

PUBLIC ENTERPRISE FOR STATE ROADS

Republic of North Macedonia



**ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (ESAR) FOR THE
PROJECT LOT 6: REHABILITATION OF THE STATE ROAD A2, SECTION
RANKOVCE - KRIVA PALANKA, L= 21KM**

July 2019

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LIST OF ABBREVIATIONS

BP	Bank Procedure
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPSAU	Environmental Protection and Social Aspects Unit
ESAR	Environmental and Social Assessment Report
ESMMP	Environmental and Social Management and Monitoring Plan
EU	European Union
IPMU	International Projects Management Unit
NTS	National Transport Strategy
NRRRP	National and Regional Road Rehabilitation Project
MoEPP	Ministry of Environment and Physical Planning
PRs	Performance Requirements
PCE	Public Communal Enterprise
PESR	Public Enterprise for State Roads
PHI	Private Health Institution
PIU	Project Implementation Unit
RNM	Republic of North Macedonia
EBRD	European Bank for Reconstruction and Development

1. Executive summary

The strategy highlights the important role of roads in promoting the country's competitiveness and harmonious development through ensuring that the national road network is connected efficiently to the corridors and existing bottlenecks are eliminated. This Project represents the implementation of the last phase of NRRRP for the period 2017-2018 and covers the following:

- improvement of condition on state road network by means of rehabilitation of approximately 125 km of the existing roads;
- increase of road safety condition through appliance of measures for improvement of road safety in all phases of the Project implementation.

The institution in charge for the Project implementation is the Public Enterprise for State Roads (PESR). Within the PESR there is a Project Implementation Unit (PIU) responsible for implementation of all necessary activities and actions for successful management and completion of the Project.

The project Rehabilitation of the State Road A2, section Rankovce - Kriva Palanka, L= 21km is classified as Category B project according to the EBRD Environmental and Social Policy. In its Environmental and Social Policy, EBRD has adopted a comprehensive set of specific Performance Requirements (PRs) that the projects are expected to meet. For the project which is a subject of this ESAR the following Performance Requirements (PRs) are relevant: PR 1: Assessment and Management of Environmental and Social Impacts and Issues, PR 2: Labour and Working Conditions, PR 4: Health and Safety, PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, PR 10: Information Disclosure and Stakeholder Engagement.

The section Rankovce - Kriva Palanka is part of the National road A2 and is located in the northeast of RN Macedonia. It starts from the bridge on the river Vetunicka and ends in the sub-urban area at the beginning of the city of Kriva Palanka, located before the junction with the road to st. Joakim Osogovski monastery. Total length of the road to be rehabilitated is 21 km. The section passes through two municipalities: Municipality of Rankovce and Municipality of Kriva Palanka, and through eight populated areas. The section has 65 culverts and 16 bridges. During the implementation of the project preliminary works, rehabilitation of the pavement and structures will be done and traffic signalization will be put in place.

Potential environmental and social impacts of the project are assessed in this Environmental and Social Assessment Report (ESAR) which is developed to meet the requirements of North Macedonian National legislation and EBRD Environmental and Social Policy.

Potential environmental and social impacts as a result of implementation of the project activities i.e. rehabilitation of the road section will be local, short-term and insignificant. Implementation of proper mitigation measures during the rehabilitation activities will ensure minimizing of the adverse project impacts to acceptable levels.

Moreover, the rehabilitation of the road section will improve technical conditions of this road and therefore, will contribute to safe, fast, economic and comfortable road traffic.

2. Policy, legal and administrative framework

The Environmental Assessment process is intended to serve as a primary input for the decision-making process by North Macedonian authorities and the EBRD, which have to approve the project before it can be implemented.

National Environmental Legal Framework

Republic of North Macedonia has developed full legal and institutional framework for Environmental Assessments. This framework is generally in compliance with the existing EBRD Environmental Assessment rules and procedures as well as in compliance with the EU EIA Directives. Environmental Impact Assessment of certain projects is required to be carried out in accordance with Articles 76-94 of the Law on Environment ("Official Gazette of RM" No. 53/05, 81/05, 79/06, 101/06, 109/06, 24/07, 159/08, 83/09, 1/10, 48/10,124/10, 51/11, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15, 39/16 and 99/18).

In accordance with Article 24 of the Law on Environment, for the projects of rehabilitation of the existing roads it is obligatory Elaborate for environmental protection to be prepared and approved by the relevant environmental authority.

The Ministry of Environment and Physical Planning (MoEPP) has prepared Rulebook for implementing, screening, scoping and reviewing of environmental impact assessment process in the Republic of North Macedonia. An aim of this Rulebook is to assist in the interpretation of the EIA laws so that they can be applied in practice. The rehabilitation activities of the section Rankovce- Kriva Palanka is covered by Decree amending the Decree for actions and activities for which is obligatory preparation of an *Elaborate for environmental protection* for which approval the Ministry of Environment and Physical Planning is competent authority (“Official Gazette of RM” No. 36/12) (XI - Infrastructure Projects, 15 - Reconstruction of Motorways and Magistral Roads for more than 10 km).

The Elaborate for environmental protection is required to identify and describe the negative and positive impacts on medias and areas of the environment – water quality, air quality, waste management, noise protection, protection of the biodiversity, as well as the social impacts – improvement of the economy, traffic conditions, etc., and define proper mitigation measures during rehabilitation activities to reduce or mitigate impacts to acceptable levels.

EBRD Environmental and Social Policy

The project Rehabilitation of the State Road A2, section Rankovce - Kriva Palanka, L= 21km is classified as Category B project according to the EBRD Environmental and Social Policy. In its Environmental and Social Policy, EBRD has adopted a comprehensive set of specific Performance Requirements (PRs) that the projects are expected to meet. For the project which is a subject of this ESAR the following Performance Requirements (PRs) are relevant: PR 1: Assessment and Management of Environmental and Social Impacts and Issues, PR 2: Labour and Working Conditions, PR 4: Health and Safety, PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, PR 10: Information Disclosure and Stakeholder Engagement.

PR 1: Assessment and Management of Environmental and Social Impacts and Issues establishes the importance of integrated assessment to identify the environmental and social impacts and issues associated with the project and the client’s management of environmental and social performance throughout the life of the project. For the purposes of this Policy, social impact refers to the impacts on individuals, community and workers, resulting from the business activity to be supported and the way in which their working conditions, socio-economic status, cultural identity, human rights and/or health may be affected. This PR outlines the responsibilities of the client in the process of assessing the potential environmental and social impacts and issues associated with the project, and developing and implementing procedures for managing and monitoring these impacts and issues.

PR 2: Labour and Working Conditions recognises that for clients and their business activities, the workforce is a valuable asset, and that good human resources management and a sound worker-management relationship based on respect for workers’ rights, including freedom of association and right to collective bargaining, are key ingredients to the sustainability of business activities. The objectives of this PR are to: respect and protect the fundamental principles and rights of workers; promote the decent work agenda, including fair treatment, non-discrimination and equal opportunities of workers; establish, maintain and improve a sound worker-management relationship; promote compliance with any collective agreements to which the client is a party, national labour and employment laws; protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions; prevent the use of forced labour and child labour as it relates to project activities.

PR 4: Health and Safety recognises the importance of avoiding or mitigating adverse health and safety impacts and issues associated with project activities on workers, project-affected communities and consumers. The objectives of this PR are to: protect and promote the safety and health of workers by ensuring safe and healthy working conditions and implementing a health and safety management system, appropriate to the relevant issues and risks associated with the project; anticipate, assess, and prevent or minimize adverse impacts on the health and safety of project-affected communities and consumers during the project life cycle from both routine and non-routine circumstances.

PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources recognises that the conservation of biodiversity¹ and sustainable management of living natural resources² are fundamental to environmental and social sustainability. The objectives of this PR are to: protect and conserve biodiversity using a

precautionary approach; adopt the mitigation hierarchy 3 approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity; promote good international practice (GIP) in the sustainable management and use of living natural resources.

PR 10: Information Disclosure and Stakeholder Engagement recognises the importance of an open and transparent engagement between the client, its workers, local communities directly affected by the project and, where appropriate, other stakeholders as an essential element of good international practice (GIP) and corporate citizenship. The objectives of this PR are to: outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular the directly affected communities; promote improved environmental and social performance of clients through effective engagement with the project's stakeholders; promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that meaningful environmental and social information is disclosed to the project's stakeholders; ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately.

3. Project description

The Project is consistent with the National Transport Strategy (2018-2030), which sets out improved road connectivity to the Corridors as the national priority after the completion of Corridors X and VIII. The strategy highlights the important role of roads in promoting the country's competitiveness and harmonious development through ensuring that the national road network is connected efficiently to the corridors and existing bottlenecks are eliminated.

This Project represents the implementation of the last phase of NRRRP and covers the following:

- improvement of condition on state road network by means of rehabilitation of approx. 125 km of the existing roads;
- increase of road safety condition through appliance of measures for improvement of road safety in all phases of the Project implementation;

The institution in charge for the Project implementation is the Public Enterprise for State Roads (PESR). Within the PESR there is a Project Implementation Unit (PIU) responsible for implementation of all necessary activities and actions for successful management and completion of the Project.

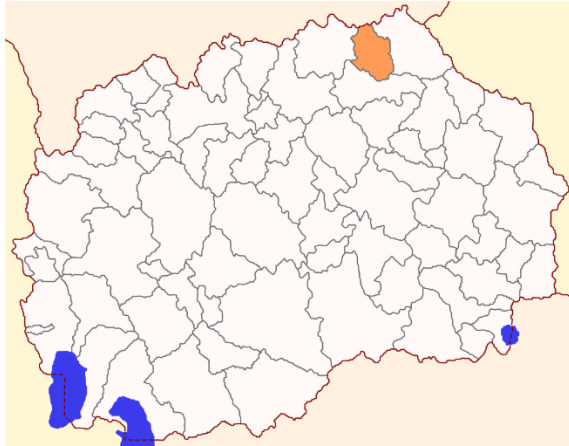
The achievement of the road rehabilitation project will be measured through:

- Reduction in travel time for passenger vehicles
- Reduction of vehicle operating costs
- Roads in good and fair condition as part of total classified roads
- Road safety design audit implemented
- Design documentation including road safety components
- Shortening of the total duration of procurement process

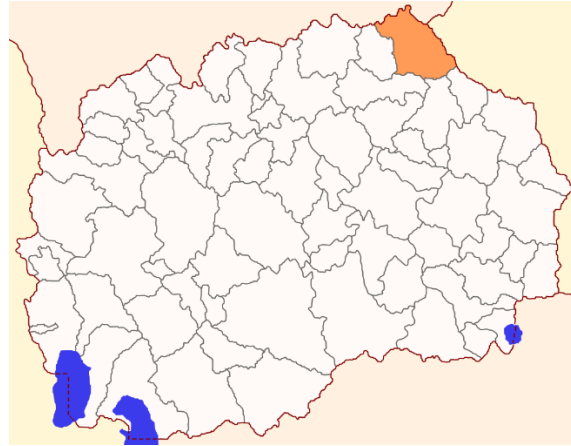
The project LOT 6: Rehabilitation of the State Road A2, section Rankovce - Kriva Palanka, L= 21km will be implemented in line with the prepared Conceptual Design for the project (delivered to the Contractor PESR's No 08-58/15 from 14.01.2019 and Granit's No 12-254 from 16.01.2019, and this ESAR is prepared on the bases of the data from the following contractual documentation: Volume 2: Bill of Quantities, Volume 3: Technical Specifications, chapter 14: Environmental Protection and Implementation of EMP, Volume 5: Conceptual Design for LOT 6 and Elaborate on Environmental Protection.

3.1 Location of the project

Project activities will be implemented in the Municipality of Rankovce and Municipality of Kriva Palanka. Both municipalities are situated in the northeast part of the country and are part of the northeast plan region of the RN Macedonia.

