

**PUBLIC ENTERPRISE FOR STATE ROADS**  
Republic of Macedonia



**ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (ESAR) FOR  
REHABILITATION OF THE REGIONAL ROAD R-1209 TETOVO –  
POPOVA SHAPKA**



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## LIST OF ABBREVIATIONS

BP	Bank Procedure
EIA	Enironmental Imact Assessment
EU	European Union
EC	European Comission
ESAR	Environmental and Social Assessment Report
EPSAU	Environmental Protection and Social Aspects Unit
ESMMP	Environmental and Social Management and Monitoring Plan
GoM	Government of the Republic of Macedonia
IPMU	International Projects Management Unit
H&S	Health and Safety
NTS	National Transport Strategy
NRRRP	National and Regional Road Rehabilitation Project
MoEPP	Ministry of Environment and Physical Planning
OPs	Operational Polices
PESR	Public Enterprise for State Roads
PUC	Public Utility Company
PM	Particulate Matter
RM	Republic of Macedonia
WB	World Bank

## 1. Executive summary

National and Regional Road Rehabilitation Project (NRRRP) is a project supported through a loan by the World Bank. This project implements the National Transport Strategy (NTS) of the Republic of Macedonia. The Project is consistent with the National Transport Strategy (2007-17), 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 National and Regional Road Rehabilitation Project (NRRRP) for the period 2017-2018 and covers the following:

- improvement of condition on state road network by means of rehabilitation of approximately 157 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.

One of the Category B sub-projects under the WB project of National and Regional Road Rehabilitation Project (NRRRP) is the rehabilitation of the regional road R-1209 Tetovo – Popova Shapka.

The road specific Elaborate for environmental protection is an integral part of the overall project documentation developed for rehabilitation activities according the Macedonian National legislation in field of environmental protection, especially the Law on Environment (“Official Gazette of RM” no.53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13 and 187/13)<sup>1</sup>. Elaborate for environmental protection should be approved by Administration of Environment within the Ministry of Environment and Physical Planning (MoEPP).

According to the WB policy on Environmental Assessment (OP 4.01), Involuntary Resettlement (OP 4.12), and other environmental and social policies, such projects should be analyzed to determine the potential for negative and positive environmental and social impacts and to avoid, compensate and/or mitigate the adverse negative impacts on the environment.

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<sup>1</sup> Article 24 - Elaborate for environmental protection

In order to ensure the environmental compliance of the proposed project and to meet the requirements of the World Bank Safeguard Policy OP 4.01 'Environmental Assessment and Environmental and Social Assessment Report (ESAR) including Environmental and Social Management and Monitoring Plan (ESMMP) has been developed for this project. The proposed rehabilitation activities for the regional road R-1209 Tetovo – Popova Shapka is determined in detail by respective Environmental and Social Assessment Report (ESAR).

The road section Tetovo - Popova Shapka is part of the regional road R-1209 located in the northwestern part of the Republic of Macedonia and connects Tetovo and the ski center Popova Sapka. The starting point of the alignment is in Tetovo with coordinates N42°00'24 "and E20°57'29", and the end of the route is Popova Shapka with coordinates N42°00'47 "and E20°53'07".

The section represents the entire regional road R-1209, it starts from the connection with the regional road R-1206 and goes to Popova Shapka with length of L= 18,2km (from km0+000 - km18+200). In certain locations along the section there are large and minor damages, intense network cracks and longitudinal and transverse cracks.

Potential impacts of the project on the environment and social aspects is assessed in this Environmental and Social Assessment Report (ESAR) which is developed to meet the requirements of Macedonian National legislation and World Bank Environmental and Social Safeguards.

Potential environmental and social impacts as 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 rehabilitation activities will ensure reduce 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 Macedonian authorities and the World Bank, which have to approve the project before it can be implemented.

### Macedonian Framework

Republic of Macedonia has developed full legal and institutional framework for Environmental Assessments. This framework is generally in compliance with the existing World Bank 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 the Republic of Macedonia" No.53/05, 81/05 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13 and 187/13).

The types of projects that require an EIA should be determined in accordance with Article 77 of the Law on Environment, which are specified in detail in the "Decree for Determining Projects for which and criteria on the basis of which the screening for an environmental impact assessment shall be carried out" ("Official Gazette of the Republic of Macedonia" No.74/05). According to this Decree, a *full EIA Study* for this project activities is not needed (only construction of new highway and national or regional road or widening of existing road with additional two lanes is subject to full EIA Study).

The Ministry of Environment and Physical Planning (MoEPP) has been prepared Rulebook for implementing, screening, scoping and review in environmental impact assessment in the Republic of 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 Tetovo – Popova Shapka 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).

The Elaborate for environmental protection is required to identify and describe how the project can have negative and positive impacts on environmental resources – water quality, air, biodiversity and on people – economic status, noise, traffic, etc., and define proper mitigation measures during rehabilitation activities to reduce or mitigate impacts to acceptable levels.

### World Bank Environmental and Social Safeguard Policies

World Bank environmental and social safeguard policies are regarded as a corner stone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate harm to people and their environment in the development process. These policies provide guidelines for the WB and borrowers in the identification, preparation and implementation of programmes and projects. Environmental Impact Assessment (EIA) is 1 (one) of 10 (ten) environmental, social and legal safeguard policies of the WB. Environmental Impact Assessment (EIA) is used to identify, avoid and/or mitigate the potential negative environmental impacts associated with lending operations. The purpose of EIA is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been adequately consulted. The WB's environmental assessment policy and recommended processing are described in *Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment*. This policy is considered to be the 'umbrella' policy for WB environmental 'safeguard policies'.

For the present road section Tetovo – Popova Shapka the relevant safeguard policies to be considered at all stages of preparation and planning:

- Operational Policy on Environmental Assessment (OP 4.01, 1999, revised April 2013);
- Operational Policy on Physical Cultural Resources (OP 4.11, 2006);
- Operational Policy on Natural Habitats (OP 4.04, 2001);
- Policy on Access to Information (2013).

The WB OB/BP on Involuntary Resettlement requires WB-assisted projects to avoid or minimize involuntary land taking. If such cannot be avoided, displaced persons need to be meaningfully consulted, compensated for lost/damaged assets and assisted in restoring or improving their living standards and livelihood.

The WB OP/BP on Natural Habitats seeks to ensure that WB-supported infrastructure and other development projects consider the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats can provide to human society.

The policy strictly limits the circumstances under which any WB-supported project can damage natural habitats, i.e. such land and water areas where most of the native plant and animal species are still present. Specifically, the policy prohibits WB support for projects which would lead to significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are either:

- legally protected;
- officially proposed for protection;
- unprotected but known of high conservation value.

In other (non-critical) natural habitats, WB-supported projects can cause significant loss or degradation only when:

- there are no feasible alternatives to achieve the project's substantial overall net benefits; and
- acceptable mitigation measures, such as compensatory protected areas, are included within the project.

At the Project level, WB seeks to ensure that its lending operations comply with international obligations to protect biodiversity. EIAs for WB should consider the impacts of proposed project on a country's biodiversity.

The WB OP/BP on Forestry aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty and encourage economic development.

The WB OP on Cultural Property is based on the acknowledgement of cultural resources as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. WB policy as stated in Operational Directive (OD) 4.50 is to: (a) assist in protecting and enhancing cultural property through specific project components and (b) decline to finance projects which significantly damage cultural property and assist only those that are designed to prevent or minimize such damage.



