of potential impacts in construction phase	Description of potential impacts in operational phase
		subsection 1 will contribute to increasing the significance of the impacts on the visual characteristics of the landscape. This impact will be more significant in a case of overlapping of the construction activities.	and auxiliary structures in combination with the constructed facilities and structures of the above-mentioned projects. The new projects will introduce new elements into the landscape (roads, bridges, tunnels, petrol station, warehouses, industrial facilities etc.)
Socio-economic aspects	Impacts on local businesses and workforce	If all of the proposed projects included in the cumulative assessment proceed, they will generate increased opportunities for local businesses to increase sales revenue and overall viability through the supply of goods and services. Existing businesses may expand, and new businesses are likely to move to the region at least temporarily to provide services to projects under construction. This may lead to increased employment in the area. . This may, however, cause an inflationary impact on prices which may raise living costs. Human resource costs are also expected to increase as a result of higher demand for workforce, particularly qualified workforce.	/

5 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

MITIGATION MEASURES AND MONITORING FOR PHYSICAL ENVIRONMENT IMPACTS		
ASPECT	**MITIGATION MEASURES**	**MONITORING**
Recourse efficiency (energy, water, raw materials use)	**Pre-construction phase:** Ensure that Lighting and Electrical Design for roads and tunnels contains energy saving measures and equipment (e.g. Specifying high frequency ballasts, LED and lower wattage lamps can deliver quick savings of over 20 % together with greater lamp durability). Consider using solar powering. **Operational phase:** Keeping records of electricity consumption and providing regular maintenance of the lightening system using energy efficient equipment.	**Pre-construction phase:** • Revision of the Design to be done by the competent and licenced company. **Operational phase** • Electricity consumption rates.
Geology and geomorphology	**Pre-construction phase:** Perform geological, geo-mechanical and hydrogeological investigations for the alignment and the disposal area and results of investigation works to be included in the design (related to embankments' construction methodology, measures for protection of ground water, etc.). Perform rock fall modelling for the section passing through the Lepenec gorge to understand the risk for the motorway construction and use and decide on the stability engineering measures). **Construction phase:** During the construction camp planning development avoid occupying the areas/specifically sensitive locations or zones at: km 3+000, km 3+600, km 5+300 and km 7+800 where steep slopes in the Lepenec gorge are presented and the well close to km 10+000. Develop the **Site Rehabilitation Management Plan** (SRMP) and include it in the **Construction Environmental and Social Management Plan (CESMP**). Upon completion of works implement the measures from the SRMP. **Operational phase**: Develop the **Operational Environmental and Social Management Plan (OESMP)** which will include measures such as: regular control and maintenance of the condition of the motorway drainage system to prevent impact on erosive sliding of the soil or flooding, monitoring of slopes, in particular after strong rains for identification of possible traces of erosion (landslides, rockfalls, rock weathering). Maintaining the vegetation and if necessary, increasing the area with vegetation.	**Pre-construction phase** • PESR to monitor implementation of works and revise the final outputs. **Construction phase** • Revision of SRMP by the Engineering Supervision. • Weekly to monthly monitoring by the Engineering Supervision in order to control the contractor's work. **Operational phase** • Monitoring by the State and municipal inspection body if the prescribed measures are implemented.
Soil	**Construction phase:** Develop **Topsoil Management Plan (TSMP) and Soil and Erosion Management Plan (SEMP),** as a part of Construction Environmental and Social Management Plan (CESMP). Ensure good planning of the material balance per sections, i.e. reuse of the excess soil resulting from cut and fill and tunnels drilling. Implement the same measures as under *Geology and geomorphology.* **Operational phase:** Develop and implement the **Operational Soil Monitoring Plan** (OSMP) and include it in the Operational Environmental and Social Management Plan (OESMP)**.** In the OESMP, make connection between implementation of measures under the Water and Waste section with prevention of	**Construction phase** • Revision of TSMP and SEMP by the Engineering Supervision, • Weekly to monthly monitoring by the Engineering Supervision in order to control the contractor's work. **Operational phase** • Implementation of measures from OESMP and EPRP. • Performing soil monitoring in line with the plan in the OESMP and ESIA – chapter 8.