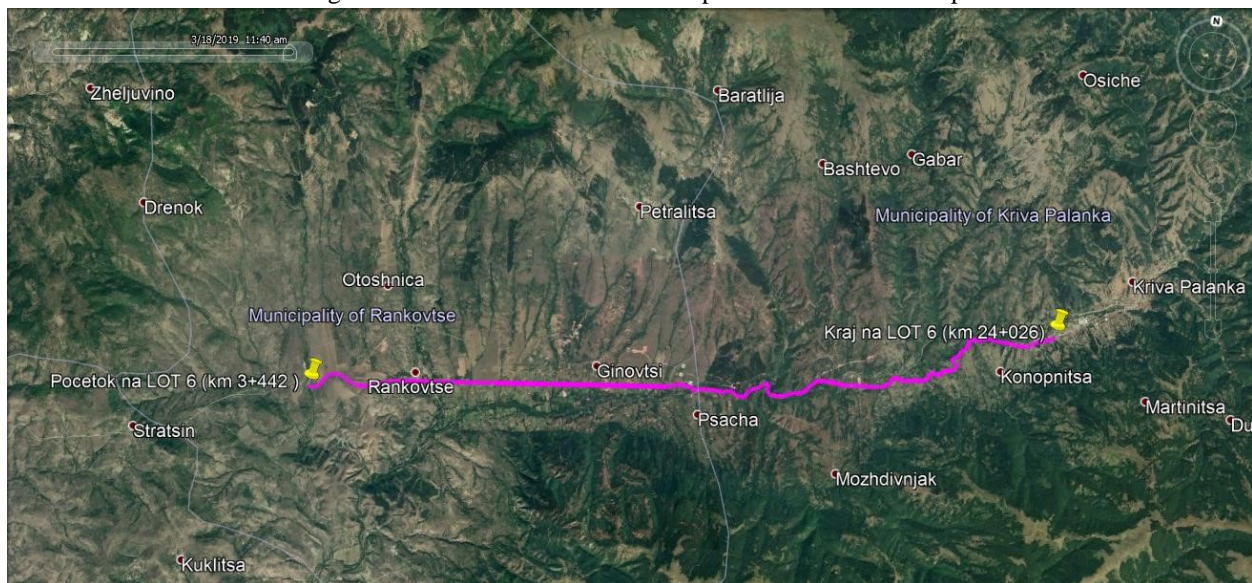


Picture 1: Municipality of Rankovce



Picture 2: Municipality of Kriva Palanka

The section Stracin - Kriva Palanka is part of the National road A2 and is located in the northeast of RN Macedonia. It is currently the most used road which connects RN. Macedonia with R. Bulgaria. The starting chainage 0+000 of the designed road is located before the junction with the road to city of Kratovo R1205 at coordinates LON +22.047346° and LAT +42.152806°. It is important to note that the design documentation of this project does not treat the first 3442m of the section (from the beginning to the bridge on the river Vetunicka) because they are treated in another project which. The end is on chainage 24+026 and is located before the junction with the road to st. Joakim Osogovski which is entrance to the city of Kriva Palanka at coordinates LON +22.308827° and LAT +42.191623°. At the beginning of the designed section from km 3+442 to km 6+400 the road width is 7,70 m and after that it is in the range from 6,00m to 6,50m. The section passes through eight populated areas: village of Rankovce from km 6+300 to km 6+800, village of Ljubinci from km 8+487 to km 9+040, v. Ginovci from km 9+130 to km 10+480, v. Petralica from km 10+500 to km 10+970, v. Psacha from km 13+400 to km 14+100, v. Mozdovnjak from km 17+800 to km 18+447, v. Konopnica from km 18+655 to km 19+765, and from km 22+390 to km 24+026 passes through the sub-urban area of the city of Kriva Palanka with residential and commercial areas close to the carriageway. Several access roads for settlements and villages connect to this section. The map of the road section is presented on the Picture 1.



Picture 3: Road section Rankovce – Kriva Palanka

3.2 Current situation of the road

During the visual distress survey of the asphalt surface of the road section implemented on the 10.03.2018, the following distresses have been registered: longitudinal cracking, transverse cracking, map cracking, potholes, edge break, raveling, rutting, repairs, deformation, bleeding and total disintegration.

Drainage, bridges and structures

One of the major causes of road damage, and problems with serviceability of road networks, is excess water filling the pores of road materials in the road and in the subgrade soils. Poor drainage creates many problems to both road users and road owners. Typically, these are:

- Traffic safety (aquaplaning and ice)
- Erosion
- Reduced bearing capacity in the subgrade and road structures causing permanent deformation
- Frost heave (poor drainage maintenance)
- Reduced pavement life time and increased pavement management costs.

On the designed section, all drainage elements are generally in bad condition. The main reason for this, are debris and sediments blocking the water flow through the culverts and ditches. Also, the structural integrity of the culverts, small bridges and gutters should be improved. The section has 65 culverts and 16 bridges.

According to the Conceptual Design accepted pavement construction is:

- AC-11s d1= 4 cm
- BBL-22s d2= 8 cm
- Subbase dt=50 cm
- Existing subgrade CBR 4%

3.3 Activities to be implemented during the rehabilitation

PRELIMINARY WORKS

- Removal of trees and shrubs in 2m wide corridor on the both side of road, measured from the end of the shoulder and removal of wastes and debris from right a way that may obstruct execution of works
- Removal of existing kerbs and stocking of regular kerbs for possible re-use. Hauling and transport of damaged kerbs to the disposal sites designated by municipality of Rankovce No. 4266/1 and No. 4937/10 CM Rankovce
- Demolishing, excavation, loading and hauling of existing pavement structure in road width and pavement thickness as designed
- Profiling of existing pavement - roughening with profiling, scraping and disposal of the material
- Cleaning of longitudinal and transverse cracks located on pavement, along pavement edges and along the joint between carriageway and kerbs.
- Cleaning the existing culverts, removal of sediments and waste materials and debris
- Cleaning and shaping of existing earth channels and gutters from deposited earth material, mud, arms, shrubs, wastes and all other materials that disable unobstructed water flow
- Excavation of top soil on berms including loading and haulage in spoil with planning and shaping of the berm behind the elevated curb
- Dismantling and removal of existing traffic signs including poles with transport to stock pile area
- Dismantling and removal of existing steel guard rails including steel poles with transport to stock pile area

PAVEMENT

- Preparation of road base in widening, cuts, embankments and side cuts with rough and fine grading and compacting

- Construction of unbound road base after partial removal of pavement
- Filling of longitudinal and transversal cracks
- Repair of pavement surface damages includes cutting, cleaning, covering by emulsion, treatment and cleaning of surface which shall be repaired, spreading and compaction of BNS 22 and preservation of completed repair in depth up to 7 cm
- Repair of damaged pavement edges including cutting of pavement edges in the width of 20 cm and depth of existing asphalt courses as well as change of the existing layer by new bituminous base course BNS 22
- Repair of potholes, including cutting, cleaning and covering by the bituminous emulsion and placing of new asphalt mixture of same thickness as existing pavement structure
- Procurement, transport and construction of bituminous bearing course, BNS 22
- Procurement, transport and construction of asphalt concrete course AC 11s
- Excavation of new ditches
- Construction of new asphalt gutters (width - 75 cm)
- Placing of prefabricated concrete curbs
- Upgrading of the existing shoulders by mechanical stabilization and Constructing of new shoulders made of non-coherent materials, covered by sand, gravel or stone grit.

For the pavement works, the proposed measures are:

- Roughening d=0-3cm
- Scraping d=3-5cm
- Bituminous bearing course (BNS-22s) d=8cm
- Asphalt-concrete (AC-11s) d=5cm
- Asphalt-concrete (AC-11s) d=4cm

The main points of the rehabilitation design are as follows:

a) Roughening d=0-3cm and one layer overlay with AC-11s d=5cm:

- from km 3+450 to km 12+875
- from km 13+300 to km 16+500
- from km 22+950 to km 24+026

b) Scraping d=3-5cm and two layer overlay with BNS-22s d=8cm and AC-11s d=4cm

- from km 12+875 to km 13+300
- from km 16+500 to km 22+950

STRUCTURES

- Reparation of the existing pipe and arch culverts - inlet and outlet
- Reparation of the exposed surface of box culverts and small bridges with reparative mortar (in visible reinforcement and concrete decomposition) in depth of 10 cm

TRAFFIC SIGNALIZATION

- Placement of standard traffic signs, boards, road markings, pedestrian crossing marking, new guard rails on shoulders, new guard rail on culverts and retaining wall, reflective studs, reflective studs, kilometre posts

4. Baseline data

4.1 Geology and Geomorphology

Precambrian

The Precambrian rocks are developed on both sides of the river Duracka Reka, a left tributary to the river Kriva Reka. They are manifested by gneisses and micaschists with layers of quartzites and lenses or layers of amphibole rocks and metabasites. According to their textural features, gneisses are divided into striped and ocular-striped, and granular

porphyritic. They are all bi - mica and metasomatically enriched by feldspars. Striped and ocular-striped gneisses are present in this section of the track.

Striped gneisses (Gmb) - are fine-grained, grey to white color and with a distinct striped texture. They occur in association with ocular-striped gneisses and micaschists which they are always bound with a gradual transition vertically and laterally. Among striped gneisses there are also gneisses not affected by metasomatic processes but identical by appearance, which is the reason why they cannot be differentiated macroscopically. They often contain layers or larger parties of micaschists and rarely layers of amphibole rocks and metabasites.

Ocular-striped gneisses (Gmb), according to distribution are detached in the form of a long zone with a northwest (the lower catchment of the Duracka river near Kriva Palanka) to southeast stretch towards Babina Cheshma, Kitka and further to v. Cera, where it subsides. They are most commonly found in micaschists. They differ from fine-grained striped gneisses only by texture and content of coarsegrained feldspars in the shape of elongated eyes up to 7 cm. Striped and ocular-striped metasomatic gneisses have identical composition: feldspars (around 50 %), quartz (around 50 %) and mica (around 15 %). By appearance *micaschists (Sm)* are yellowish to brownish rocks with prominent shale-like structure and content of large mica scales. Most commonly they are composed of quartz (20-50 %) and micas (30-40 %) as core components. At certain spots in the composition of micaschists, granite or albite occurs as a core component and ortite as a secondary component.

Quartzites (Q)- They occur on the left riverbank of the river Kriva Reka near Kriva Palanka. They are found in the micaschists composition in the form of layers of up to a few hundred meters in length and up to a few tens of meters in depth.

Riphean-Cambrian

Albite-epidote-chlorite and albite-chlorite shales (Sep) - are the most permanent lithologic members of the series. They are distributed on both sides of the Kriva river on the southwestern slopes of German Mountain and the northern slopes of Osogovo. They have a distinctively green color and are hale-like in texture with dense dots (balls) of feldspar (up to 3 mm). They contain albite, chlorite, epidote, quartz and albite-chlorite.

Quaternary Sedimentary Deposits

Upper River Terrace (t2) - It extends along the Kriva river valley at an elevation of 510 m, with a total depth of approximately 30 m. It consists of clayish matter, clay, clay-loam and sands, which constitute arable land.

Lower River Terrace (t1) - It also mainly extends along the Kriva river valley at an elevation ranging between 480 and 510 m. It is composed of clayish matter, mixed with gravel and sand.

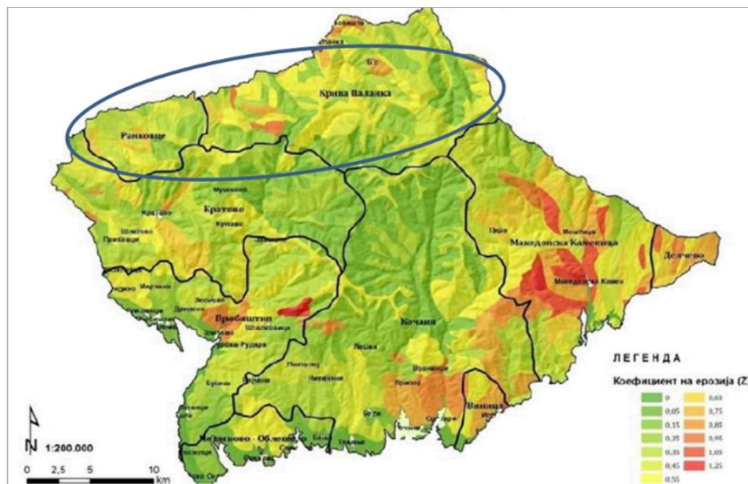
Proluvium (pr)- The proluvial sediments occur along the Kriva river valley and they are chiefly reddish in colour. The sediments are composed of scantily workable fragments of various rocks with clayish sandy material.

Diluvium (d)- Diluvial sediments are found on the slopes north of the Kriva river (Radibus, Ginovci), and they mildly descend towards the river. They are made of coarse, unworkable material originating from adjacent rocks, mixed with clayish-sandy material.

4.2 Erosion

Regarding the erosion, almost half of the territory of the municipalities located in category IV erosion (46.8%) and together with V category (11%), the total area of these two categories is 57.8%. So more than half of the territory is not threatened by erosion. But this is only apparently so. The other parts of the surface, II and III category are located where human activity is more intense (around villages).