### 3. Project description

National and Regional Road Rehabilitation Project (NRRRP) is a project supported through a loan by the World Bank. This project implements the National Transport Strategy (NTS) of the Republic of Macedonia. The Project is consistent with the National Transport Strategy (2007-17), 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 for the period 2017-2018 and covers the following:

- improvement of condition on state road network by means of rehabilitation of approx. 157 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.

According to the conceptual design, rehabilitation of 12 road routes are foreseen, one of the routes for rehabilitation is LOT 1: R-1209 Tetovo – Popova Shapka. The road section Tetovo - Popova Shapka is part of the regional road R-1209 located in the northwestern part of the Republic of Macedonia and connects Tetovo and the ski center Popova Sapka. The starting point of the alignment is in Tetovo with coordinates N42°00'24 "and E20°57'29", and the end of the route is Popova Shapka with coordinates N42°00'47 "and E20°53'07".

In certain locations along the section there are large and minor damages, intense network cracks and longitudinal and transverse cracks. On this section is foreseen the upgrading of the existing pavement. On the initial part of km 0+000,00 to km 18+200,00, an overhaul over an existing roadway is foreseen, and alignment of the road to the surrounding road network that gravitates around the regional road and, in general, sends the configuration of the surrounding terrain.

The current condition of the road section Tetovo – Popova Shapka is given in Figure 1.



Figure 1 Section Tetovo – Popova Shapka

### 3.1 Technical Characteristics of the Project

The road section Tetovo - Popova Shapka is part of the regional road R-1209 located in the northwestern part of the Republic of Macedonia and connects Tetovo and the ski center Popova Sapka. The starting point of the alignment is in Tetovo with coordinates N42°00'24 "and E20°57'29", and the end of the route is Popova Shapka with coordinates N42°00'47 "and E20°53'07".

The carriageway has two traffic lanes with a total width of about 6,50m (5,50 – 7,50m) and shoulders/gutters with an average width of 1,0/0,50m. On this part, the following road damage has been noted that occur on a larger scale compared to the other parts:

- mesh cracks and crocodile skin,
- shock holes,
- local landing,
- collapsed and/or twisted sheaths,
- local remediation,
- expressed cracking,
- degradation of the surface asphalt layer.

#### 3.1.1 Topographic bases

In order to determine the structural elements of the existing alignment and setting the axle, detailed tachymetric recording of the alignment was carried out:

- Installation of an operating polygon for the whole length of the route. The points of the polygonal train are made of concrete elements with a certain dimension at distance not greater than 250m,
- The operational polygon train was measured with their absolute coordinates and heights in relation to the fixed geodetic points with the absolute values X, Y and Z.

After the geodetic survey was completed, the train was moved to mark the route and record it. Marking of the route is done by placing steel nails on the left and right edges of the asphalt pavement in every 10 meters.

Also, existing facilities along the alignment, existing flaws, grooves, stops, bridges, etc. were recorded and geodetic existing situation was developed with the application of a software program for field modeling.

### 3.1.2 Limitations

In defining the axis of the road there are usual limitations from the aspect of topography on the terrain, the construction of the terrain, expropriation, etc.

### 3.1.3 Elements of the geometric cross-sectional profile

The elements of the geometric cross-section are defined by the existing situation on the ground and are:

- Traffic lanes 2 x 3,00m
- Edge lanes 2 x 0,30m
- Carriage profile 6,60 (6,00) m
- Shoulders 1,00m
- Gutters 0,50m
- Planum 8,60 (8,00) m

### 3.1.4 Characteristic and critical traverse profiles

The specific conditions of characteristic critical traverse profiles are determined by geodetic recording, processing and presentation of data.

Based on the recorded data and the data for the longitudinal profile, cross profiles has been designed as detailed solutions presented in scale 1:100.

### 3.1.5 Situation plan (horizontal solution)

The basis for defining the horizontal solution ie the axis of the road is the geodetic base using the existing pavement from the regional road R-1209. Using the recorded points from the geodetic survey, a "fine" shift of the axis of the road was performed to accurately track of the existing pavement of R-1209.

In general, the route extends in the direction of the southeast - northwest. The beginning of the route on km 0+000,00 is located at the exit from the intersection with Blvd.Ilindenska in Tetovo, while the end of the rehabilitation is located at 18+200,00km, near the ski center Popova Shapka.

The axis of the road is driven along the middle of the existing road. It is projected with horizontal circular arcs projected in the vertices of the crossover angles greater than 3°, interconnected with the transversal curves. The formation of circular arcs is performed with radius  $R = 12-1.250m$ .

### **3.1.6 Vertical solution**

The vertical solution of the alignment is defined by the level line, which is defined as the intersection of a vertical plane laid through the axis of the road. In geometric terms, the alignment is composed of directions (hills and downhill on the route) and vertical curves (convex and concave curves). The ravines of the leveling are defined by their slopes, while the vertical curves are determined by the radius of curvature.

The boundary values of the projected elements are determined according to dynamics, exploitation and constructive criteria, while the applied values are selected according to the design rules and terrain conditions.

The vertical solution of the route is conditioned by the project conditions and the existing state of the terrain and follow the level of the existing pavement.

Once the axis of the existing pavement has been defined, the longitudinal profile of the alignment with the line on the ground has been made.

The starting point of the vertical alignment at km 0+000,00 is about 470 mNV until the end of the 18+200,00 is about 1720mNV, meaning that vertical alignment is climbing towards chainage.

### **3.1.7 Carriageway**

The dimensions for the pavement construction are undertaken in accordance with the solutions of the Conceptual Design:

- Abbey layer AB 16 d = 5 cm,
- Leveling bituminous layer, I layer BNC 22cA d = 7 cm, (local, as needed).

### **3.1.8 Drainage**

Drainage of the carriageway is provided by using the existing elements of the road for drainage and clearing of the gutters, ditches and culverts.

### **3.1.9 Transport and technical equipment**

Based on the defined content and traffic-technical equipment on the road, they are made in a special traffic management project.

### 3.2 Construction Materials

Since only rehabilitation activities are planned for this road section, no active processing of raw materials is envisaged on the temporary construction sites. The basic construction materials to be used are bitumen emulsion, sand, asphalt layer, etc. Contractor will obtain construction materials from existing borrow pit "Crkoven Rid" v. Orashac, located 60km from the alignment.

The proposed borrow pit is privately owned and possesses environmental permit (given in Appendix 1) specifying the environmental requirements to be followed/met by borrow pit owners/operators, which have been issued by Ministry of Environment and Physical Planning (MoEPP) in accordance with the Law on Environment ("Official Gazette of the Republic of Macedonia" No.53/05, 81/05 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13 and 187/13). The environmental compliance of the borrow pit operation is supervised by the State Environmental Inspectorate under the MoEPP.

The inspections are carried out in accordance with MoEPPs annual inspection programs, or as judged to be necessary by the MoEPP.

The asphalt plant Orashac owned by the Company VE Grupa will be used for the purposes of the project. The asphalt plant Orashec is located 60km from the alignment. The plant possesses an environmental permit - IPPC (given in Appendix 2) issued by MoEPP which carried out regular monitoring of the plant's environmental compliance.