	soil contamination. Develop and implement the **Emergency Preparedness and Response Plan (EPRP)** based on a hazard analysis including the nature, consequence and probability of accidents.	
Hydrology, surface and ground water	**Pre-construction phase:** Include all recommendation in the design officially issued by the Public Enterprise "Vodovod and kanalizacija", Ministry of environment and spatial planning – Water Department and Municipality of Chucher Sandevo related to implementation of appropriate measures for protection of the III zone of the well area Nerezi – Lepenec as well as protection of water body within the project area. Obtaining water management consent. Design hydro-engineering structures based to hydrological, meteorological conditions and climate changes scenarios for the project area that will provide protection of the motorway from natural disasters such as floods. Ensure that each bridge that is crossing river beds have oil separators and sedimentation traps. Ensure that the construction camp is designed in a way to have all appropriate water and sanitary facilities for which appropriate consents are obtained from authorities. Perform baseline monitoring of water quality in Vrazanska River and possibly in other intermittent streams. Monitoring activity should be performed during the wet (rainy) period when the river will have regular (even minimal) flow and when construction works are nearby the flows. The measuring points, frequency and monitoring parameters are defined in Chapter 8 Monitoring Plan, under Emissions in surface and groundwater (Preconstruction phase). **Construction phase:** Development on **River Crossing Management Plan (RCMP)** and include it in the Construction Environmental and Social Management Plan (CESMP). Develop water pollution control measures and include them in the Construction Environmental and Social Management Plan (CESMP). Develop a **Water Monitoring Plan** and include it in the **CESMP**. Perform regular monitoring of water quality during construction works as per the plan. Implementation of same measures as under the *Waste* section. **Operational phase:** Develop Operational Environmental and Social Management Plan (OESMP) and include water pollution control measures. Develop and implement an **Effluent monitoring plan** in line with the water permit. Include the plan in OESMP. Develop and implement Operational **Emergency Preparedness and Response Plan** to act in case of traffic accidents with high risk of pollution.	**Pre-construction phase** • Engineering supervision to revise developed designs and approve structures for water protection. • Supervision Engineer to approve Construction Camp Organisation Plan. • Water quality parameters as specified in ESIA. **Construction phase** • Implementation of measures from CESMP including RCMP and water pollution control measures to be controlled by Engineering Supervision during weekly to monthly site visit checks. • Performing water monitoring in line with the plan in the CESMP. **Operational phase** • Procedures for operation of the sanitary and drainage facilities. • Monitoring of effluent discharge in line with the OESMP and the Water Permit. • Setting up preparedness and response procedures in line with the EPRP.
Ambient air quality	**Pre-construction phase:** Repeat the analysis of air quality in the project area, possibly in two seasons (summer and winter). **Construction phase:** The CESMP to include Air Quality Management Plan (AQMP). Perform monitoring and reporting in accordance with Table 133 in the ESIA. **Operational phase:** Regular monitoring of air quality to take place at sensitive receptors and grievances, when raised, will be dealt with according to the Operational Stakeholder Engagement Plan. Conducting monitoring of the air quality in accordance with the Table 133 in the ESIA. In case that monitoring indicates increased pollution of ambient air caused by traffic around the sensitive receivers,	**Pre-construction phase** • Checking if the air quality monitoring is performed. **Construction phase** • Engineer supervision of the Contractor's work based on CESMP (AQMP): weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures. • Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external