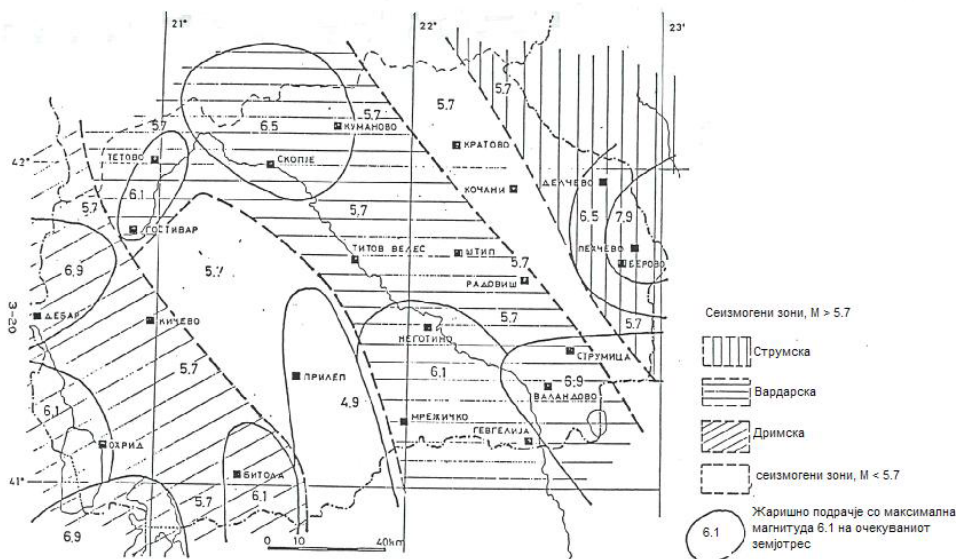
The area is characterized by the highest water sediment in the state. When snow is being melt in the spring it starts severe drainage and erosion processes. The intensity of rain is crucial for incidental occurrences of strong erosive processes.



Picture 4 : Erosion map of the project area

4.3 Seismology

The project area is situated in the East Macedonian neotectonic zone, in the Strumska seizmogenic zone where the magnitude of the earthquake is $M > 5.7$.



Picture 6: Seismogenic zones of the territory of the RN Macedonia according to D. Hadzievski, 1985

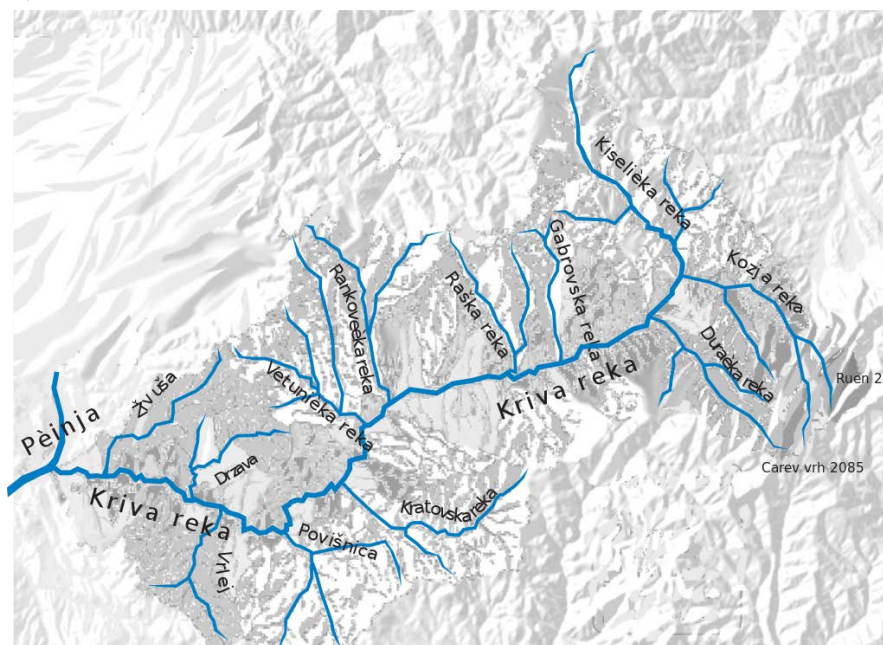
4.4 Climate and meteorology

The Municipality of Rankovce is situated in Slavisko Pole, and from north and from south is surrounded with the mountains. These orographic characteristics have important role in creating the climate in the municipality, which is moderately – continental. The average annual temperature is 10.2°C, the hottest month is July and the coolest is January. In the municipality blow the following winds: southwestern, northern, southern, southeastern and eastern. The most present is southwestern wind, with the frequency of 219%, the annual average speed of 2.9 m/s and the maximal speed of 19.0 m/s. The amount of precipitation is significant in the area, with the average annual precipitation of 633.5mm, with minimum in November and maximum in May. The average datum for the first snow is 30 November.

Due to the geographical position and hilly-mountainous terrain, the climate in the Municipality of Kriva Palanka is different in different zones: low-mountain, intermediate-mountain and high-mountain zones. The climate in the low-mountain zone is continental; in the intermediate mountain zones the climate is characterized by fresh summers, cold springs, cold and snowy winters and large amounts of rainfall. In the higher areas, low temperatures are present in all seasons. The average annual temperature is 11°C. The average annual precipitation is 622mm, due to the altitude which is a natural condenser of the vapor brought by the southern and western winds. The winds have an average annual rate of 2.9m/s, and the most frequent are the northeastern winds.

4.5 Hydrology

Road section is located in the northeastern region of the RN Macedonia, where the rivers are part of the Vardar river catchment. Specifically, the road stretches along the river Kriva Reka and its tributaries and in some points, it crosses over some of them.



Picture 7: Kriva Reka and its tributaries

The tributaries of Kriva Reka which are present in the broader area where the project is implemented are: Vetunicka Reka, Rankovacka Reka, Raska Reka and Gabrovska Reka. The road section crosses over: Vetunicka Reka, Rankovacka Reka and Kriva Reka.

The quality of the river Kriva Reka, as prescribed in the Decree of Categorization of Water Courses, Lakes, Accumulations and Ground Waters (Official Gazette No.18/99), is of the second class.

There is no detailed study about the underground waters and only local detailed investigations for exploitation purposes have been undertaken. Estimated static reserves of the unconfined alluvium aquifer of the river Kriva Reka are 675 x 106 m³.

4.6 Air quality

Measurements of concentrations of particulate matter with an equivalent aerodynamic diameter < 10µm (PM₁₀) have been done on two measurement points for the purposes of this ESAR. 24 hours measurements of PM₁₀ were done in the village of Rankovce (Municipality of Rankovce) and village of Mozdivnjak (Municipality of Kriva Palanka). On the measurement point in the village of Rankovce the 24 hours concentration of PM₁₀ is 8.3µg/m³, and the 24 hours concentration of PM₁₀ in the village of Mozdivnjak is 38 µg/m³. The limit value of 24 hours concentration of PM₁₀ is 50µg/m³, thus it could be concluded that the air quality regarding PM₁₀ in the project area is good. The whole Report on measurements of concentrations of PM₁₀ is given as an Annex 1 of this ESAR.

4.7 Noise

Taking into account that the road Rankovce – Kriva Palanka connects RN Macedonia with R Bulgaria and through which a great number of transport vehicle pass, the area around the road will be classified as an area with III level of noise protection. In this area the maximal allowed noise level during the day is 60dB (A) according to the Rulebook for the limit values of the noise levels in the environment (Official Gazette of RM 147/08). For the purpose of this ESAR the measurements of noise levels in the environment were done in the village of Rankovce (Municipality of Rankovce) and village of Mozdivnjak (Municipality of Kriva Palanka). The measurements were done during 10:50 – 12:00 (day time period) The noise levels measured in the village of Rankovce are 52,9 Leq dB(A), and the noise levels measured in the village of Mozdivnjak are 58,7 Leq dB(A). It could be seen that in the village of Mozdivnjak the measured noise levels are close to the limit noise value of 60dB (A). The whole Report on measurements of noise levels in the environment are given as an Annex 2 of this ESAR.

4.8 Biodiversity

The main biodiversity features can be divided in two distinctive parts:

- Slavishko Pole More or less flat to gently sloped area from the village of Rankovce to the villages of Psacha/Petralica which is densely populated agricultural area
- from the villages Psaca/Petralica to the town of Kriva Palanka is hilly or mountainous area and populated area.

The habitats along the area of the state road can be divided in two main categories according to their origin: natural and anthropogenic habitats.

Natural habitats include:

- Forests and shrublands;
- Water habitats;

Anthropogenic habitats include:

- Agricultural land;
- Urban or urbanized areas.

Forests and Shrublands

Belt of oak forest

Thermophilous Oak Forest – Mixed Italian Oak and Turkey Oak Forest

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.762 Helleno-Moesian [*Quercus frainetto*] forests**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

In the upper parts of the oak forest belt there are stands of Italian oak (*Quercus frainetto*). These stands represent small patches of the forest belt **Querquetum frainetto-cerris macedonicum** Oberd. 1948 em. H-at. 1959, which is normally above the belt of pubescent oak and oriental hornbeam. The edifier species are Italian oak and Turkey oak (*Quercus cerris*). Beside these tree species, *Cornus mas*, *Carpinus orientalis*, *Crataegus monogyna*, *Rosa galica*, *Rosa arvensis* etc. represent the subdominant tree layer and shrub layer. *Danaa cornubiensis*, *Trifolium pignanii*, *Inula salicina*, *Lathyrus inermis*, *Stachys scardica*, *Crocus veluchensis* etc., are the most common plants in the herb layer. The elements from more xerothermic forest (*Querco-Carpinetum orientalis*) such as *Quercus pubescens*, *Carpinus orientalis*, *Pyrus amygdaliformis*, *Fraxinus ornus*, *Colutea arborescens*, *Coronilla emeroides* etc. are usually mixed with *Quercus frainetto* forest.

The habitat is distributed intermittently on a number of locations along the Kriva Reka. The better-preserved associations are in the surroundings of village T'Iminci.

Mammals: Mammal fauna is similar to the one of forests of pubescent oak and Oriental hornbeam.

Birds: Bird fauna is almost the same as in the forest of pubescent oak and Oriental hornbeam.

Reptiles and amphibians: The species of amphibians and reptiles: In this habitat are the same as the forest of pubescent oak and Oriental hornbeam.

Mesophilous Oak Forests - Flowering Ash and Sessile Oak Forest

Reference to EUNIS Habitats: G1.76 Balkano-Anatolian thermophilous [*Quercus*] forests - **G1.763 Helleno Moesian [*Quercus dalechampii*] forests**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **41.7 Thermophilous and supra-Mediterranean oak woods**

General characteristics

In the upper parts of the oak forest belt, there are stands of ass. **Orno-*Quercetum petraeae*** Em 1968. It grows on a base of phylitoids, covered by medium-deep to deep forest brown soil. The tree belt is dominated by the following: *Quercus petraea*, *Quercus cerris*, *Fraxinus ornus*, *Carpinus betulus* and *Acer campestre*. *Corylus avellana*, *Cornus mas*, *Ligustrum vulgare*, *Crataegus monogyna*, *Evonimus verrucosa*, *Mallus silvestris* occur in the bush belt. The most frequent in the herb layer are as follows: *Festuca heterophylla*, *Lathyrus niger*, *Lathyrus venetus*, *Campanula persicifolia*, *Melica uniflora*, *Pulmonaria officinalis*, *Cyclamen neapolitanum*, *Scilla bifolia*, *Poa nemoralis*, *Sanicula europea*, *Stellaria media*, etc.

It does not have a regular distribution. As an intermittent belt, it stretches along the left course of the Kriva Reka above Kriva Palanka, as well as along the downstream of the Vitunica river, at the confluence with the Kriva Reka.

Mammals: Mammal fauna is similar to the one of the forests of Pubescent Oak and Oriental Hornbeam.

Birds: Bird fauna is almost the same as in the Forests of Pubescent Oak and Oriental Hornbeam and forests of Italian and Turkey oak.

Riparian Forests, Woodlands and Shrublands

These forests and shrublands develop along the river banks and streams everywhere in the area under consideration.

Riparian Willow - Poplar Woodland

Reference to EUNIS Habitats: G1.11 Riverine [*Salix*] woodland - **G1.112 Mediterranean tall [*Salix*] galleries** (G1.1121 Mediterranean white willow galleries)

Reference to EU HD Annex I: **92A0 *Salix alba* and *Populus alba* galleries**

Reference to CoE BC Res. No. 4 1996: **44.1 Riparian willow formations**

Reference to EUNIS Habitats: G1.31 Mediterranean riparian [*Populus*] forests -

G1.315 East Mediterranean poplar galleries

Reference to EU HD Annex I: **92A0 *Salix alba* and *Populus alba* galleries**

Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The willow-poplar woodlands in the studied area develop on alluvial sandy soils on the riverbank terraces. The ground is flooded regularly during the wet period. The biotope is characterized by permanent humidity, light structure and texture of the soil. In the wider areas along the rivers, open terrain and small meadows are often present.