During rehabilitation phase small amount of construction wastes such as humus, branches and earthen materials will be generated. These wastes will be disposed on the existing landfill approved by the Municipality of Tetovo, located about 1km from the starting point of the alignment.

## 4. Baseline data

### 4.1 Description of the environment around the project location

The municipality of Tetovo is located in the north-western part of the Republic of North Macedonia. North Macedonia is part of the Polog statistical region. It stretches in the foothills of Shar Planina, in the valley Polog, which is surrounded by the mountains Zheden and Suva Gora.

The municipality of Tetovo is bordered by Kosovo to the north and west, the Municipality of Tearce to the northeast, Municipality of Jegunovce to the east, the Municipality of Zhelino to the southeast, the Municipality of Brvenica to the south and the Municipality of Bogovinje to the southwest.



Figure 2 Location of the road section Tetovo – Popova Shapka

The municipality of Tetovo covers a total area of 87km<sup>2</sup> and according to the last official census in 2002 there are 70,841 inhabitants, of which 52,915 inhabitants live in the city of Tetovo, while the rest live in the villages in the municipality.

The number of settlements in the municipality is 19 settlements, and according to the new territorial division in 2004 it is estimated that the population density is about 330 inhabitants/km<sup>2</sup>. All settlements in the municipality gravitate towards the city, and the average distance of settlements in relation to the city is 12,5km.

## **4.2 Geological features of the region**

The road section is located in the lower part of the Polog Valley. Polog valley with its border parts to the valley of the river Treska and Skopje valley, is characterized by the dynamics of a very shallow relief. From a geological and geomorphologic aspect, the valley is characterized by the presence of specific morphological structures. The dominant and characteristic morphological structures of the Polog valley are the massifs of mountains Shar Planina, Zheden, Suva Gora and Bukovikj.

In the peripheral parts of Polog there are characteristic Pliocene lake shores in the Upper Polog and the river-glacial shores of Dolen Polog. All these objects are the product of tectonic activities and erosion, which had an impact during the geological history of creation.

The formation of the Polog valley is a result of the large tectonic disturbances during the tertiary and quaternary period due to the outflow of the lake that existed in the bottom of the valley, through the gorge Derven and Vardar it poured into the Aegean Sea. At this stage, the geologic basic relief of this part of the Balkans is formed, and thus the basic relief forms of the Polog valley.

In general, the geology of the region is composed of Paleozoic, Permian, Mesozoic, tertiary and quaternary rocks. The oldest are the Paleozoic rocks represented by: the epidemic - chlorite - the series of quartz shales and metadiabas (Scoop), marble and calcist (M), granite rocks (γ), albitides - chlorite - epidote - quartz shale, and gabbro (v). Permolyte rocks are represented by phyllites, metamorphic glues, sandstones and shitsi (P, T) and quartz (π q).

The mesozoites are present in the triple massive marbles (T 2.3), the jura harbuge (ûr) and serpentine (Se). Tertiary consist only of Pliocene sediments. The ridge rocks are represented by: Marine material (gl), terrains of terraces (tj), low river terraces (t1), proluvial (pr), diluvial (d) and alluvial sediments (al).



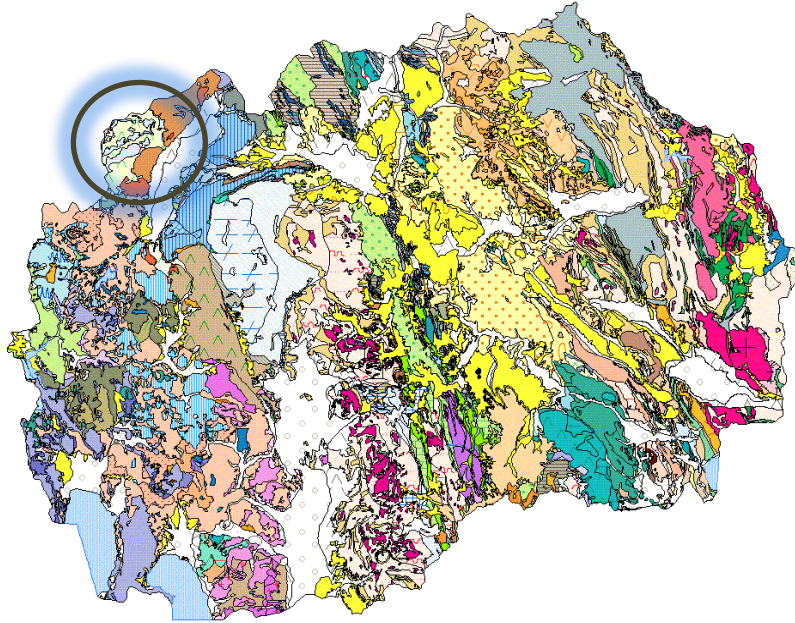


Figure 3 Project area on the geological map of the R. Macedonia

### 4.3 Basic hydro – geological features of the terrain

On the basis of the engineering geological and hydrogeological mapping of the terrain, the mapping of the core from the investigated holes and the investigative and geophysical investigations, a classification of rock masses was made from the aspect of their hydrogeological characteristics.

On the basis of the earlier defined parameters, the following types of rock masses are singled out:

- Poorly permeable diluvial sediments with interstitial porosity (d).
- Poorly-permeable fluvio-glacial sediments with interstitial porosity (fgl).
- Waterproof slopes of rock masses registered in the surrounding terrain and in contact with limestones - the epitope - actinolite shale with local crack porosity (Sep).
- Waterproof carbonate rock masses - crystalline limestone limestones, surface cracking with local crack porosity (T2 ').
- Waterproof carbonate rock masses - more compact crystals of limestones with locusts with local crack porosity (T2 ').

#### 4.4 Basic tectonic and seismic – tectonic features of the terrain

In seismological tectonic sense, the site belongs to the West-Macedonian zone, characterized by small plicate structures and radial tectonics. The continuation of the structures in the West-Macedonian zone is NW-SE to SSR-SSE. Tectonic development is associated with two major orthogeneses: hertzian and alpine orogenesis. Palaeozoic sediments were regionally metamorphic and wavy in soft syncline and anti-synclinal structures. Alpine orthogenesis requires a strong dynamo-metamorphosis, intense clamping of the terrain and, to a large extent.

In later stages of alpine orthogenesis (at the end of the lower or early middle pliocene), the terrain was captured by intense radial tectonics, which formed multiple tectonic rocks. Palaeozoic metamorphic rocks are intensely wavy in a milder syncline and anticlinal structure.

The project area belongs to a zone of high degree of seismic activity, which is the second zone of seismicity from the ninth degree. This area is located 30 km west of the Skopje hard area.

According to the seismic analysis, this area is characterized by earthquakes with different force and direction (from horizontal to vertical) and duration (of short, impact type, longitudinal), some of which go down deep under the Earth's crust, so that fragmented interruptions form seismic blocks are active occasionally.