	implement construction of natural of artificial barriers to protect the receptors. If this is not sufficient protection or these species cannot grow on the Project area, artificial barriers are also acceptable, e.g. noise barriers also prevent spread of air pollution, and their efficiency depends on their height. In case of reconstruction activities, conduct measures for construction phase.	supervising engineer. • Air quality parameters as defined in the ESIA – chapter 8. **Operational phase** • Standard set of parameters to include CO, SO_2, O_3, NO, NO_2, NO_X, PM_{10} and $PM_{2.5}$. • Checking if Air quality measurements have been performed by PESR.
Project impacts on climate change	**Pre-construction phase:** Same as under air quality in the pre-construction phase. **Construction phase:** Selected contractors should have incorporated a commitment to reduce GHG emissions in their environmental policies. Include climate change mitigation measures in the CESMP, such as: use construction materials with lower carbon footprint wherever possible (e.g. cold mixed asphalt, asphalt with lower content of bitumen). **Operational phase:** Include climate change mitigation measures in the OESMP. Use the best practice-efficient approach to maintenance and refurbishment. Implement re-cultivation and restoration activities. Encourage drivers with motivational messages on electronic displays to maintain a consistent speed of 100 km/h for the benefit of reducing GHG emissions, etc.	**Pre-construction phase** • Same as under air quality in the pre-construction phase. **Construction phase** • Weekly monitoring by the Engineering Supervision in order to control the contractor's work. **Operational phase** • Monitoring by the PESR on the implementation of mitigation measures.
Climate change impacts on project	**Pre-construction phase:** Development of **Emergency Resilience Plan (ERP)** as a part of CESMP. Review of the Preliminary Design and Main Design to evaluate design measures and materials specification in light of the anticipated climate change forecasts and projections over the lifetime of the Project. Implement control mitigation measures to avoid climate change impacts on project activities in construction phase, as a part of CESMP. **Construction phase:** Include climate change mitigation measures in the CESMP such as stopping the work during extreme temperatures, supply the construction site with sufficient technical water, control the state of fires in the project area by visual inspection and monitoring of news in local media, store flammable materials in special heat-resistance containers, improved coverage of fire-fighting equipment, make culverts in places to drain the accumulated waters, collect and channel water through temporary or permanent channels and pipelines, etc. **Operational phase:** Include climate change mitigation measures in the OESMP. For protection of the alignment it is recommended to maintain and implement vegetation management practices, tree planting to reduce run-off rates across a catchment, prepare **Operational Emergency Preparedness and Response Plan,** control water leakage, restrict the movement of vehicles transporting dangerous substances during periods of high temperatures, install fire extinguishers in tunnels. For protection of underpasses and bridges provide regular cleaning and removal of vegetation, tree planting to reduce run-off rates across a catchment. For protection of the retaining walls and bridges is recommended: maintenance of the planted vegetation on slopes; drainage of road embankment, use vegetation for improving	**Pre-construction phase** • Designer to review Preliminary and Main Design to include measures to increase climate resilience, • Prepared ERP and control mitigation measures included, as a part of CESMP. **Construction phase** • Daily visual inspection of construction site by Engineering Supervision, • Checking the storage of hazardous substances, • Collected storm water through temporary or permanent channels and pipelines. **Operational phase** • Evidence of prepared Operational Emergency Preparedness and Response Plan.