This woodland type belongs to the ***Salicetum albae-fragilis*** Issler 1926 association. The most typical tree species are *Salix alba*, or mixed *Salix alba* and *Salix fragilis*. *Populus nigra*, *Salix triandra*, *Sambucus nigra*, *Viburnum opulus*, *Cornus sanguinea*, *Rhamnus frangula*, *Amorpha fruticosa* etc. occur in small groups or individually. In some stands, poplar trees (*Populus nigra*, *Populus tremula* and *Populus alba*) prevail and the stand resembles typical poplar community. In the herb layer the most characteristic species are: *Poa trivialis*, *Poa palustris*, *Carex vulpina*, *Polygonum lapatifolium*, *Polygonum hidropiper*, *Rumex sanguineum*, *Veronica anagalis-aquatica*, *Scirpus lacustris* etc. Well-preserved riparian willow-poplar woodland is present along the Kriva river, particularly close to the villages Vetunica (at the confluence of Vetunica river into the Kriva river), and in the surroundings of the villages of Psacha and other localities along the Kriva river.

Mammals: Common species for this habitat are the lesser white-toaded screw (*Crocidura suaveolans*) and wood mouse (*Apodemus sylvaticus*). Red fox (*Vulpes vulpes*), wild boar (*Sus scrofa*), red squirrel (*Sciurus vulgaris*), common mole (*Talpa europea*) and weasel (*Mustela nivalis*) are also common for this habitat. Presence of the otter (*Lutra lutra*) is likely in this habitat of the investigated area, even though not confirmed for certain.

Birds: The fauna of resident species is not much different compared to the other forest types in the area, except for *Common Kestrel Falco tinnunculus*, *Common Kestrel Falco tinnunculus* and *Cetti's warbler Cettia cetti*. The main difference can be observed in the fauna of breeding birds (19 species). Specific for this habitat are: *European Roller Coracias garrulus*, *Sedge Warbler Acrocephalus schoenobaenus*, *Marsh Warbler Acrocephalus palustris*, *Eastern Olivaceous Warbler Hippolais pallida* and *Eurasian Penduline Tit Remiz pendulinus*.

Reptiles and amphibians: This habitat is preferred both, by amphibians and reptiles. In total 8 amphibians and 10 reptile species are present. The amphibians found here are *Fire Salamander (Salamandra salamandra)*, *Common Newt (Lissotriton vulgaris)*, *Yellow Belied Toad (Bombina variegata)*, *Common Toad (Bufo bufo)*, *Green Toad (Pseudepidalea viridis)*, *European Tree Frog (Hyla arborea)*, *Balkan Stream Frog (Rana graeca)* and *Marsh Frog (Pelophylax ridibundus)*. The reptiles found here are: *Hermanns Tortoise (Eurotestudo hermanni)*, *Greek Tortoise (Testudo graeca)*, *Erhard's Wall Lizard (Lacerta erhardii)*, *Green lizard (Lacerta viridis)*, *Balkan Green Lizard (Lacerta trilineata)*, *Slow Worm (Anguis fragilis)*, *Aesculapian Snake (Zamenis longissimus)*, *Grass Snake (Natrix natrix)*, *Dice Snake (Natrix tessellata)* and *Nose-horned Viper (Vipera ammodytes)*.

Shrub Communities - Shrublands of Tamarisk and *Salix amplexicaulis*

Reference to EUNIS Habitats: F9.12 Lowland and collinar riverine [Salix] scrub - **F9.123 Balkan riverine willow scrub**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **44.1 Riparian willow formations**

Reference to EUNIS Habitats: F9.31 [Nerium oleander], [Vitex agnus-castus] and [Tamarix] galleries - **F9.3133 East Mediterranean tamarisk thickets**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **44.8 Southern riparian galleries and thickets**

General characteristics

This biotope mostly represents the heliophilous shrubland dominated by *Tamarix* spp. and *Salix amplexicaulis*. These shrub species form the specific plant community named **Tamarici-Salicetum amplexicaulis** (Kárpáti 1962) Em 1967. It develops on sandy and gravelly river drifts in the range of the willow community. The ground comprises sandy or gravelly soil or soil in the process of formation. These areas are flooded from time to time and the wetland shrubland or forest vegetation cannot be established. In the herb layer, *Lycopus europaeus*, *Equisetum arvense*, *Juncus articulatus*, *Mentha longifolia*, *Agrostis alba* etc. are common. Numerous annual species from the neighbouring grassland areas can often be seen.

This biotope develops on the Kriva Reka banks or smaller permanent river islands. On the Kriva Reka valley, riparian shrub communities develop in the vicinity of the village Vetunica.

Fauna: Animal composition of the shrublands of *Tamarix* and *Salix amplexicaulis* is mixture of the different types of fauna of the neighboring communities and it is very similar with the fauna of the willow woodlands, but much poorer. It is due to the small surface that the community is distributed on very small areas. This is especially true for the birds, amphibians, reptiles and mammals.

Water Habitats

Rivers and streams

There are several types of water bodies in the area of interest. The assignment of a proper typology according to Water Framework Directive (WFD) is an on-going process in Macedonia. Preliminary results from the studies of this process will be used for the purposes of the current study.

Epipotamal Streams - Rivers (approximately wider than 5 m)

Reference to EUNIS Habitats: **C2.31 Epipotamal streams**

Reference to EU HD Annex I: **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation**

Reference to CoE BC Res. No. 4 1996: **none**

Reference to Water Framework Directive (EEC 60/2000): **Lowland medium/small river type**

General characteristics

Water courses that can fulfil the aforementioned criteria for "river" in the area of the expres road corridor is only Kriva Reka. Vascular vegetation that gives the physiognomy of the river banks and of the water close to the banks is not well-developed. Anyway, there is some plant species related to the water ecosystem. These are *Ranunculus trichophyllus*, *Myosotis scorpioides* etc. Stony banks enable development of populations of *Cladophora spp.*, during summer, and rich epilithic diatoms communities and cyanophytes, during winter and spring.

Mammals: The typical mammal species that inhabits bigger rivers is Otter (*Lutra lutra*).

Birds: The only characteristic breeding bird species is the *Common Kingfisher (Alcedo atthis)*. There are no resident birds. A number of species use rivers for foraging (Heron, White and Black Stork) or during migration (some species of ducks, egrets and cormorants).

Amphibians: This habitat is favourable for the amphibians in general and less for the reptiles. Three species of amphibians, such as Yellow Belied Toad (*Bombina variegata*), Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*) and two species of reptiles, Grass Snake (*Natrix natrix*) and Dice Snake (*Natrix tessellata*) are present in this habitat.

Fish: There is an abundant fish population in the rivers, especially in the Kriva Reka. According to the information from the fisherman's, the following fish species are present in this area: *Squalius cephalus* L., *Chondrostoma nasus* L., *Gobio gobio* L., *Barbus macedonicus* Karam., *Barbus balcanicus* Kotlik et al., *Vimba melanops* Heck., *Alburnus alburnus* L., *Cobitis taenia* L., *Salmo trutta* (only in the upper flow of Kriva Reka).

Hiporhithral Streams - Rivers (approximately narrower than 5 m)

Reference to EUNIS Habitats: **C2.22 Hiporhithral streams**

Reference to EU HD Annex I: HD Annex I: **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**

Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

The area is characterized by a well-developed hydrographical network. It covers the catchment basin of the Kriva River. The following streams with permanent flow can be identified in the express road corridor area: Blidecka Reka, Vetunica, Rankovska Reka, Gaberska Reka.

Fauna

The vertebrate fauna that is present in this habitat is more or less the same in large rivers and streams.

Birds: The fauna of birds of smaller rivers and streams is similar to the one of lowland rivers (Kriva Reka). More specific is the *White-throated Dipper (Cinclus cinclus)*. **Amphibians:** There are few species of amphibians and reptiles in this habitat, mostly semi-aquatic ones. Two species of frogs, Balkan Stream Frog (*Rana graeca*) and Marsh Frog (*Pelophylax ridibundus*), and the Grass Snake (*Natrix natrix*) as a representative from the reptiles.

Anthropogenic Habitats

Agricultural Land

The agricultural land, in general, is characterized by smaller or larger areas planted with only a single plant species. Biomass production is huge compared to similar natural ecosystems, but it is of low biodiversity value. From a nature conservation and preservation point of view, smaller plots of land are more suitable than large fields and plantations.

The agro-ecosystems along the road are represented mostly by individual parcels of different types of fields, acres, gardens and meadows. Only a small percentage is represented by large monoculture plantations. The biodiversity value of the agricultural land in this area has increased with the presence of natural or fruit trees at the boundaries of the fields, which is a very common occurrence (more than half of the fields are of this type). That is the reason why particular attention to this phenomenon has been paid during the biotope mapping.

Orchards

Reference to EUNIS Habitats: **G1.D4 Fruit orchards and FB.31 Shrub and lowstem tree orchards**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Orchards in the area are not a characteristic type of agricultural activity, and the majority of them are small individual parcels separated by fields. The composition is very diverse and they are primarily of the mixed type. Apricots, apples, cherries, peaches, pears, plums, walnuts, etc. are the most frequent plantations and almost regularly mixed, often by domination of certain species. Fruit trees are usually planted in the villages and in their close proximity. The production is intended only for individual use. Therefore, orchards occur only sporadically in the studied corridor, and they do not have considerable dimensions.

Mammals: Species found in the orchards can also be found in other agricultural terrains. Most common are: eastern hedgehog (*Erinaceus concolor*), lesser white-toaded shrew (*Crocidura suaevolans*), common mole (*Talpa europea*), red squirrel (*Sciurus vulgaris*), sibling vole (*Microtus rossiaemeridionalis*), lesser mole rat (*Nanospalax leucodon*), fat dormouse (*Glis glis*), Balkan short-tailed mouse (*Mus macedonicus*), brown hare (*Lepus europeus*), fox (*Vulpes vulpes*), wild boar (*Sus scrofa*), weasel (*Mustela nivalis*), roe deer (*Capreolus capreolus*).

Birds: Very few species are present in orchards. *European Bee-eater Merops apiaster*, *Eurasian Hoopoe Upupa epops*, *Crested Lark Galerida cristata* and *Northern Wheatear Oenanthe oenanthe* nest in the orchards; other species use these habitats for foraging.

Reptiles and amphibians: The species of amphibians and reptiles are the same as in the Plantations habitat.

Fields and Acres

Reference to EUNIS Habitats: **II.3 Arable land with unmixed crops grown by low intensity agricultural methods**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **none**

General characteristics

Plantations of monocultures have smaller biodiversity value than individual fields. The monotypic structure of the community, ecological conditions controlled by man, and the usage of a significant quantity of pesticides and fertilizers dictate a development of biogenesis with low species diversity. Fields and acres in the area of the projected are mostly represented by wheat and corn culture. Industrial plants are cultivated very seldom except for some fields and acres of sunflower. More interesting is the fact that fields are very often planted with 1) fruit trees inside or at the boundaries, or 2) they contain remainders of wild trees from natural forests besides fruit trees, or 3) they are surrounded by poplar and willow trees. Certain mixtures of fields and gardens significantly enhance the biodiversity value of these biotope types. Typical gardens in the studied area are very rare. They are usually mixed with fields and almost regularly surrounded by fruit trees. Fields and acres are widely distributed throughout the road section area.

Fungia: There are some fungal species typical of various types of agricultural land such as *Agaricus campestris*, *Coprinus* spp., *Psathyrella* spp. etc. The species composition is identical in all types of agricultural land.

Mammals – Driven by the food supply, fields and acres are home for many mammal species such as: lesser white-toaded shrew (*Crocidura suaevolans*), common mole (*Talpa europea*), sibling vole (*Microtus rossiaemeridionalis*), guenther's vole (*Microtus guentheri*), lesser mole rat (*Nanospalax leucodon*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), fat dormouse (*Glis glis*), black rat (*Rattus rattus*), Balkan short-tailed mouse (*Mus macedonicus*), brown hare (*Lepus europeus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), badger (*Meles meles*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds: About 25 bird species can be listed for the habitats of fields and acres. Three of them are resident (*Grey Partridge Perdix perdix*, *Corn Bunting Miliaria calandra* and *Crested Lark Galerida cristata*) and 11 more species are breeders. Other bird species use field and acres for foraging.

Reptiles and amphibians: Only two species of amphibians are found here and they are: Common toad (*Bufo bufo*) and green toad (*Pseudepidalea viridis*). This habitat is also rich in reptile species, among and the species composition is very similar to that of the dry pastures and abandoned fields.

Urban or Urbanized Areas

Rural Settlements - Villages

Reference to EUNIS Habitats: **J1.2 Residential buildings of villages and urban peripheries; I1.22 Small-scale market gardens and horticulture, including allotments**

Reference to EU HD Annex I: **none**

Reference to CoE BC Res. No. 4 1996: **none**

Village settlements along the road are characterized by rural features. As a rule, the houses in these villages are surrounded by small gardens and fruit trees even in their central part. In such conditions, many wild animal species are adapted to living close to human presence. The peripheral parts of the villages in the area of the are characterized by sparsely distributed houses with small meadows, grasslands and sparse trees around. The participation of natural vegetation is high. Besides cultural and decorative plant species, vegetation is primarily represented by elements from the neighboring biotopes and ruderal and weed species. Some of the villages or parts of the villages are more urbanized and are less important from a biodiversity standpoint.