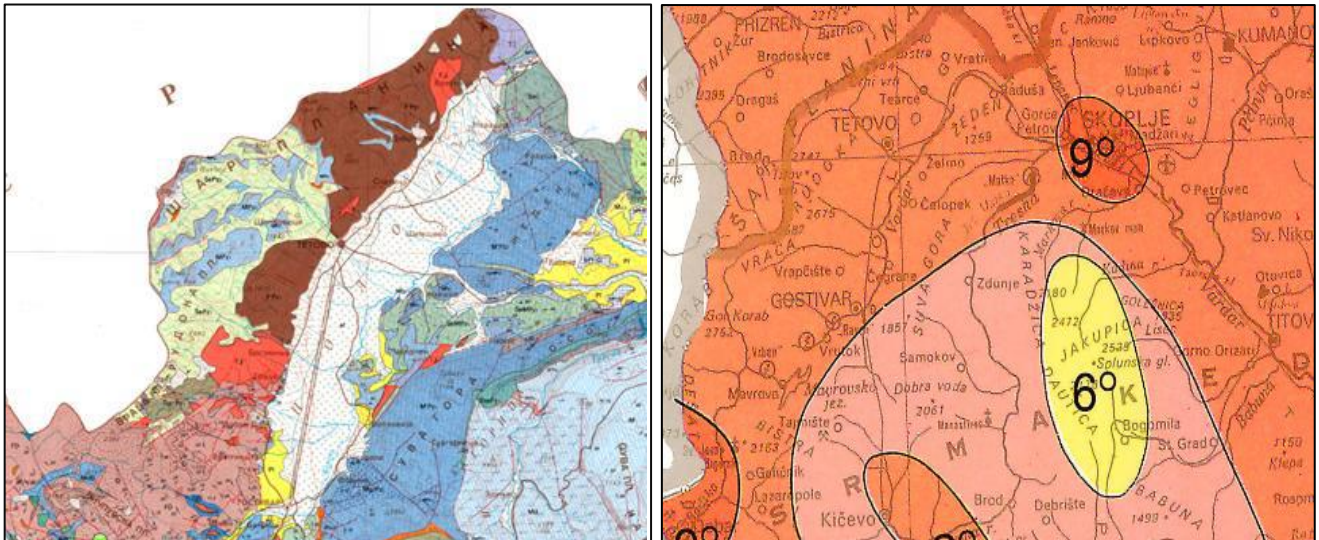


Figure 4 Geological map of Macedonia - Polog valley and Figure 5 Seismic map at the wider location project

#### **4.5 Features of the location**

Soils that represent wider area of the municipality, and especially in the plain part are: alluvial soils that cover 300ha and diluvial soils distributed along the slopes of Shar Planina. The humus content varies but is usually 2% of the soil surface and contains large amounts of  $\text{CaCO}_3$ . The mechanical composition of soils is characterized by fertility.

At an altitude of 300-600 m, valley relief is dominant. At the bottom of the valley stretches Polog which is divided into two parts: Goren Polog (near the city of Gostivar) at an altitude of 400-461 m and Dolen Polog (near the city of Tetovo) at an altitude of 461 m.

The mountainous relief is hilly and mountainous and consists of the mountains of Suva planina (1,853 m asl) and Shar Planina (2,748 m). The western mountain parts are covered with lush vegetation that gives a characteristic forest landscape character, while the eastern mountains are empty and desert (Suva Gora, Zeden), due to the presence of limestone.

#### **4.6 Features of the area (landscape)**

The landscape in the municipality is diverse - there are fertile valleys and valleys, separated by mountains and hilly lands. The bulk of the city of Tetovo extends to the flat part of the lower Polog valley, and only a smaller part, mainly the elderly, lies on the slopes of Baltepe. The absolute altitude of the city ranges between 450 and 500 m. In recent years efforts have been made to spread the city to mountainous areas, which is slightly raised and favorable for urban construction.

The basic characteristics of the local topographical conditions of Tetovo are the result of its location on the border of two different physical and geographical units. On the one side, it is the zone of the Polog valley, and on the other side Shar Planina. These differences largely affect the appearance of the city and the structure of its landscape.

#### **4.7 Existing water resources**

The hydrographic network in the subject region region is quite rich with springs, rivers and their tributaries. The main recipient in the Polog valley is the river Vardar. Vardar is the largest river in Macedonia with a total catchment area of 20,661km<sup>2</sup>, length of 301 km, and the average annual flow of 63-145m<sup>3</sup>/s. Vardar's spring is in village Vrutok, 5 km west of Gostivar and runs along the entire length of Polog. On the course of the Polog valley, the Vardar River shows a highly developed hydrographic network consisting of tributaries, especially on the left side of Shar Planina, and on the right side the only larger tributary is the Lakavica River which flows from Bukovik Mountains.

The larger tributaries of Vardar, which flow from the Shar Planina, are Mazdracha, Bogovinska Reka, the Pena River and the Bistrica River. In addition, there are many smaller tributaries from which Vardar receives its waters.

The Pena River is a left tributary of the river Vardar and the longest river in the Polog region, with a length of about 37km, a catchment area of 191.6 km<sup>2</sup> and a 54‰ slope. The river flows through the city of Tetovo and flows into the river Vardar near the village of Sarakino. Its more important tributaries are the Krivosija River, Leshnichka Reka, Karanikolicka Reka, Skakale River, Brodechka River, Vejchka Reka and others.

#### **4.8 Climate characteristics of the area and Meteorology**

Climate (temperature, humidity, insolation, cloudiness, precipitation, winds, etc.) and climatic factors influence the development and existence of wildlife, the entire human activity and certain processes in nature, as an important element in the biosphere.

The Tetovo region, as well as the entire Polog valley is fairly northwest and is affected by the changed Mediterranean and continental climate. Thus, the climate is characterized by many cold winters, because the valley is surrounded by high mountains from all sides, which have a great influence on the regime in the region.

Although this region is at a higher altitude, there are very high maximum temperatures. Thus, the absolute maximum temperature of 40°C was determined on July 21, 1987. High temperature parameters in the warm season are confirmed by the intensity of the summer days of about 100 days, as well as the 35 tropical days with an average temperature of 30°C or more, which is typical for the months of July and August. Very high parameters of the absolute maximum and low values of the absolute minimum temperature require a high absolute variation with a parameter of 69°C, which is a characteristic of an area with a very pronounced continental influence.

The Polog valley during the winter period is characterized by cold air and the appearance of temperature inversions up to a height of 1000m. Low temperatures are often accompanied by fog, on the surrounding mountain massif the temperature is above zero, with pure sky, sunshine and relatively warm weather.

An average rainfall in Polog valley is 784 mm, which are not equally dominant during the year. The most robust month is November with an average amount of 103 mm or 13% annually, with the least rainfall in August with 38 mm or only 5%. In certain years there are deviations from these parameters, and according to the seasons, the winter is the most powerful with an average of 219 mm, then the spring with 199 mm and the summer with 117 mm.

#### **4.9 Biodiversity (flora and fauna) in the project area planned for performing rehabilitation activities**

The Republic of North Macedonia is located in the central part of the Balkan Peninsula and is part of the wider Mediterranean Region, which is identified as the third most significant biodiversity hotspot in the world by the number of endemic plant species (Myers et al., 2000). Consequently, although relatively small in territory (25,713 km<sup>2</sup>) R. of North Macedonia occupies a significant place on the global map of hotspots of biodiversity.

Through interaction of natural conditions and the long human influence on the territory of the Republic of Macedonia, about 120 types of habitats have been identified, from the 3rd level of the EUNIS classification, which belong to 28 types of ecosystems. Among them there are also those that are of exceptional significance not only nationally but also globally.

Regarding the project location Shar Planina mountain is identified Emerald Area on the west side of the project location and Important Bird Area and Primary Butterfly Area.