	slope stability and erosion protection, use geo-synthetics for improving slope stability and erosion protection. For culverts and tunnel is recommended: inspect and clean drainage systems regularly, keeping the road drainage in good condition, prevent the clogging of pipes/culverts on connecting roads; install fire extinguishers in tunnels, etc.	
Noise and vibrations	**Pre-construction phase:** In case of large timespan, repeat the analysis of ambient noise in the project area. In the Detail Design should be taken into consideration proposed mitigation measures for reduction of noise, generated during the operational phase of the project. For protection of few sensitive receptors along the motorway, noise barriers should be constructed at several locations i.e. on km 3+805; km 3+828; km 3+870; km 4+610; km 4+631; km 9+128; km 9+168, with technical characterises described in the ESIA. **Construction phase:** Include noise control measures in the CESMP, such as installation of operational noise barriers as early as possible in order to be functional in construction phase, monitoring upon complaints during the construction phase of the Project. Conducting monitoring on noise during construction phase in accordance with the Table 133 in the ESIA. **Operational phase:** Include noise control measures in the OESMP. It is possible that the traffic intensity during motorway use will be higher than originally planned. If this would be the case, perform control measurements of the noise level along the complete motorway length annually, during the first three years of the operation of the motorway, in order to determine the noise emission level. If the allowed levels were exceeded, additional protection measures must be planned in the form of additional noise protection barriers, preserving the road and the tarmac in a good condition, pavement curtain which absorbs noise, green belts etc. Maintenance and replacement of the noise barrier along the alignment in case broken parts are present. Noise monitoring upon complaints during the operation phase of the Project.	**Pre-construction phase** • Checking if the ambient noise levels measurement is performed. • Checking if noise barriers are included in the Detailed Design. **Construction phase** • Weekly site walkover by Engineering Supervision to consider if noise mitigations being appropriately implemented. • Noise mitigation measures are included in the CESMP. • Monitoring of noise levels are performed. **Operational phase** • Periodical monitoring of the ambient noise in accordance with the provisions of Environmental Permit. • Conducting regular maintenance of noise barriers.
Waste	**Pre-construction phase:** Decide on the locations for temporary storage and permanent disposal of surplus of excavated land and other construction waste. **Develop required design documents** and obtain necessary permits, develop **Construction Waste Management Plan (CWMP)** to address methods for handling and disposal of spoil and other types of construction waste. Prepare the **Waste Management Plan (WMP)** that will address management options for communal waste and other special waste categories that are generated in the construction camp including both hazardous and no-hazardous waste. **Construction phase:** Contractor to nominate a Waste Manager on site, to sign agreements with licensed companies for collection, transport and treatment for all types of generated waste (hazardous, non-hazardous). Full implementation of the measures that will arise from the WMP and CWMP. Besides the proposed location, if the Contractor asses that there is a need for new locations for storage or disposal of generated waste, it is recommended to propose locations which should be approved	**Pre-construction phase** • Design documents reviewed and approved by Engineering Supervision. • WMP and CWMP reviewed and approved by the Engineering Supervision. • All approvals for the disposal locations have been obtained. **Construction phase** • Records of generated waste during construction phase. • Weekly to monthly monitoring by the Supervision in order to control the contractor's work on managing the waste in line with WMP and CWMP. **Operational phase** • Records of generated waste during the maintenance phase. • PESR to monitor implementation of OESMP measures.

	by the Supervisor and Investor and to provide all required permits/agreements for their use. **Operational phase:** Develop the measures related to waste management in the operations/maintenance phase and include them in the OESMP. Identify waste types generated during the maintenance of the road section and handling method.	
Safe use and management of hazardous substances	**Pre-construction phase:** Preparation of **Hazardous Materials and Leak Control Management Plan (HMLCMP), Plan for Evacuation and Rescue in Emergency Situations (PERES)** in accordance with the Law on Protection and Rescue ("Official Gazette of RM" no. 93/12, 41/14, 71/16, 106/16, 83/18) and notification procedure (form) in case of emergency. **Construction phase:** Implementation of measures that will arise from the prepared **HMLCMP** and **PERES**. Training of workers involved in handling the hazardous materials and hazardous waste should be provided as well as the training should be provide for all arranged workers about possible hazards and harmful effects of chemicals/hazardous substances. **Operational phase:** Implementing the measures for fire protection proposed during designing phase in order to avoid possible risk of fire of hazardous materials, usage of herbicides for vegetation management should be avoid as much as possible, or to avoid excess use of herbicides, untreated buffer zones or strips should be established along water sources, rivers, streams, ponds, and ditches to help protect water resources, etc. Training of workers involved in handling the hazardous materials and hazardous waste should be provided, etc.	**Pre-construction phase** • Engineering supervision to review and approve Hazardous Materials and Leak Control Management Plan and Plan for Evacuation and Rescue in Emergency Situations, • Notification procedure (form) in case of emergency and all required documentation proposed for waste management has been prepared. **Construction phase** • Daily monitoring implementation of the measures by responsible person from the Contractor. • Weekly monitoring by the Supervision in order to control the contractor's work. **Operational phase** • Record of implementation of proposed measures.