Mammals: Villages are suitable mammal habitats. Variety of vegetable, livestock and poultry offer food supply for both, herbivore and carnivore mammals. Most common species are: lesser white-toaded shrew (*Crocidura suaevolans*), red squirrel (*Sciurus vulgaris*), yellow-necked mouse (*Apodemus flavicollis*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), fat dormouse (*Glis glis*), black rat (*Rattus rattus*), western house mouse (*Mus domesticus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), western polecat (*Mustela putorius*), beech marten (*Martes foina*), badger (*Meles meles*), wild cat (*Felis sylvestris*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds: There are about 40 bird species that occur in the villages. This number is higher even compared to some of the natural habitats. There are 10 resident and 31 breeding species, most of them tightly connected to anthropogenic habitats: *Black-billed Magpie Pica pica*, *Eurasian Jackdaw Corvus monedula*, *Hooded Crow Corvus cornix*, *Common Raven Corvus corax*, *House Sparrow Passer domesticus*, *Eurasian Tree Sparrow Passer montanus*, *White Stork Ciconia ciconia*, *Common Kestrel Falco tinnunculus*, *Rock Pigeon Columba livia*, *Eurasian Collared Dove Streptopelia decaocto*, *Barn Owl Tyto alba*, *Common Scops Owl Otus scops*, *Little Owl Athene noctua*, *Long-eared Owl Asio otus*, *Barn Swallow Hirundo rustica*, *Red-rumped Swallow Hirundo daurica*, *Northern House Martin Delichon urbica*, *Blackcap Sylvia atricapilla*, *Blue Tit Parus caeruleus*, *Great Tit Parus major*, *Eurasian Golden Oriole Oriolus oriolus* and *Spanish Sparrow Passer hispaniolensis*.

Reptiles and amphibians: The rural settlements are rich in amphibians because usually there are small gardens with constant water supply (wells and springs) near the households. Therefore, many amphibian species are present here such as Common Newt (*Lissotriton vulgaris*), Agile Frog (*Rana dalmatina*), Yellow Belly Toad (*Bombina variegata*), Common Toad (*Bufo bufo*), Green Toad (*Pseudepidalea viridis*), European Tree Frog (*Hyla arborea*) and Marsh Frog (*Pelophylax ridibundus*). These habitats are preferred by the reptiles as well. Seven species of reptiles are present such as Hermanns Tortoise (*Eurotestudo hermanni*), Slow Worm (*Anguis fragilis*), Erhard's Wall Lizard (*Lacerta erhardii*), Wall Lizard (*Podarcis muralis*), Balkan Green Lizard (*Lacerta trilineata*), Green Lizard (*Lacerta viridis*), Whip Snake (*Dolichopis caspius*), Aesculapian snake (*Zamenis longissimus*) and Nose-horned Viper (*Vipera ammodytes*).

Protected areas and biocorridors

The subject section does not pass through protected areas. There is one recognized biocorridor (Osogovo – German biocorridor) which intersect with the subject road, but it is not yet approved by MoEPP.



Picture 8: Intersection of the biocorridor and the subject road

4.9 Socio-economic parameters

Municipality of Rankovce is a rural municipality with a total number of inhabitants 4 144 (according to the Census from 2002), with estimated number of inhabitants for 2016 – 3 720. Municipality of Kriva Palanka has 20 820 (according to the Census from 2002), with estimated number of inhabitants for 2016 – 19 930.

Table 1: Number of inhabitants in the villages along the road and the city of Kriva Palanka

Settlement	Municipality	Number of inhabitants
Rankovce	Rankovce	1 192
Ljubinci	Rankovce	164
Ginovci	Rankovce	315
Petralica	Rankovce	669
Psacha	Rankovce	539
Mozhdivnjak	Kriva Palanka	770
Konopnica	Kriva Palanka	1 398
Kriva Palanka	Kriva Palanka	14 558

Dominant activity of the households in both municipalities is agriculture. Livestock breeding is also spread practice. Those people living in the city obtain their income generally from services and manufacturing. Garment and used cars resale and service companies are raising the number of companies in the appropriate industry sector. The vicinity of the Bulgarian border offers excellent opportunity for trade, thus some 42% of all companies belongs to Wholesale and retail trade and repair of motor vehicles and motorcycles.

In Kriva Palanka there is a Healthcare Centre Kriva Palanka responsible for both Kriva Palanka and Rankovce municipalities. Also, there are thirteen General Private Practices, and two private practices for women.

Two primary schools and one high school are supporting the process of education in municipality of Kriva Palanka. Both main objects of the two primary schools are located in the city of Kriva Palanka. In the project area there are remote objects from the primary school Ilinden in the settlements Dlabochica, Mozhdivnjak and Konopnica. There is only one primary school in municipality of Rankovce (the main object located in Rankovce) with six dispersed objects in the settlements Geman, Radibush, Otoshnica, Petralica, Psacha and Odreno. For secondary school, the local students have to go to Kriva Palanka or Kumanovo.

In municipality of Rankovce the Public Communal Enterprise "Chist Den" provides collection, transport and disposal of municipal solid waste, maintenance of water supply systems in municipality, public urban greenery and waterways,

and the capture, processing and distribution of drinking water. In Kriva Palanka, similar role has been given to the Public Communal Enterprise “Komunalec”, whose main activities are: Production and distribution of drinking water, drainage of sewage waters, collection, transport and disposal of solid waste, maintenance of green markets, and funeral services. Both municipalities have police office and firefighting brigade. In both municipalities there are main post office and additional outpost office in settlements Petralica (Rankovce) and Mozhdivnjak (Kriva Palanka).

5. Environmental Impacts

5.1 Emissions in the Air

Increased emissions into the air will occur during the constructive phase of the project due to the work of construction machinery and transport vehicles, as well as the processes of rehabilitation – cleaning of the terrain, roughing and scraping of the pavement, and constructing of the new bitumen and asphalt – concrete layers. The exhaust gases emitted as a result of combustion of fuels in the construction machinery and transport vehicles are usually composed of the following pollutants: SO₂, NO_x, CO, PM₁₀, not combusted hydrocarbons, benzene and other aromatic hydrocarbons. The quantities of the exhaust gases and the type of pollutants will depend on the quality of the used fuel, condition in which the transport vehicles and constructive machinery are, as well as the duration of their activity. The following table presents the limit values for the pollutants from construction machines, in accordance with the Directive 97/68/EC:

Table 2: Limit values for pollutants emitted by the construction machinery (Directive 97/68/EC)

Motor power	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	PT (PM) (g/kWh)
130 ≤ P ≤ 560	5.0	1.3	9.2	0.54
75 ≤ P ≤ 130	5.0	1.3	9.2	0.7
37 ≤ P ≤ 75	6.5	1.3	9.2	0.85

During the constructive phase will occur fugitive dust emissions from the processes of cleaning of the terrain, roughing and scraping of the pavement and loading and unloading of the earth material.

During the application of the bitumen and asphalt emulsions will occur fugitive emissions of volatile organic compounds.

All emissions into the air will be locally and temporally limited (only during the constructive phase). Dispersion of the pollutants depends on the configuration of the terrain. In the mountainous terrain large dispersion of the pollutants is not expected, while in the flat terrain the dispersion of pollutants is greater. If the recommendations from the Environmental Management Plan are implemented, significant impacts from emissions into the air in the constructive phase are not expected.

During the exploitation of the road emissions into the air will be caused by exhaust gases from the vehicles that will use the roads. The composition of the exhaust gases will be similar to those emitted in the construction phase: SO₂, NO_x, CO, PM₁₀, not combusted hydrocarbons, benzene and polycyclic aromatic hydrocarbons (PAHs). The composition and the quantities will depend on the type of fuels and technical correctness of the vehicles which will be using the road. Taking into account that increasing of the traffic intensity is not expected, emissions into the air from the operational phase are considered to be the same as the current ones.

During the rehabilitation, one measurement of PM₁₀ will be done at the points already identified in the village of Rankovce and the village of Mozhdivnjak.

5.2 Emissions into waters

The subject road follows the water flow of the river Kriva Reka, and passes over three rivers: Vetunicka Reka, Rankovacka Reka and Kriva Reka.

The pollution of the waters during the rehabilitation and use of the road can be physical, chemical and biological.

The physical pollution is demonstrated by the presence of solid particles from residues of earth, sand, solid particles from the friction of the tyres, residues from disasters, etc. The physical pollution from liquid material means presence of grease and oils. The solid particles are deposited in the gutters and in the drain canals after being washed off from the road surface whereby they may clog them, while the grease and the oils swim on the surface and reach the recipient. Then they create a film, which stops the supply of oxygen in the watercourse, which inhibits the normal development of the living organism in the recipient.

The chemical pollution is a result of the dilution of the pollutants present in the air. These pollutants come from the exhaust gases from the construction machinery and vehicles. The chemical pollution may be demonstrated as strongly acidic, weakly acidic, neutral medium and all the variations from strongly alkaline to strongly acidic medium.

Biological pollution is a consequence to the disintegration of organic material that serves as food to different microorganisms. They can be a result from food waste, of leaves scattered by the wind and other biodegradable wastes, or other material present in the close surroundings.

Mechanical impurities caused from the washing of the ground by heavy rain and the flow of surface waters will cause filling of the beds and blurriness of waters, which will decrease the penetration of light in the greater depths and change the living conditions in the aquifer. The change of quality of the superficial and groundwaters may influence the usual utilisation of the water for different purposes by the population and the industrial capacities.

The most dangerous pollutants of the surface and ground waters are the organic material components difficult to degrade and the harmful metals.

Camps for workers and places for maintenance and cleaning of the mechanization are potential polluters, through production of fecal waste water, solid waste and non proper maintenance and cleaning of the mechanization.

When carrying out the construction activities, it is possible for the emission of waste storm water and insignificant quantity of sanitary water that will be produced by the employees in the maintenance of hygiene.

During the construction activities, the employees will produce waste water while maintaining the hygiene (hand washing) and refreshment in the summer period. The amount of wastewater to be produced is minimal.

For avoiding the water pollution, recommendations given in EMP should be followed.

5.3 Waste generation

During the construction activities will be produced the following types of waste: construction waste, which in this case is inert waste, unless bituminous substances containing tar occur; biodegradable waste; hazardous waste; and solid and liquid waste produced by the workers.

Biodegradable waste (debris from branches, leaves, roots, etc.) will be produced during the preparation activities. This type of waste should not end in the water flows, because its decay would cause eutrophication of the water.

Inert waste is consisted by earth, stones, asphalt, concrete etc. Inert waste does not cause chemical contamination of the environment, but has impact on the landscape.

Hazardous waste will be consisted mainly by petroleum products, lubricants and oils for the vehicle and construction machinery, bituminous substances containing tar, as well as used packages of these substances. Hazardous waste, if not properly handled, causes pollution to all environmental medias, especially to soil, water and groundwater, and has toxic effects on the wildlife.

Solid and liquid waste produced by the workers will be consisted by biodegradable waste from food, plastics, paper, glass, metal, and feces matter. If this type of waste is not properly managed, it will cause pollution and negative visual impact to the site.

For proper waste management, waste produced by the workers, and inert waste which won't be reused, have to be disposed on landfill for municipal solid waste. Hazardous waste should be collected by company specialized for hazardous waste management.

During exploitation of the road, producing of waste is not expected. Producing of solid waste at this stage may occur from people who will traffic the road, and it will be solid municipal waste.

Table 3: List of waste occurring during the construction activities

Phase	no	Waste type	No. from the List of types of waste (“Official Gazette of RM” No. 100/2005)	Manner of waste treatment (processing, storage, transferring, removal, etc.)	Name of the legal entity that treats the waste
Preparatory and constructive phase	1	Mixed communal waste	20 03 01	Disposal in plastic bags and containers on the construction site, handling to the CPEs of the municipalities and landfilling on the municipalities’ landfills	CPE “Chist Den” – Mun. of Rankovce
	2	Biodegradable waste	20 02 01	Handling to the CPEs	CPE “Chist Den” – Mun. of Rankovce
	3	Earth and stones	20 02 02	Final disposal on the sites appointed by the Municipalities of Rankovce and Kriva Palanka	The contractor in agreement with the municipalities of Rankovce and Kriva Palanka
	4	Scratched asphalt	17 03 02	Reuse in agreement between PESR and the municipalities	PESR and Municipalities of Rankovce and Kriva Palanka
	5	Soil polluted from possible fuel, oil and lubricants leakage from the mechanisation and transport vehicles	17 05 05*	Polluted soil will be removed by the licenced company for handling the hazardous waste.	Company that possess an appropriate Licence for handling with hazardous waste according to the Law on waste management

5.4 Soil contamination

Emissions on/into the soil are possible during the constructive phase of the project. Possible pollutants from this phase are as follows: gasoline, petroleum, oil and lubricants, bituminous substances and asphalt-concrete. If oil products and lubricants leak into the soil they will cause long lasting toxic soil pollution.