On the territory of Shar Planina there are rare types of fungi. Among the invertebrates, endemic species and relict species also occur. In the group of daily butterflies there are no endemic species registered, there are several relic species and species that are listed on the list of the Habitat Directive, the Berne Convention and the IUCN Red List. Snails are represented with 5 endemic species for the mountain, and 11 are Balkan endemics. The class of Amphibians is represented by 12 species, of which 5 are listed in Annex 2 of the Berne Convention.

On the project location there isn't species that can be affected by implementation of the project activities. However, foreseen project activities cover rehabilitation of the existing road section without widening of the road section, therefore project will not have an impact on the overall biodiversity in the project area.

#### **4.14. Socio-Economic aspects**

Development of the market economy and private initiative in the last two decades have been caused stagnation, restruction or liquidation of large social enterprises (Teteks, Jugohrom, EDKO, Shik Jelak, Autoprogress, Nemetali, etc.), development of the small economy and small businesses.

According to the economic structure in the Polog region, the following types of industrial branches are represented: production of building materials, processing and production of final products of wood, food industry, processing of plastic masses, processing of aluminum and production of textile products.

According to official statistics, the services dominate with 49% in production versus the industry with 35%, however, employment is dominated by the industry with 50%, while the services account for 40%.

#### **4.10. Hydrology**

The territory of the Polog valley is quite rich with constant and irregular flows in the area, creating a network of rivers and streams rich in water during the year. The hydrography of the Polog Valley is characteristic of the great number of watercourses and abundance of water. Polog Valley is part of the watershed of the Vardar River, waters that are part of the Aegean catchment area.

The hydrogeological characteristics of the project area are determined by the presence of compacted aquifers, cracks and karststone type of edges. The collected editions are related to non-cohesive, mainly gravel-sand deposits with inter-granular porosity, which are most often spread to the Polog valley.

The level of groundwater in the upper water layer in this part of the charged water bodies is generally shallow, mainly 2-5 m below the surface and near the river Vardar.

#### **4.15. Road infrastructure**

The Municipality of Tetovo extends mostly in the plain area, to a lesser extent it lies on the slopes of Baltepe, Brdo high 806 meters, and on other hills. Tetovo villages are widespread in the foothills of Shar Planina, in the lower Polog, mainly around the river Vardar and the highways, then at the foot of Suva Gora and Zeden and in the mountain part of Shar Planina.

Neighboring municipalities of the Municipality of Tetovo are: Tearce, Jegunovce, Zhelino, Brvenica and Bogovinje. The municipality of Tetovo are connected with the regional roads Skopje-Ohrid and Tetovo-Jazhince.

The project area ie road section Tetovo – Popova Shapka, is located on the southeast side of the mountain Popova Sapka, northwest of Tetovo with a distance of about 18km.

#### **4.16. Education**

There are several schools and universities also higher education within Municipality of Tetovo, given below:

##### Universities and higher education State University in Tetovo, with instruction in Macedonian and Albanian language

- University of South East Europe started operating in 2001,
- University St. Cyril and Methodius, from the school year 2012/13 opened dispersed studies in Tetovo in Informatics, E-Business and Legal Studies,

- University of Tourism and Management has opened dispersed studies in Tetovo in the field of Economics, Tourism, Management and Management of Human Resources from the school 2013/14.

### Secondary schools

In Tetovo there are following high schools:

- MC "Mosha Pijade" - Tetovo. Known as Agricultural School. It was founded in 1928 as a Lower Agriculture School, which created conditions for professional training of students from many parts of the country. And today it holds the primacy of a regional school center.
- Medical School "Nikola Shtajn" - Tetovo. It was founded in 1961 by the Assembly of the municipality of Tetova under the name of the Secondary medical school for nurses and technicians. There are two school centers.
- "8th of September" - Tetovo. Founded in 1996, it is the first school to study the economy in Tetovo.
- Secondary school "Todor Skalovski-Tetovo". Founded before the Second World War, until 2000, it operated as a music school, until the dispersion centers of the Skopje Music School were opened.
- SU "Gojce Stojcevski" - Tetovo or textile school center. Designed to meet the needs of the Teteks company. Apart from textile trades, chemistry is also known.
- High School "Kiril Pejcinovic" - Tetovo. The oldest school center in Tetovo. And one of the oldest gymnasiums in Macedonia.

### Primary education

In Tetovo there are the following primary schools:

- PS "Naim Frasheri"
- PS "Lirija"
- Primary School "Cyril and Methodius"
- PS "Andreja Saveski Qikish"
- PS "Istikbal"
- PS "Goce Delchev"
- Primary School "Brotherhood of Midnight".

### **4.17. Health institution**

In Municipality of Tetovo there is a clinical center, and residents use the health services of the general health care homes in the larger settlements with outpatient clinics in the villages, as well as in the Clinical Center in Skopje.

There are private health clinics that provide primary care in general in general medicine, pediatrics, gynecology and dentists.

#### 4.18. Population

According to the number of inhabitants, the Municipality of Tetovo belongs to the larger municipalities in the Republic of North Macedonia. The total number of populations in the municipality is 86,560 inhabitants or about 5% of the total population of the Republic of North Macedonia.

**Figure 6 Total population, households and flats in the municipality of Tetovo, 2002**

Municipality	Population	Households	Apartments
Tetovo	86,580	20,094	22,592

According to the statistics, the city of Tetovo has a total of 18,893 housing units (apartments) and compared to the number of households there are more apartments, by 7,8%. In the municipality of Tetovo, beside the city of Tetovo, the following villages are located: Bozovce, Brodec, Vejche, Veshala, Gajre, Golema Recica, Germo, Yedoarce, Lavce, Lisec, Mala Recica, Otunje, Pori, Saracino, Selce, Dzepciste and Sipkovica.

#### 4.19. Industrial objects

The economy on the territory of the Municipality of Tetova has been steadily increasing in recent years. The most developed industries are wood processing industry, construction and construction materials, agriculture, textile industry, etc.

Also, the increased economic growth can be noticed by the permanent increase in the number of economic entities operating in the Tetovo region.

According to the data from the State Statistical Office, the number of business entities in the municipality of Tetovo is around 3000.

The following tables show the division of business entities by size and activity.

**Figure 7 Classification of business entities by size**

	Mikro	Small	Middle	Big	Total
Number	1967	932	20	2	2921

#### 4.21. Culture Heritage

Significant cultural heritage (archaeological site or monument of culture) has not been identified at the site and in its surroundings.

The project location is not on the map of the cultural and historical heritage of the Republic of Macedonia, that is, there are no protected goods and goods for which it is assumed that they represent a cultural heritage.



## 5. Environmental impacts

Rehabilitation of the road section Tetovo – Popova Shapka will be implemented on existing road, where only rehabilitation activities without widening of the road section are foreseen. Environmental impacts will occur during preparation and rehabilitation phase. Therefore, environmental management in the preparation and rehabilitation phase is the main content of this ESAR.

Preparation phase – it includes all preparatory activities before the start of the activities for rehabilitation of the subject section. The preparatory phase has a short duration with preparation of the terrain for the construction phase. This phase is limited in duration and depends on the dynamic plan for execution of construction activities, and at the same time it depends on weather conditions and terrain configuration. Also, during this phase, the initial measures for protection of the environment will be undertaken: organizing of movement and work of construction machinery, as well as placing appropriate containers for waste collection.