MITIGATION MEASURES AND MONITORING FOR BIODIVERSITY IMPACTS		
ASPECT	**MITIGATION MEASURES**	**MONITORING**
Biodiversity (habitats, flora, fauna) and critical habitats	**Pre-construction phase:** Design recommendations regarding wildlife crossing and supporting structures of bridges must be implemented. Preparation of **Biodiversity Management Plan (BMP) and Vegetation Removal Management Plan (which includes Afforestation activities)** and ensuring both are harmonized with each other and other plans to be developed as sub-plans within CESMP. BMP must include compensation measures in order to secure no net loss of the identified Priority biodiversity features (PBFs) and net gain of Critical Habitats (CH). Avoiding installation of worker camps and parking lots for heavy vehicles near the sensitive location and sensitive habitats (see Habitat sensitivity map in the Blace-Stenkovec motorway corridor. Monitoring of the water quality in Vrazanska River (in the period when there is water in the river spring/autumn) and River Lepenec (and possible other water bodies) according to the water monitoring plan included in the CESMP and when the construction works are nearby the flows. **Construction phase:** Fully implement the measures prescribed in the Detailed Design, Biodiversity Management Plan and Vegetation Removal Management Plan (which includes afforestation activities). Implement GIIP (e.g. avoid important and sensitive habitats, avoid	**Pre-construction phase** • Checking if the wildlife crossings are incorporated in the Detailed Design; • Checking if the, Biodiversity Monitoring Plan and Vegetation Removal and Management Plan are prepared; • Checking if water quality analysis of Vrazanska River has been conducted. **Construction phase** • Checking if water quality analysis of Vrazanska River (if there is a water flow) and Lepenec River have been conducted; • Daily monitoring by responsible person from the Contractor in order to monitor the successful implementation of the measures; • Weekly monitoring by the Supervision in order to control

	destruction of natural habitats, as well as temporal occupation and destruction of adjacent land etc.) Temporary land-take must include adequate areas of land set away from sensitive biodiversity areas. Construction of access roads should avoid the riparian habitats (willow and poplar woodlands) as well as hill pastures (to the extent possible). Attention should be paid to riparian habitats (no-go areas) at the following riparian sites: 21.344711, 42.088961 and 21.322070 42.120404. Undertake education of workers. Control the spread and eradicate invasive alien species. Water quality analysis of Vrazanska River and Lepenec River by authorized laboratory in order to assess the ecological status of the Rivers on locations presented in the Monitoring Plan of the ESIA. **Operational phase:** Maintenance of the wildlife crossings (tunnels, culverts, underpasses), establishment of sound waste management including removal of food and carcasses from the motorway, maintenance of the fence of the motorway in order to avoid collisions with vehicles, application of soil, water and air protection measures, application of measures to prevent the occurrence of fires and other incidents, regular maintenance of the vegetation along the motorway, avoid utilization of pesticides, re-cultivate the construction waste landfill by autochthonous species.	the contractor's work. **Operational phase** • Monitoring by the State and municipal inspectorates after the prescribed measures are implemented each season after the completion of construction works; • Monitoring of invasive plant species; • Monitoring of afforestation and revegetation success; • Monitoring of road-kills (number, species and localities)
Landscapes	**Pre-construction phase:** Preparation of the **Rehabilitation and Landscaping Plan** in construction and operation phase, to address measures for mitigation of the visual and landscape effects. **Construction phase:** Principal strategy during the construction phase to mitigate the impacts, as far as practicable and to the extent possible, includes undertaking of construction works such as: full implementation of the Rehabilitation and Landscaping Plan, measures to retain and protect vegetation/trees during construction, replanting of erosion-prone areas to be conducted by indigenous plant species, screen construction facilities, establish soil and waste management system. **Operational phase:** Preparation and full implementation of the **Rehabilitation and Landscaping Plan-operation phase part,** regular maintenance of underpasses and fences, retention of natural vegetation, embankments and slopes are to be re-vegetated where possible and maintenance of vegetation is to be ensured, tree berms should be established in key places where the cuttings are high and invasive, design resting areas in accordance with aesthetics of the surroundings.	**Pre-construction phase** • Checking if the Rehabilitation and Landscaping Plan has been prepared. **Construction phase** • Weekly monitoring by responsible person from the Contractor in order to monitor the successful implementation of the measures; • Weekly monitoring by the Supervision in order to control the contractor's work **Operational phase** • Monitoring by the State and municipal inspection body if the prescribed measures are implemented.
Forest	**Pre-Construction phase:** Preparation of Biodiversity Management Plan and Vegetation Management Removal Plan (which includes afforestation activities). **Construction phase:** Fully implement of the measures from the Vegetation Management Removal Plan, avoid construction work near the willow and poplar riparian, forests; undertake education of workers to eliminate possibility for occurrence of forest fires; timely implement of expropriation procedures and fair compensation for lost ownership of private forest owners and forest land, prevent substantial dust deposition on plants. **Operational phase:** Implementation of the measures from the Vegetation Management Removal Plan (which includes afforestation activities), implement preventive measures to reduce the danger of forest fires by timely clearing of vegetation along the motorway and	**Pre-Construction phase:** • Checking if the Vegetation Management and Removal Plan has been prepared prior to construction. **Construction phase** • Daily monitoring during works near or in woodlands by responsible person from the Contractor in order to monitor the successful implementation of the measures; • Weekly monitoring by the Supervision in order to control the contractor's work. **Operational phase**