In case of oil and lubricant leakage from the construction machinery and transport vehicles, it is necessary to act in accordance with the Law on Waste Management i.e. it is necessary to remove the contaminated soil and treat it like hazardous waste. Improper management of inert waste and waste produced by the workers will also cause impact on the soil, unless they are properly removed from the location. Contamination of the soil could cause contamination of the groundwater.

Major impacts on soil are not expected during the exploitation of the road. Impacts on the soil in this phase will occur from the exhaust gases from the vehicles which will traffic the road, as well as from the residues from gasoline, oil and lubricants. These impacts are directly conditioned by the number of vehicles which will traffic the road, technical conditions of the vehicle, as well as the quality of used fuels.

5.5 Noise and vibration

Noise and vibrations that will occur during the rehabilitation of the section appears as a result of the operation of construction machinery that will be engaged during the preparatory and construction phase. Construction machinery and vehicles causing noise intensity (depending on the scope and duration of construction activities) around 85 dB at the source, while the dispersion of the sound depends on weather conditions (wind speed, humidity, air pressure), morphology, absorption powers of vegetation and other factors whose differences contribute to difficulties predicting the intensity of noise at various distances from the source of noise. During the rehabilitation, one measurement of noise in the environment will be done at the points already identified in the village of Rankovce and the village of Mozhdivnjak.

Given that it is an already existing road, the noise emitted during the execution of the overhauled construction activities for the rehabilitation of the same, will not significantly affect the surrounding population. During the implementation of the activities, vibrations will occur, primarily caused by the movement of the construction and transport machinery, and especially during the asphalt works, but they will be of temporary character, and locally in the immediate vicinity of the route planned for the construction activities.

The limit values for the basic indicators of noise in environment are defined with the Rulebook for limit values of the noise level (“Official Gazette of RM” No. 147/08). According to the degree of protection from noise, the limit values for the basic indicators of noise in environment caused by different sources should not be higher than:

Table 4: Noise level per area

Area differentiated by the degree of noise protection	Noise level expressed in dB (A)		
	Ld	Lv	Ln
Area of first degree	50	50	40
Area of second degree	55	55	45
Area of third degree	60	60	55
Area of fourth degree	70	70	60

Legend:

- Ld - day (period from 07:00 h to 19:00 h),
- Lv - evening (period from 19:00 h to 23:00 h),
- Ln - night (period from 23:00 h to 07:00 h).

The areas according to the degree of noise protection are defined in the Rulebook for locations of measurement stations and measuring points (“Official Gazette of RM” No. 120/08). The subject road is in 3rd category defined as: “Area of III degree of noise protection is area where activities in the surroundings are allowed and the causing of noise is less considered: trade–business–residential area, which is also designed for accommodation, i.e. area with buildings that have protected spaces, crafts and related production activities (mixed area), area designed for agriculture activities and public centers for administrative, commercial, service and catering activities.”

During the exploitation of the road, the noise will be produced by the vehicle, which will traffic the road. Considering that increasing of traffic intensity is not expected, and abrasion between wheels and pavement will decrease, decreasing of noise level during the operational phase are expected.

5.6 Impacts on the biodiversity

Considering the fact that the road will be not widened, i.e. new areas by the road will not be engaged and cleaned from the vegetation, major impacts on flora and fauna are not expected.

At preparatory phase, during the activities for preparation of the terrain and its proper clearing, there will be no destruction of the vegetation belt that currently exists in the immediate vicinity of the road (most of the habitats are agricultural land). Due to the use of construction machinery in preparatory and constructive phase, increased intensity of noise and vibration and increased amounts of emitted exhaust gases are expected, as well as emission of dust, that will cause impact on the surrounding flora and fauna, but with measures for protection, monitoring plan within the plan for environmental protection prepared by the contractor, on the basis of project documentation, these impacts will be minimized.

Noise, vibrations and exhaust emissions from driving fuels are impacts that will certainly occur in the operational phase. But it is important to mention that the impacts that are expected during the operational phase are already present and occur during the use of the subject section.

To mitigate indirect impacts (air, soil and noise pollution, waste management etc.), recommendations given in EMP should be implemented.

5.7 Socio – economic impact

There are not foreseen activities that will cause changes directly related to settlements (intercession of agricultural land conversion), which were to change the lifestyle of the local population and to create significant demographic changes and impacts.

Socio - economic aspect over the rehabilitation process will not cause negative impacts, due to the fact that the project is related to the rehabilitation within the existing dimensions of the road. Expansion of the section is not anticipated, so there will be no demolition activities along the route, as well as conversion of agricultural land and changes in the landscape. It is important to have in mind that there is no need for land acquisition or displacement of any structure. Positive socio-economic effects are expected after the implementation of construction activities and commissioning of the section which will be upgraded and rehabilitated.

The project has a positive impact on the society, especially in the part of the economic life of the community and environment. The rehabilitation of the road will enable faster and more secure transport which will positively effect on the transport sector, agriculture and on the other economic sectors that are developing and on which is based the future economic development of the municipalities.

Public and especially stakeholders will be able to use the grievance procedure. All the information regarding the grievance procedure will be widely disseminated to affected municipality and affected local government.

PESR is truly committed to receiving and responding to all comments or complains, either verbally or in writing in relation to the Project. PESR recognizes that consultation is an ongoing process and different concerns may arise as the project moves into construction phase. All comments and complaints will be forwarded and processed by the responsible person of the PESR services:

Mr Joze Jovanovski

Tel: + 389 (0) 78 242 319

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

Address: Public Enterprise for State Roads

Dame Gruev 14, 1000 Skopje, Republic of North Macedonia

Web: www.roads.org.mk

The response time for grievances will be in accordance with national legislation for this subject. Comments on the Project, and complaints, can also be submitted to the responsible contact person of the municipality of Kriva Palanka and municipality of Rankovce.

Municipality of Kriva Palanka

Tel: + 389 (0) 31 375 035
E-mail: opkp@krivapalanka.gov.mk
Address: str. Sv. Joakim Osogovski No 175
Kriva Palanka
Republic of North Macedonia

Municipality of Rankovce
Tel: + 389 (0) 31 380 440
Address: Opstina Rankovce, Rankovce 1316

It is recommended that all grievances should be processed by a Commission which would be composed of at least three persons: representatives of the Investor (PESR), local self-government and the local population. The names and contact information of the authorized persons from PESR and the municipality should be also indicated on the boards which are posted before the beginning of the construction activities. The inhabitants of the affected municipalities are recommended to elect a person in charge of the grievances on the side of their village. The local inhabitants will be able to submit their comments and complaints to that appointed person. Being a part of the Commission, that person would be also to inform on the course of the grievance procedure.

Contact details of the contractor's project office will also be made publically-available. In addition to this document, the main formal bases for submission of comments and complaints directly or indirectly relating to the project are also established.

Other complaints regarding the environmental impact and the social environment will be entered in the complaints record.

The Grievance Form (in Macedonian and English) will be made available on the web site www.roads.org.mk and all the concerned municipalities will receive pre-printed forms to be readily-available for the public. A worker's Grievance Mechanism will also be established for the employees of construction companies (as a separate system). PESR will monitor the entire process of comments and complaints and the information will be transposed in the corresponding reports, which will be prepared and posted on its website. PESR is obliged to respond to all complaints according to procedures prescribed in national legislation.

In their complaints, the stakeholders may use legal assistance provided by the North Macedonian legislation.

6. Environmental and Social Management and Monitoring Plan (ESMMP)

For assumed negative impacts elaborated in Chapter 5, which project could pose to the environment, avoiding and mitigation measures are foreseen in the Environmental and Social Management Plan (Table 5). Environmental and Social Management Plan and Monitoring Plan (Table 6) are parts of the Environmental and Social Management Plan. Thus, maximum protection to the environment and people will be insured.



Table 5: Environmental and Social Management Plan					
Phase	Issue	Mitigation Measure	Cost	Institutional Responsibility	Comments
Preparation	Material supply	<ul style="list-style-type: none"> Contractor is to provide materials (sand gravel, and asphalt) from the facilities (quarries and asphalt plant) that have obtained IPPC permissions from MoEPP 	N.A.	Contractor	Providing materials from facilities that already have obtained IPPC Permit, will ensure maximal protection to all environmental medias
Construction	Air Protection	<ul style="list-style-type: none"> Maintenance of vehicles and construction machinery in good condition; Shut off the vehicles and construction machinery when not in use; Using good quality fuels for vehicles and construction machinery; Trucks which carrying material to be covered; Water spraying during dry weather as protection against dust; Using newer machinery that is less polluting 	N.A.	Contractor	
Preparation/Construction	Protection from Noise	<ul style="list-style-type: none"> Planning the construction procedures due to minimizing emitted noise (in time and intensity); Planning of work activities to minimize the emitted noise (in terms of time and intensity); Maintenance of vehicles and construction machinery in good condition; 	N.A.	Contractor	



Table 5: Environmental and Social Management Plan					
Phase	Issue	Mitigation Measure	Cost	Institutional Responsibility	Comments
Preparation Construction	Soil Protection	<ul style="list-style-type: none"> • Provide minimal size of work site • Termination of construction activities in case of uncontrolled spills of fuel, oil, lubricants and other chemicals, sprinkle with sand and removal of polluted soil layer. Polluted soil layer would be treated as a hazardous waste. • Placing mobile toilets on certain places along the section and contracting with the company which will undertake and clean them. • Prevent washing of vehicles and construction machinery along the route 	N.A.	Contractor	
Construction	Water protection	<ul style="list-style-type: none"> • Implementation of waste management procedures as given in this Table (see waste management). The waste, including the waste from the mobile toilets has not to be 	2 * 4.500 denars/month	Contractor	



Table 5: Environmental and Social Management Plan					
Phase	Issue	Mitigation Measure	Cost	Institutional Responsibility	Comments
		disposed on the river banks and waters. <ul style="list-style-type: none"> • Washing of construction machinery and vehicle on the river banks and river waters has to be prevented • Prohibited activities in and near the riverbeds 			
Preparation Construction	Biodiversity protection	<ul style="list-style-type: none"> • Provide minimal size of work site; minimal removal of the vegetation alongside the section during the preparation activities; • Implementation of waste management procedures as given in this Table (see waste management); • Washing of construction machinery and vehicle on the river banks and river waters has to be prevented; • Prohibited stripping of animals by the employees • Forbidden access to foreign property and cultivations by the employees • Prohibited dispersal of cleared vegetation along the route and in watercourses. 	N.A.	Contractor	
Construction	Traffic Safety	<ul style="list-style-type: none"> • Public to be informed about the scope and schedule of the construction activities, expected disruption and access restriction; 	N.A.	Contractor	Management Traffic Plan to be prepared and approved by the Ministry of Internal Affairs



Table 5: Environmental and Social Management Plan					
Phase	Issue	Mitigation Measure	Cost	Institutional Responsibility	Comments
		<ul style="list-style-type: none"> Measures to allow for permanent adequate traffic flow around construction areas; Appropriate signalisation, traffic safety signs, barriers and flag persons for traffic control; Appropriate lighting and well-designed safety signs 			
Preparation	General work safety	<ul style="list-style-type: none"> The Contractor will provide a method statement on accidents, fire and chemical spill containment/emergency procedures 	N.A.	Contractor	
Construction	Worker’s safety and health	<ul style="list-style-type: none"> Provide workers with safety instructions and appropriate personal protective gear such as protective clothing, safety boots, helmets, gloves, goggles, ear protection, etc 	N.A.	Contractor	Plan on Safety and Health at Work will be prepared by the Contractor
Preparation/ Construction	Community Safety	<ul style="list-style-type: none"> Informing the public about the construction activities: part of the day when they will be implemented, duration etc. Limit activities to daylight working hours Establishing complaint mechanism and involving the stakeholders 	N.A.	PESR/ Contractor	



Table 5: Environmental and Social Management Plan					
Phase	Issue	Mitigation Measure	Cost	Institutional Responsibility	Comments
		before and during the construction activities <ul style="list-style-type: none"> • Provide contact persons and contact details to the local population of the Contractor and the Engineer. 			