The following environmental impacts are expected during the preparation phase:

- Occurrence of fugitive dust emission from the clearing of the terrain;
- Exhaust gases from construction mechanization;
- Noise and vibrations from the work of the construction mechanization;

The following environmental impacts are expected during rehabilitation phase:

- emission of exhaust gasses from the construction machinery;
- solid communal waste;
- waste water produced by construction workers;
- noise and vibrations from the construction machinery.

### 5.1 Air emissions

Emission of harmful pollutants into the air is expected during preparation and rehabilitation phase. During the process of preparation and rehabilitation phase of road section i.e. cleaning of the culverts, ditches, gutters, operation of construction mechanization and transport of construction material, the following air emissions are expected to occur: emission of exhaust gasses from mobile sources of pollution - construction machinery and fugitive emissions of volatile organic compounds from applying bituminous emulsion and asphalt mixture.

During the rehabilitation of the road section, dust emitted from the mechanical operation of construction machinery and combustion of fuel affects the nearby and distant environment will depend on the size (aerodynamic diameter of the particles) and the

weather conditions. The impact of the fugitive dust emission will be additionally intensified by the emission of exhaust gasses from the construction machinery.

The fine dust, i.e. inhalable particles with diameter  $D \leq 2.5 \mu\text{m}$  that are created during combustion of fuel in motor vehicles are transferred at a greater distance and have a chemical composition, i.e. contain organic compounds and heavy metals, which has negative impact on the human health and the environment.

The following table presents the limits and margin of tolerance for suspended dust with a diameter of 10 micrometers PM10, according to the National Plan for protection of ambient air in the Republic of Macedonia and relevant sub law acts on air protection, which were prepared in accordance with transposed EU legislation. The suspended dust with a diameter of 10 micrometers PM10 will be measure on representative roadside receptors and air quality measurements report will be given in Appendix 5.

**Table 1 Limits and margin of tolerance for suspended dust PM10**

Polluting substance	Average period	Limited value to be reached in 2012	Allowed number of exceeding during the year	Margin of tolerance for 2010	Limited value for 2010	Threshold of alert
<b>PM10</b>	24 hours	50 $\mu\text{g}/\text{m}^3$	35	0 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	
	1 year	40 $\mu\text{g}/\text{m}^3$	0	0 $\mu\text{g}/\text{m}^3$	40 $\mu\text{g}/\text{m}^3$	

The fugitive emission of volatile organic components (VOC) from the use of bitumenous emulsion and asphalt mixture will have less influence, because these compounds are easily evaporative and retain shortly in the air.

Gasses and pollutants are emitted in the ambient air through the system for disposal of waste gases, from vehicles and construction machinery on-site.

The quantity and composition of exhaust gases depends on several parameters such as the type and age of vehicle, the performance of vehicle, the type of used fuel, features of the fuel in the distribution network, the presence of additives, the degree of combustion of fuel, etc.

SO<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O and aromatic hydrocarbons occur during the complete combustion of fuel, while Pb<sub>2</sub>O<sub>3</sub>, etc., occur when using catalysts., CO, hydrocarbons, suspended dust, etc. occur during the incomplete combustion of fuel.

During a long-term exposure to these toxic substances, they have negative effect on the human health. The geomorphological and weather conditions have influence on the concentration of emitted pollutants in the air i.e. the pollution of the ambient air in the region.

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)**

<b>Motor power</b>	<b>CO (g/kWh)</b>	<b>HC(g/kWh)</b>	<b>NOx (g/kWh)</b>	<b>PT(PM) (g/kWh)</b>
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

## 5.2 Water pollution

Water pollution can be physical, chemical and biological:

- The physical pollution is manifested through presence of solid particles from debris of soil and sand, solid particles from tire friction, debris from crashes, etc. The presence of grease and oils is physical pollution with liquid materials.
- The chemical pollution occurs as a result of dilution of the pollutants present in the air. These pollutants are result of the exhaust gasses from vehicles, emission of pollutants from the nearby industrial and processing facilities, dissolution of individual components from the surrounding land, from the use of agrochemical substances and pesticides, animal and plant waste.
- The biological pollutions are result of disintegration of organic materials that are used as food for various microorganisms.

In the vicinity of the alignment there is no watercourse that can be affected during project implementation. Considering the scope of the project activities rehabilitation of the road section (without widening), no water pollution is expected during the implementation of the project activities. To avoid water pollution, recommendations given in EMP should be followed.

## 5.3 Waste generation

The waste management is one of the most serious environmental problems in the Republic of Macedonia. The regular waste collection service is limited only to the urban areas, and very little attention is paid to the rural areas, 70% of the total urban population receives regular waste collection service and only 20% of the population in rural areas is covered by the service.

The municipal waste management is entirely controlled by the local government. It is directly connected with the urban plans for use of the local land and should be in accordance with the national strategic documents – the National Plan for Waste Management of RM and the National Strategy for Waste Management of RM as well as other relevant documents.

Proper waste management according to the generally accepted international norms will reduce the waste impact on soil (through uncontrolled waste dumping), underground water (directly contaminated over time from uncontrolled waste disposal) and air (through waste burning on open air).

Public Utility Company (PUC) "Tetovo" are responsible for the collection and disposal of municipal waste for the settlements in Municipality of Tetovo.

During the preparation and rehabilitation phase of the road section mixed municipal waste will be generate from the employees. According to the Law on Waste Management ("Official Gazette of RM" No.09/11), the generators of waste shall, to the greatest extent possible, avoid waste generation and reduce the harmful effects of waste on the environment, life and human health.

The waste generators are responsible to sign separate agreement for collection and transportation of the waste with waste service provider Public Utility Company (PUC) "Tetovo". The wastes will be transported by specialized vehicles designed for waste transportation and disposed on the nearest landfill. Hazardous waste will be consisted mainly by petroleum products, lubricants and oils for the vehicle and construction machinery, 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 fecal 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 and disposed on a landfill for hazardous waste.

The types of waste that will be generated during preparation and rehabilitation phase of the road section as well as the managing method for the different types of waste are presented in the following table:

**Table 3 Types of waste and quantities**

Phase	No.	Type of waste	Number from the List of waste types (Official Gazette no.100/05)	Amount of waste per year expressed in tones or liters	Method of waste management (processing, storage, transfer, disposal, etc.)	Name of the legal entity that manages the waste and location for disposal of waste (landfill)
Preparation and rehabilitation phase	1	Mixed municipal waste	20 03 01	Cannot be determined at this phase	Temporary disposal in PVC bags, to its removal in containers located nearby.	PUC "Tetovo"
	2	Soil contaminated by eventual leakage of oil from the construction machinery	17 05 05*	Cannot be determined (only in an emergency)	Engagement of authorized legal/ physical entities.	Legal or physical entities
	3	Construction debris	17 03 02	Cannot be determined at this phase	Disposal to nearest landfill.	PUC "Tetovo"

\*Hazardous waste according to the List of waste types ("Official Gazette of RM" No.100/05)

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.

#### 5.4 Soil contamination

The impacts on the soil during preparation and rehabilitation phase of the road section Tetovo – Popova Shapka are expected to be mitigated with proper implementation of mitigation measures.