	maintaining the protective zone along the motorway, installation of appropriate signalization for possible danger of forest fires, application of forest protection and regeneration measures.	• Monitoring of implementation by the State and municipal inspection body.

MITIGATION MEASURES AND MONITORING FOR SOCIAL IMPACTS		
ASPECT	**MITIGATION MEASURES**	**MONITORING**
Community Health, Safety and Security	**Construction phase:** Establishing a fenced safety zone around construction zones and facilities. Preparation of **Community Health and Safety Management Plan (CHSMP), Traffic Management Plan (TMP), Emergency Preparedness and Response Plan (EPRP)** as part of the CESMP in consultation with the relevant local authorities and emergency services. **Operational phase**: Conducting regular control and maintenance of traffic signalization, and inspection and maintenance of the fence along the motorway; implementation of EPRP, TMP and CHSMP, regular communication with the Army regarding the shooting range activities in the vicinity of the motorway.	**Construction phase:** • Contractor to develop quarterly reports on implementation of CHSMP, TMP and EPRP activities; • PESR to check and approve CHSMP, TMP and ERPR, and monitor its implementation; • PESR to monitor implementation of measures; • Contractor to report to PESR; • Contractor to report to PESR quarterly on stakeholder engagement activities conducting on construction site. **Operational phase**: • PESR to publish EPRP, TMP and CHSMP online; • Semi-annual control on traffic signalization and protection fence; • PESR to check on implementation of CHSP.
Labour, Working conditions, Occupational health, Safety and Security	**Construction phase:** Development and implementation of relevant labour and working conditions policies and plans by the Contractor (HR Policy; Non-discrimination and Equal Opportunities Policy; Policy against GBVH; Policy against Child and Forced Labour; Grievance Mechanism for workers, Code of Conduct; Workers' Accommodation Management Plan if needed; Local Employment and Procurement Plan). Contractor to engage independent consulting company that will perform Compliance Assessment of Contractor's HR & other labour related policies with national labour law and bylaws and PR2. Training of Contractor's workers, including annual training on GBVH. Development of Occupational Health and Safety Plan (OHSP). **Operational phase:** PESR to make available and maintain Grievance Mechanism for its workers, as well as workers engaged on road maintenance. Development of OHS Plan for the operational phase. Provision of traffic safety training to all maintenance workers. Implementation of EPRP during operation,	**Construction phase:** • PESR to check and approve Contractor's policies and monitor their implementation; • Continuous monitoring of implementation by receiving semi-annual reports on status of engaged workers; • PESR to check if the OHSP has been prepared; • Daily monitoring by responsible person from the Contractor of successful implementation of the measures; • Weekly monitoring by the Supervision in order to control the Contractor's work • Visual check of existence and presence on site by responsible monitoring entities • Monitoring officers to check and compare lists of engaged workers and those who received First aid training. **Operational phase:** • Monitoring by the relevant governmental inspection body; • Visual check of document adequacy by PESR.
Property, Housing, Communicat	**Pre-construction phase:** Develop and fully implement Land Acquisition and Resettlement Plan (**LARP**) (based on the developed Land Acquisition and Resettlement Framework - LARF). Establish Grievance Redress Mechanism (GRM) prior to commencement of	**Pre-construction phase** • Internal and external monitoring of land acquisition process in line with LARF/LARP provisions;