Table 6: Monitoring Plan					
Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Responsibility
Traffic safety Safety during rehabilitation activities	Existence and Implementation of Traffic Management Plan	On project site	Visual inspection	During rehabilitation phase	Contractor Supervision Engineer



Table 6: Monitoring Plan					
Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Responsibility
<p>General Work Safety</p> <p>Safety of the employees, visitors on site</p>	<p>Developed Plan on Safety and Health at Work</p>	<p>On project site</p>	<p>The status of implementation of safety measures; number of injures at work place; appointed person/officer for health and safety on site.</p>	<p>On daily bases</p>	<p>Contractor Supervision Engineer</p>
<p>Air pollution (fugitive emission of dust, emission of exhaust gases from construction mechanization)</p>	<p>Exhaust gases, Dust</p>	<p>On project site</p>	<p>Visual inspection</p> <p>Technical documentation for the features of the construction equipment</p> <p>Measurement of PM₁₀ on one point in the village Rankovce and one point in the village Mozhdivnjak</p>	<p>On daily bases</p> <p>One baseline measurement and one measurement during the construction activities</p>	<p>Contractor Supervision Engineer</p> <p>Licensed company</p>



Table 6: Monitoring Plan					
Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Responsibility
Potential pollution of soil and groundwater/ contamination of surface water	Soil quality	On project site	Visual inspection for spills and leaks which might impact soil quality (and potentially groundwater)	On daily bases	Contractor Supervision Engineer
Waste generation (municipal waste from engaged employees, demolition waste etc.)	Implementation of Waste Management Plan	On project site	Visual inspection, contracts with authorized legal/ physical entities	On daily bases	Contractor Supervision Engineer
Noise and vibrations	Noise levels	On project site	Technical documentation for the features of the construction equipment Measurement of noise levels on one point in the village Rankovce and one point in the village Mozhdivnjak	On daily bases One baseline measurement and one measurement during the construction activities	Licensed company



Table 6: Monitoring Plan					
Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Responsibility
Material transport	Truck load covered	On project site	Visual inspection	During rehabilitation activities	Contractor Supervision Engineer
Road safety (Increased vehicle speed)	Traffic signs; vehicle speed limitation	Along the road section	Visual observation	During rehabilitation activities	Contractor Supervision Engineer

7. Roles and Responsibilities for implementation of ESMMP

Table 7: Roles and Responsibilities for implementation of ESMMP

Company/Unit	Responsibilities
<p align="center">International Projects Management Unit - IPMU (PESR)</p>	<p>In coordination with EPSAU, this Unit will be responsible for overseeing the project implementation, for monitoring the overall project implementation, including environmental compliance of the project. IPMU will have the final responsibility for environmental performance of the project, during project implementation. Specifically, IPMU will: i) closely coordinate with local authorities in the participation of the community during project preparation and implementation; ii) monitor and supervise ESMMP implementation including incorporation of ESMMP into the detailed technical designs and bidding and contractual documents; iii) be in charge of reporting on ESMMP implementation to the EBRD.</p>
<p align="center">Environmental Protection and Social Aspects Unit (EPSAU) (PESR)</p>	<p>This Unit is responsible for monitoring the implementation of EBRD's environmental safeguard policies in all stages and process of the project. Specifically, this unit will be responsible for:</p> <p>i) reviewing the subproject: ESAR, ESMMP prepared by consultants to ensure quality of the documents; ii) helping IPMU incorporate ESMMP into the detailed technical designs and civil works bidding and contractual documents; iii) helping IPMU incorporate responsibilities for ESMMP monitoring and supervision into the TORs, bidding and contractual documents for selection of Contractor, Supervision, Monitoring contractor iv) providing relevant inputs to the consultant selection process; v) reviewing reports submitted by the Contractor, Supervision, Monitoring contractor; vi) conducting periodic site checks; vii) advising PESR management on solutions to environmental issues of the project; and viii) preparing environmental performance section on the progress and review reports to be submitted to the EBRD.</p>
<p align="center">Contractor</p>	<p>Based on the approved ESMMP, the Contractor will be responsible for establishing a site-specific ESMMP for the project site, submit the plan to PESR and Supervision Contractor for review and approval before commencement of construction. In addition, it is required that the Contractor get all permissions for construction (traffic control and diversion,</p>

Company/Unit	Responsibilities
	<p>excavation, labor safety, etc. before civil works) following current national regulations.</p> <p>The Contractor shall be required to appoint a competent individual as the contractor 's on-site <i>Health, Safety and Environmental Officer (HSEO)</i> who will be responsible for monitoring the Contractor 's compliance with the ESMMP requirements and the environmental specifications.</p>
<p>Supervision Engineer</p>	<p>The Supervision Engineer will be responsible for supervising and monitoring all project activities and for ensuring that Contractor comply with the requirements of the contracts and the ESMMP. The Supervision Engineer shall engage sufficient number of qualified staff (e.g. Environmental Engineer) with adequate knowledge on environmental protection and construction project management to perform the required duties and to supervise the Contractor's performance.</p>
<p>Ministry of Environment and Physical Planning (MoEPP)</p>	<p>MoEPP is responsible for issuing a decision for approval of Elaborate for Environmental protection and monitoring of the state of implementation of all mitigation measures for environmental protection described in Elaborate for environmental protection.</p>



8. Annexes

Annex 1: Report on measurements of PM₁₀

Annex 2: Report on noise measurements



Извештај од тестирање на PM₁₀ прашина во амбиентен воздух од патен правец А2, делница Страцин-Ранковце-Крива Паланка

Клиент:	РИ-ОПУСПРОЕКТ ДОО бул. „Јане Сандански“ бр.113, Скопје
Предметна инсталација:	патен правец А2, делница Страцин-Ранковце-Крива Паланка
Број на извештај:	095 -И/19
Извршител:	Фармахем ДООЕЛ Лабораторија за животна средина Адреса: ул. „Манчу Матак“ бр. 23, Скопје Телефон: + 389 2 2050 648; Факс: + 389 2 2031 434 Е-маил: ekolab@farmahem.com.mk
Тестирање и изготвка на извештај:	Маријан Лакс, дипл. инж. по заштита на животна средина стручен соработник 
Одговорно лице:	Јулијана Димзова, дипл. инж. технолог Шеф на Лабораторија за животна средина 
Датум на испитување:	30/31 мај 2019 година
Датум на изработка:	3 јуни 2019 година



Напомена: Презентираните вредности важат за услови и работни процеси кои биле вршени во времето кога се изведени мерењата. Забелешка: Умножување на овој извештај е дозволено само како целина. Делови од овој извештај не смеат да се умножуваат без писмено одобрение на Фармахем ДООЕЛ Скопје.

I. Вовед

Фармахем Лабораторијата за животна средина, на барање на РИ-ОПУСПРОЕКТ ДОО, изврши определување на PM_{10} прашина во амбиентниот воздух, која произлегува од патниот сообраќај на државниот пат А2, делница Страцин – Ранковце – Крива Паланка. Тестирањето на PM_{10} прашина во амбиентниот воздух беше извршено во период од 30 до 31 мај 2019 година. Мерењето на PM_{10} прашина би требало да го определи влијанието на патниот сообраќај врз квалитетот на амбиентниот воздух во рамки на рехабилитацијата на предметниот патен правец.

II. Методи на мерење и мерна опрема

Тестирањето на квалитетот на амбиентниот воздух во однос на прашина PM_{10} беше извршено со референтна метода МКС EN 12341:2014 - акредитирана метода на Фармахем Лабораторија за животна средина, согласно стандардот МКС EN ISO/IEC 17025:2006, од страна на Институт за акредитација на Р.Македонија. За земање на примерок беше користен уред Comde Derenda и Desaga, додека гравиметриското определување на концентрацијата на PM_{10} прашина беше извршено со аналитичка вага Mettler Toledo XP26-PC (1 μ g).

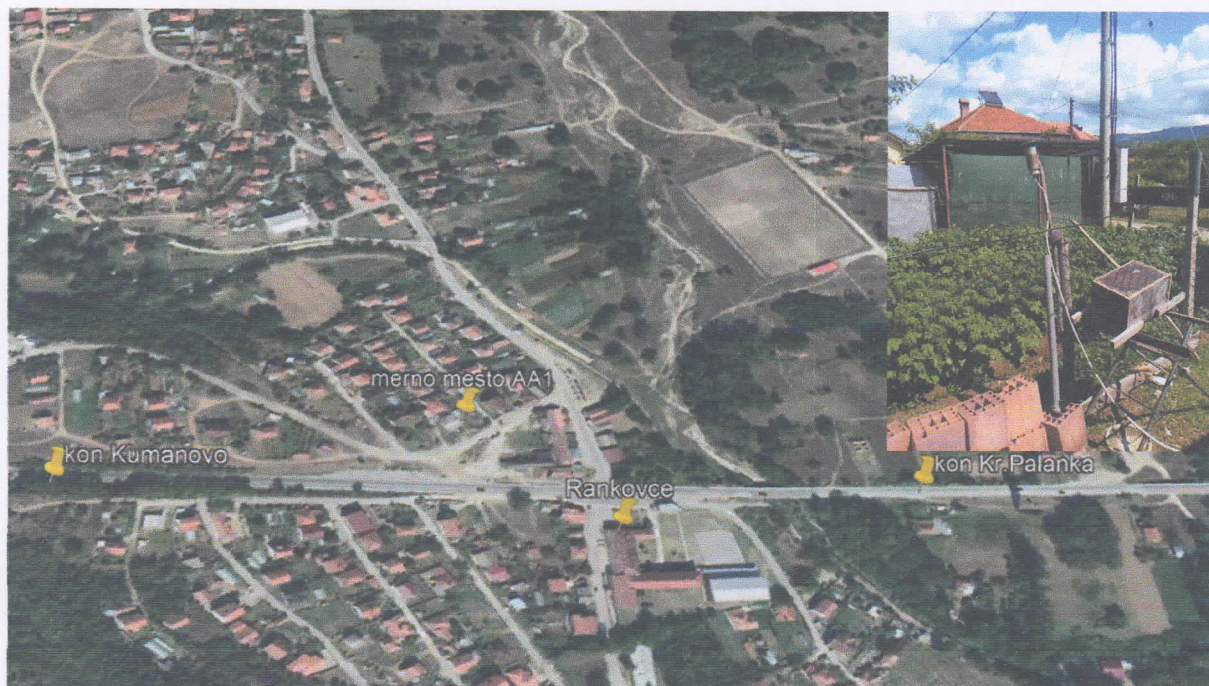
III. Опис на мерни места

Протоколот околу влезот на сондите за земање примерок беше неограничен, без попречувања кои можат да влијаат врз протоколот на воздухот во близина на мерната опрема за земање примероци. Опремата за мерење на вкупна прашина беше поставена на височина од 1,5 - 2,0 m (зона на дишење). Локациите за поставување на инструментите во инсталацијата беа избрани во согласност со Правилник за методологија за мониторинг на квалитетот на амбиентниот воздух (Сл.Весник на РМ, бр. 138/2009 год.).

Мерно место AA1 - со координати N:42° 10' 05,29" E: 22° 07' 00,02", поставено во с.Ранковце, во рамки на живеалиште, на оддалеченост од 60 m од работ на сообраќајницата Страцин-Крива Паланка. Широчината на сообраќајница изнесува од 6,5 m. Брзината на движење на возилата на предметниот патен правец изнесува 50 km/h, при што сообраќајот се одвива без ограничувања. На слика бр.1 прикажана е сателитска снимка со патниот правец и мерното место.

Мерно место AA2 - со координати N:42° 10' 35,92" E: 22° 15' 05,37 поставено во с. Мождивњак, во рамки на живеалиште, на оддалеченост од 14 m од работ на сообраќајницата Страцин-Крива Паланка. Широчина на сообраќајница изнесува од 6,5 m. На оддалеченост од околу 40 m се наоѓа сепарација, при што помеѓу сепарацијата и мерното место AA2 како бариера служи живеалиштето које има височина од околу 9 m. Брзина на движење на возила на предметниот патен правец изнесува 50 km/h, при што сообраќајот се одвива без ограничувања. На слика бр.2 прикажана е сателитска снимка со патниот правец и мерното место.

Временските услови забележани во периодот на мерење на 30/31.05.2019 се средна амбиентна температура за периодот на мерење 18,3 °C, атмосферски притисок од 943 hPa и средна релативна влажност за периодот на мерење 68,5 % при стабилни временски услови.



Слика бр.1



Слика бр.2

IV. Резултати од тестирање**IV.1 Мерно место AA1 - Резултати од тестирање на имисија на PM₁₀ прашина**

Во Табела бр. 1 дадени се резултатите од тестирањето на PM₁₀ прашина на мерното место AA1.