During rehabilitation activities following impacts can be expected:

- Emission of dust from cleaning of the section;
- Emissions of exhaust gasses from the construction machinery that will be present on the site;
- Leakage of fuel and lubricants gasoline, petroleum, oil and lubricants, bituminous substances and asphalt-concrete. In case of spill from the construction machinery engaged during the construction activities, which may affect the soil and cause a pollution of underground water;
- Pollution of underground water and soil might occur in the case of accident.
- Contamination of the soil could cause contamination of the groundwater.

Contractor shall introduce good construction practice to prevent entering bitumen into channels, and proper handling of contaminated soil in case of spill according to national environmental requirements.

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 vehicle 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, vibration and non-ionizing radiation**

During the preparation and rehabilitation phase of the road section, the maximum allowed noise levels is expect to be exceeded as result of the project activities ie rehabilitation of the road section. The nearest settlements to the subject road section are Tetovo and Popova Shapka. The noise during the rehabilitation activities will result from the operation of construction machinery, vehicles for delivery and transportation of construction materials. These impacts will be reduced by applying proper mitigation measures. Noise level will be measure on representative roadside receptors and noise measurements report will be given in Appendix 5.

The significance of the impact will depend mostly on the type of equipment and technical features of the construction machinery. The distance from populated areas, geological conditions and terrain configuration are crucial for the noise impact on the environment.

The meteorological conditions have a great influence on the noise intensity and air shocks. The wind has effect on the increasing of the sound intensity, i.e. the increasing of sound intensity is almost always in the direction of the wind. The influence of the wind on the noise intensity is highest during the winter.

Table 5 presents the list of sources of noise, vibration and non-ionizing radiation.

**Table 4 List of sources of noise, vibration and non-ionizing radiation**

Source of emission	Type of emission (noise, vibration or non-ionizing radiation)	Equipment - device with a description of the maximum power	Emitted noise intensity (dB) expressed through index value of the equipment	Intensity of vibrations and non-ionizing emitted radiation	Emission periods (number of hours per day)
Heavy vehicles	Noise	Bulldozer Dredger Track	85 dB	/	8

The noise intensity and its impact on the environment depend on the scope and duration of the 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 5 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 07:00h to 19:00h), -Lv - evening (period from 19:00h to 23:00h), -Ln - night (period from 23:00h to 07:00h).

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).

- Area of I degree of noise protection is area intended for tourism and recreation, area nearby hospitals, areas of national parks and natural reserves.
- Area of II degree of noise protection is area that is primarily intended for residence, i.e. residential region, area nearby buildings designed for educational activity, facilities for social protection intended for accommodation of children and elder persons, facilities for primary health protection, area of playgrounds and public parks, area of public greenery spaces and recreational area, areas of local parks.
- 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.
- Area of IV degree of noise protection is area where activities in the surroundings are allowed, which can cause interference with noise, area without apartments, designed for industrial and crafts or other similar production activities, transport activities, storage activities, service and communal activities that are causing bigger noise.

- Subject road section belongs to Area of IV degree of noise protection - area where activities in the surroundings are allowed, which can cause interference with noise, area without apartments, designed for industrial and crafts or other similar production activities, transport activities, storage activities, service and communal activities that are causing bigger noise.

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 Biodiversity (flora and fauna)**

During preparation and rehabilitation phase of the road section Tetovo – Popova Shapka impacts on flora and fauna will be insignificant due to the rehabilitation nature of the proposed project. No vegetation clearance is expected due to the project activities.

Noise, vibrations and exhaust gasses from the fuel are impacts that will occur during exploitation phase, are already present. Since 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.

Due to increased noise level during the rehabilitation phase, harassment of local fauna and its migration from the micro location is possible. Since the rehabilitation phase is time bounded, when the periods with high noise and vibration levels will be finished, fauna will return on micro location.

### **5.7 Social impacts**

The project does not acquire land acquisition only rehabilitation of the existing road section. Social impacts due to land acquisition and resettlement issues are not expected.

During rehabilitation activities some health issues for the local population may emerge due to increased noise, fugitive emission of dust, exhaust gases etc., and occupational, health and safety issues for the employees.

In general, social impacts will be positive due to the rehabilitation process, traffic conditions will be improved, and traffic safety will be increased.



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

The main mitigation activities are described in Environment and Social Management and Monitoring Plan (ESMMP) given in Table 7 and Table 8.

Environment and Social Management and Monitoring Plan (ESMMP) identifies the environmental impacts during preparation and rehabilitation phase, mitigation measures and responsibilities for implementation of mitigation measures.

Mitigation is an integral part of impact evaluation. It looks the better ways of taking actions so that the negative impacts are eliminated or minimized.

Table 6 Environment and Social Management Plan

Phase	Issue	Mitigation measures	Responsibility	Comments	Indicative costs (euros)
Preparation	<i>Traffic safety</i>	<ul style="list-style-type: none"> <li>- Information to the public about rehabilitation activities,</li> <li>- Procedure for providing adequate information road signs.</li> </ul>	Contractor	/	2.000€
Preparation	<i>Health and safety</i>	<ul style="list-style-type: none"> <li>- Develop the Plan for Occupational health and safety for temporary construction mobile sites according to Law on occupational health and safety ("Official Gazette of RM" No.92/07).</li> </ul>	Contractor	/	500€
Preparation	<i>Health and safety</i>	<ul style="list-style-type: none"> <li>- Setting mobile toilets along the route and signing a contract with an authorized company.</li> </ul>	Contractor	/	300€
Preparation	Procedure for providing construction materials (sand gravel and asphalt)	<ul style="list-style-type: none"> <li>- Providing materials (sand gravel, and asphalt) from the facilities (quarries borrow pits, and asphalt plant) that have obtained IPPC permissions from MoEPP).</li> </ul>	Contractor	/	1.500€
Rehabilitation	<i>Traffic safety</i> Traffic Mangement, Placement of traffic signs	<ul style="list-style-type: none"> <li>- Providing adequate signalization,</li> <li>- Traffic safety signs,</li> <li>- Flag persons for traffic control.</li> </ul>	Contractor	Traffic management plan shall be prepared by the Contractor and approved by Ministry of Interior affairs.	2.000€

Rehabilitation	<i>General Work Safety</i>	<ul style="list-style-type: none"> <li>- According to the Macedonian legislation in field of occupational, health and safety (Law on occupational, health and safety - "Official Gazette of Republic of Macedonia" No.92/07) a <i>Plan for Occupational, Health and Safety</i> for temporary mobile construction site should be develop.</li> </ul>	Contractor	/	400€
Rehabilitation	<p><i>Air pollution</i></p> <p>Fugitive emission of dust, emission of exhaust gases from construction mechanization</p>	<ul style="list-style-type: none"> <li>- Use of standardized fuels for mechanization,</li> <li>- Minimising emissions through regular spraying with water during the construction works,</li> <li>- Using technically correct machinery,</li> <li>- Route planning and factor of loading and unloading to reduce of fuel consumption and emissions of exhauste gases and fugitive dust emissions,</li> <li>- Avoid working on machinery in so called "idle",</li> <li>- Covering vehicles that transport solid material,</li> <li>- Implementation of Traffic Management Plan,</li> <li>- Turn off mechanization when is not necessary.</li> </ul>	Contractor	/	2.500€
Rehabilitation	Potential pollution of <i>soil and groundwater/</i> contamination of surface water	<ul style="list-style-type: none"> <li>- Provide minimal size of work site,</li> <li>- Termination of construction activities in case of uncontrolled spills of fuel, oil, lubricants and other chemicals, sprinkle with</li> </ul>	Contractor	/	1.500€