ion & Infrastructure	expropriation process. **<u>Construction phase:</u>** Contractor and PESR to inform affected communities about planned construction works as foreseen in SEP. During construction works, Contractor to send semi-monthly updates to PESR and PESR to publicise this information via its website and municipality website.	• Monthly review of external grievances by LARP Implementation Unit (LIU). **<u>Construction phase</u>** • Monitoring of Contractor's compliance with SEP provisions by PIU member responsible person for SEP implementation.
Economy, Use of natural resources & Livelihood provision	**<u>Construction phase</u>:** Develop and fully implement LARP provisions. For access to free water resources, Contractor to liaise with sheep pens owners, at the very beginning of the construction phase, in order to find quick and sustainable solution for continuous supply of water in case rubber hoses used for delivery of fresh drinking water to cattle/sheep are damaged – through replacement of these hoses by the Contractor. For access to pastureland, Contractor to give accent and priority in construction to underpasses to serve as a passage to the pastures for livestock. PESR to keep active GRM during construction.	**Construction phase** • Internal and external monitoring of land acquisition process in line with LARF/LARP provisions, • Contractor to create Minutes of Meetings with sheep pen owners on access to water resources, • Monitoring by PESR of construction of underpasses for animals, • Monthly review of external grievances by LARP Implementation Unit (LIU), • Visibility check.
Cultural heritage	**<u>Pre-construction phase:</u>** Contractor to develop a Chance Find Procedure (CHP) and train its workers in use of the CHP. **Construction phase:** Contractor to implement the CHP if sites or items of archaeological significance are found during construction works.	**<u>Pre-construction phase</u>** • Verification by PESR that the Contractor has developed a CHP prior to works, • Construction phase, • Verification by PESR that the Contractor is implementing the CHP in case of any chance finds during works.

6 MANAGEMENT OF RESIDUAL IMPACTS

The possible residual impacts, i.e. the impacts that will remain after implementation of mitigation measures, during the construction phase, are geology, geomorphology, soil, water, impacts that may be caused by waste and workers. During both phases of the project the possible residual impacts can be expected on biodiversity, forest and forestry, impacts on the project as a result of climate changes, as well as noise and vibration and use of hazardous materials. Residual impacts are not expected to be significant. For all identified residual impacts additional mitigation measures are proposed in the ESIA.

7 COMMUNICATION

PESR intends to provide all relevant Project information to the public in Macedonian and English (where appropriate). A detailed Stakeholder Engagement Plan has been developed for this Project, outlining the stakeholder engagement and communication programme, including access to the Project's Grievance Mechanism. This NTS will also be translated into Albanian.

All grievances and enquiries will be directed to PESR through the following designated staff member:

Contact information for enquiries and grievances:

Attention: Mr. Jozhe Jovanovski

Public Enterprise for State Roads (PESR)

Address: ul. Dame Gruev 14, Skopje, Republic of North Macedonia

Tel: + 389 2 311 80 44 ext. 305

E-mail: j.jovanovski@roads.org.mk

The following documents will be published on the PESR's website (http://www.roads.org.mk and the EBRD website (www.ebrd.com) in Macedonian and in English language, as well as NTS in Albanian language:

1. Environmental and Social Impact Assessment (ESIA) Study, including Environmental and Social Management Plan (ESMP) and Monitoring Plan
2. Environmental and Social Action Plan (ESAP)
3. Stakeholder Engagement Plan (SEP) and the Project Grievance Form
4. This Non-technical Summary (NTS)
5. Land Acquisition and Resettlement Framework (LARF)
6. Land Acquisition and Resettlement Plan (LARP) when developed

The PESR will make available hard copies of these documents at the following locations:

- Public Enterprise for State Roads, ul. Dame Gruev 14, Skopje, N. Macedonia;
- EBRD office in Skopje.

On the websites of the Municipality Chucher-Sandevo (www.cucersandevo.gov.mk) and the Ministry of Environment and Physical Planning (www.moepp.gov.mk), will be published:

1. Environmental and Social Impact Assessment (ESIA) Study, including Environmental and Social Management Plan (ESMP) and Monitoring Plan in Macedonian and language
2. This Non-technical Summary (NTS) in Macedonian and in Albanian language