Табела бр. 1

Мерно место AA1 (N:42° 10' 05,29" E: 22° 07' 00,02")	
Почеток на мерењето:	10:15 на 30.05.2019 година
Крај на мерењето:	10:15 на 31.05.2019 година
Ознака на филтерот слепа проба – лабораторија	I-003/19
Маса на слепа проба во лабораторија	-17 µg
Ознака на филтерот слепа проба – терен	I-006/19
Маса на слепа проба – терен	+50 µg
Ознака на примерок за одредување на PM ₁₀	I-005/18
Маса на примерок на PM ₁₀	417 µg
Количество земен примерок	50,4 m ³
Средна вредност за концентрација на PM₁₀ прашина за мерно место AA1 за период од 24 часа	8,3 µg/m³

IV.2 Мерно место AA2 - Резултати од тестирање на имисија на PM₁₀ прашина

Во Табела бр. 2 дадени се резултатите од тестирањето на PM₁₀ прашина на мерното место AA2.

Табела бр. 2

Мерно место AA2 (N:41, 987903° и E:21, 512537°)	
Почеток на мерењето:	10:45 на 30.05.2019 година
Крај на мерењето:	10:45 на 31.05.2019 година
Ознака на филтерот слепа проба – лабораторија	I-003/19
Маса на слепа проба во лабораторија	-17 µg
Ознака на филтерот слепа проба – терен	I-006/19
Маса на слепа проба – терен	+50 µg
Ознака на примерок за одредување на PM ₁₀	I-004/19
Маса на примерок на PM ₁₀	2100 µg
Количество земен примерок	55,278 m ³
Средна вредност за концентрација на PM₁₀ прашина за мерно место AA2 за период од 24 часа	38,0 µg/m³

V. Заклучок

Добиените резултати од индикативното мерење на имисија на PM_{10} прашина во амбиентниот воздух, извршено во периодот 30/31.05.2019 година, на патниот правец А2, делница Страцин-Ранковце-Крива Паланка, споредени се со граничните вредности за концентрација на PM_{10} прашина во амбиентен воздух кои се наведени во Уредбата за гранични вредности (Сл. Весник на РМ 50/05) се прикажани во Табела бр.3.

Табела бр.3.

Мерно место	Период на испитување	Концентрација на PM_{10}
Мерно место АА1 (N:42° 10' 05,29" E: 22° 07' 00,02") – с. Ранковце	30/31. 5.2019	8,3 $\mu\text{g}/\text{m}^3$
Мерно место АА2 (N:41, 987903° и E:21, 512537°) – с. Мождивњак		38,0 $\mu\text{g}/\text{m}^3$
24 часовна гранична вредност за концентрација на PM_{10} прашина во амбиентен воздух		50 $\mu\text{g}/\text{m}^3$

Врз основа на добиените резултати од индикативното мерење на имисија на PM_{10} прашина во амбиентниот воздух извршено во периодот 30/31.05. 2019 година, може да се заклучи дека измерената концентрација на PM_{10} прашина на мерните места АА1 во с. Ранковце и АА2 во с. Мождивњак се наоѓа во рамки на пропишаните гранични вредности за 24 часа за PM_{10} прашина.

Напомена: Презентираните вредности важат за услови и работни процеси кои биле вршени во времето кога се изведени мерењата. Мислењата/толкувањата наведени во овој Извештај не се дел од акредитираниот опсег на лабораторијата.
Забелешка: Умножување на овој извештај е дозволено само како целина. Делови од овој извештај не смеат да се умножуваат без писмено одобрение на Фармахеџ ДООЕЛ, Скопје.



ОПУСПРОЕКТ
ЕКОЛОГИЈА | БЕЗБЕДНОСТ ПРИ РАБОТА | МОНИТОРИНГ

ИЗВЕШТАЈ ОД ТЕСТИРАЊЕ

бр. 0802/694
03.06.2019 год.



Предмет на тестирање:

НИВОТО НА БУЧАВА ЕМИТИРАНА ВО ЖИВОТНАТА СРЕДИНА НА ПАТЕН ПРАВЕЦ С. РАНКОВЦЕ - С. МОЖДИВЈАК

Корисник на тестирањето: ГД Гранит АД Скопје

Адреса на корисникот: ул. Димитрие Чуповски број 8, 1000 Скопје

Тестирањето го извршија: Иван Вулгаракис, дипл. еколог _____

Кире Станојоски, м-р. по ИЖС _____

Одобри, Раководител на лабораторија: Кире Станојоски, м-р. по ИЖС _____



ИЗГОТВУВАЧ:
РИ-ОПУСПРОЕКТ Д.О.О. СКОПЈЕ

УПРАВИТЕЛ:
Иван Вулгаракис

2019 год.



I. Општи податоци

Местоположба на мерните места	<p>Со цел да се утврди бучавата која се продуцира од интензивен патен сообраќај, беа одредени 2 мерни места на патниот правец с. Ранковце – с. Мождивјак.</p> <p>Мерните места беа утврдени во согласност со член 7, точка 3 од Правилникот за локациите на мерните станици и мерните места (Сл. весник бр. 120/08), т.с. на 3 метри од фасадата на станбените објекти/семејните куќи кои се наоѓаат најблиску до погоренаведените патни правци.</p>	
Извор на звук	<ul style="list-style-type: none">Лесни и тешки моторни возила	
Инструмент со кој што е извршено мерењето	<p>Инструмент за мерење на бучава: Cirrus CR:831 C Sound Level Meter Мерна несигурност ($\pm 1,62$ dB)</p>	
Прописи врз основа на кои што е извршено мерењето	Правилникот за гранични вредности на нивото на бучава во животната средина (Сл. весник бр. 147/08)	
	Правилникот за локациите на мерните станици и мерните места (Сл. весник бр. 120/08)	
	МКС ISO 1996-2:2010, Одредување на нивоата на бучава во околината	
Метеоролошки услови	Дата	31.05.2019
	Ветер [км/ч]	8,0
	Температура [°C]	18,0
	Ат.Притисок [hPa]	1021
	Релативна влажност [%]	74,0
	Дожд	/
	Снег	/



II. Методологија на работа и мерни инструменти:

Методологија на одредување на нивото на бучава која се емитира во животната средина е со примена на инструментот за мерење на бучава **Cirrus CR:831 C Sound Level Meter**, во согласност со стандардот МКС ISO 1996-2:2010 за одредување на нивото на бучава од околината.

III. Резултати од тестирањето:

Резултите од мерењето се дадени во следната табела:

Табела бр.1

Објект:	Патен правец: с. Ранковце – с. Мождивјак							
Број на мерни места:	2							
Датум и време на мерење:	31.05.2019 год. 10:50-12:00 час.							
Параметар на испитување:	Нивото на бучава која се емитира во животната средина							
РЕЗУЛТАТИ								
Бр.	Мерно место	Вкупен број на возила/час	Просечна брзина на возилата (km/h)	Координати	Измерено [Leq dBA]	МДК [Leq dBA]		
						дење	вечер	ноќе
1.	с. Ранковце	138	≈50	42°10'4.44" N 22° 6'59.67"E	52,9 (±1,80)	60	55	50
2.	с. Мождивјак	186	≈50	42°10'34.96" N 22°15'6.98"E	58,7 (±1,80)	60	55	50



IV. Изјава за усогласеност:

Врз основа на извршените мерења и добиените резултати за нивото на бучава, која се емитура од лесните и тешките товарни возила кои патуваат по патниот правец с. Ранковце – с. Мождивјак, а согласно Правилникот за гранични вредности на нивото на бучава во животната средина (Сл. весник на РМ бр. 147/08) констатираме дека за денски период на мерење бучавата се движи во рамките на максимално дозволените вредности.

Напомена: Резултатите прикажани во извештајот важат само за условите за време на извршеното мерење.



Лабораторија за тестирање

Бул. Јане Сандански бр. 113, 1000 Скопје | тел/факс:389 (2) 2448-138 | e-mail:opusproekt@opusproekt.com.mk | www.opusproekt.com.mk

Прилог 1: Детален приказ од мерењето на 1ММ – с. Ранковце

Measurement Report

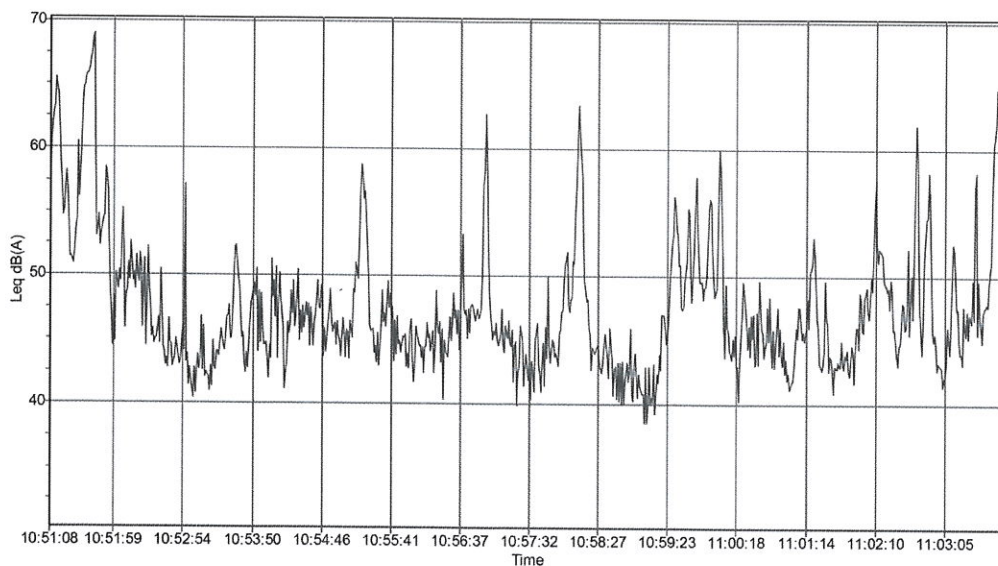
Measurement Details

Date and Time: 31.05.2019 10:51
Sound Level Meter: Cirrus Research plc

Run Duration: 00:12:43 hh:mm:ss
Range: 20-90 dB
Overload: no

Data

Leq	52,9 dBA	L1,0	65,2 dBA
Lepd	37,2 dBA	L10,0	55,0 dBA
LAE	81,6 dBA	L50,0	46,2 dBA
LAFmax	69,8 dBA	L90,0	42,0 dBA
Peak	93,1 dBC	L95,0	40,9 dBA
		Lmin	36,7 dBA





Прилог 2: Микролокација на 1ММ – с. Ранковце





Прилог 3: Детален приказ од мерењето на 2ММ – с. Мождивјак

Measurement Report

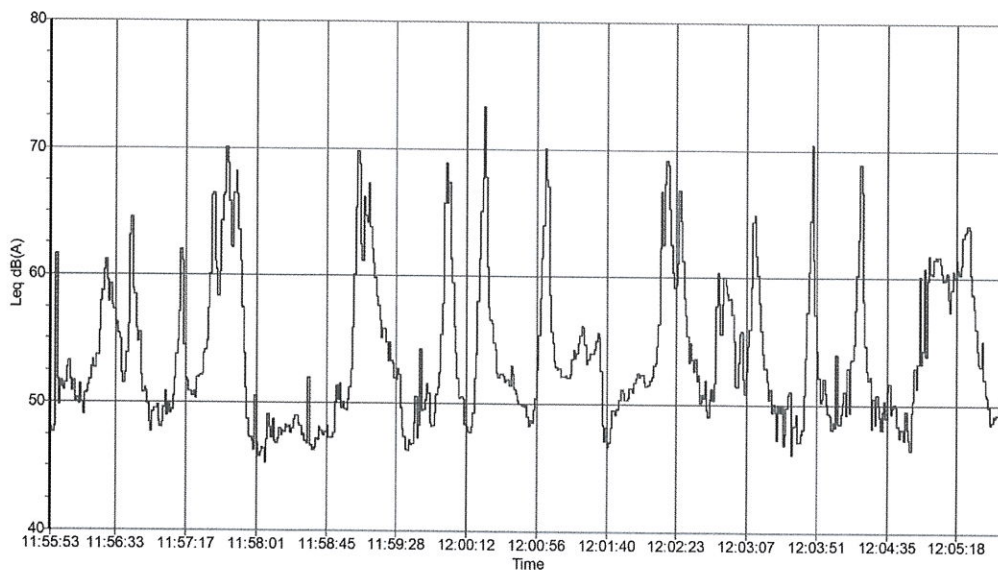
Measurement Details

Date and Time: 31.05.2019 11:55
Sound Level Meter: Cirrus Research plc

Run Duration: 00:09:54 hh:mm:ss
Range: 20-90 dB
Overload: no

Data

Leq	58,7 dBA	L1,0	69,5 dBA
Lepd	41,9 dBA	L10,0	62,4 dBA
LAE	86,3 dBA	L50,0	52,4 dBA
LAFmax	74,8 dBA	L90,0	47,7 dBA
Peak	97,1 dBC	L95,0	47,1 dBA
		Lmin	44,7 dBA





Прилог 4: Микролокација на мерното место 2ММ – с. Мождивјак