		<p>sand and removal of polluted soil layer. Polluted soil layer would be treated as a hazardous waste,</p> <ul style="list-style-type: none"> <li>- Placing mobile toilets on certain places along the section and contracting with the company which will undertake and clean them,</li> <li>- Washing of the construction mechanization to be done on proper location,</li> <li>- Waste disposal on nearest permitted locations for waste disposal,</li> <li>- Proper handling of lubricants, fuel.</li> </ul>			
Rehabilitation	<p><i>Waste generation</i> (municipal waste from engaged employees, construction waste etc.)</p>	<ul style="list-style-type: none"> <li>- Implementation of key principles for sustainable waste management,</li> <li>- Placement of appropriate containers for collection of municipal waste on location,</li> <li>- Handling waste to authorized legal/physical entities,</li> <li>- Transportation of collected waste to the nearest landfill in coordination with local authorities,</li> <li>- Contracting with authorized companies for collecting and further management of different types of waste;</li> <li>- Separation of different types of waste,</li> <li>- Part of the construction waste to be reused, the other part of the construction waste which cannot be reused, to be landfilled,</li> </ul>	Contractor	Contract with authorized legal/physical entities.	3.500€

		<ul style="list-style-type: none"> <li>- Hazardous waste to be undertaken by the authorized company for hazardous waste management,</li> <li>- Waste produced by the workers (municipal waste) to be landfilled on a nearest landfill for municipal waste (according to National Waste Management Plan for RM) "Rusino" in Municipality of Tetovo.</li> </ul>			
Rehabilitation	Noise and vibrations from construction activities	<ul style="list-style-type: none"> <li>- Limit activities to daylight working hours from 8 am – 5 pm,</li> <li>- Planning the construction procedures due to minimizing emitted noise (in time and intensity);</li> <li>- Turning off the engines of vehicles and construction machinery when they are not in use,</li> <li>- Information for the local population about the project activities.</li> </ul>	Contractor	Control of technical features of the construction mechanization.	1.000€
Rehabilitation	Biodiversity	<ul style="list-style-type: none"> <li>- Provide minimal size of work site,</li> <li>- Minimal removal of the vegetation alongside the section during the preparation activities,</li> <li>- Temporary waste disposal sites along the route not to be created,</li> <li>- Hunting and fishing, collecting forest berries, bird eggs etc, by</li> </ul>	Contractor	/	1.500€

		the workers is not allowed.			
Rehabilitation	<i>Material supply</i> Asphalt Plant Borrow pits	<ul style="list-style-type: none"> <li>- Contractor to provide materials (sand gravel, and asphalt) from the facilities (quarries borrow pits, and asphalt plant) that have obtained IPPC from MoEPP,</li> <li>- Engagement of the professional and well managed personnel,</li> <li>- Properly handling with the contaminated soil must be according to legal environmental requirements. Contaminated soil should be treated as hazardous waste in accordance with Article 57 (General rules for hazardous waste handling and management),</li> <li>- Use existing borrow pit "Crkovni Rid" v. Orashac (with operating license issued by MOEPP/Competent authority)., at distance of 60km from the alignment.</li> </ul>	Contractor	/	10.000€
Rehabilitation	<i>Material transport</i>	<ul style="list-style-type: none"> <li>- Cover truck load,</li> <li>- Trucks shall be covered to minimize dust and material spillage,</li> <li>- Impementation of Traffic Management plan,</li> </ul>	Contractor	/	3.500€
Rehabilitation	<i>Construction site</i> Noise disturbance to population and employees.	<ul style="list-style-type: none"> <li>- Limit activities to daylight working hours,</li> <li>- Location of construction camps should not be close to watercourses.</li> </ul>			

Rehabilitation	<i>Worker's health and safety</i>	<ul style="list-style-type: none"> <li>- Provide workers with safety instructions and appropriate protective gear such as protective clothing, safety boots, helmets, gloves, goggles, ear protection, etc.,</li> <li>- Develop of the Plan for Occupational health and safety for temporary construction mobile sites according to Law on occupational health and safety ("Official Gazette of RM" No.92/07),</li> <li>- Health and safety training for the engaged personnel,</li> <li>- The Contractor will provide a method statement on accidents, fire and chemical spill containment/emergy procedures,</li> <li>- Provide workers with safety instructions and appropriate personal protective gear such as protective clothing, safety boots, helmets, gloves, goggles, ear protection, etc.</li> </ul>	Contractor	Appoint an Environmental and Health and Safety Manager	3.000€
Rehabilitation	<i>Traffic Mangement</i>	<ul style="list-style-type: none"> <li>- Develop of the Traffic Management Plan for regulation of traffic during the project activities.</li> </ul>	Contractor	/	1.000€
Rehabilitation	<i>Traffic Safety – Impairment of traffic during construction</i>	<ul style="list-style-type: none"> <li>- Public to be informed about the scope and schedule of the construction activities, expected disruption and access restriction,</li> <li>- Measures to allow for permanent</li> </ul>	Contractor	/	1.500€

		<p>adequate traffic flow around construction areas,</p> <ul style="list-style-type: none"> <li>- Adequate signalisation, traffic safety signs and flag persons for traffic control,</li> <li>- Appropriate lighting and safety signs..</li> </ul>			
Rehabilitation	<i>Informing the public/public consultation</i>	<ul style="list-style-type: none"> <li>- Informing the public about the construction activities: part of the day when they will be implemented, duration etc.,</li> <li>- Establishing complaint mechanism (Grievance Redress Mechanism) and involving the stakeholders (local communities and workers) before and during the rehabilitation of the road section.</li> </ul>	Contractor Engineer PESR	/	1.000€



**Table 7 Monitoring Plan**

Phase	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	Indicative costs (euros)
<b>Traffic safety</b>  Safety during rehabilitation activities	Existence of Traffic Management Plan	On project site;	Visual inspection;	During rehabilitation phase	Contractor Supervision Engineer	1000€
<b>General Work Safety</b>  Safety of the employees, visitors on site	Develop Plan for Occupational health and safety	On project site;	The status of implementation of mitigation measures; number of injures at work place; appointed person/officer for health and safety on site.	During rehabilitation phase	Contractor Supervision Engineer	500€
<b>Air pollution</b> (fugitive emission of dust, emission of exhaust gases from construction mechanization)	Exhaust fumes, Dust	On project site;	Visual inspection, Measurement of PM10	During operation of the mechanization, During material delivery	Contractor Supervision Engineer	1.500€
Potential pollution of <b>soil and groundwater</b> /contamination of surface water	Soil quality	On project site;	Visual inspection for spills and leaks which might impact soil quality (and potentially groundwater)	During rehabilitation activities	Contractor Supervision Engineer	400€

<b>Waste generation</b> (municipal waste from engaged employees, construction waste etc.)	Waste Management	On project site;	Visual inspection, contracts with authorized legal/ physical entities	During rehabilitation activities	Contractor Supervision Engineer	1.500€
<b>Noise and vibrations</b>	Noise levels	On project site;	Visual inspection, Noise measurements	Selection of measurements points near sensitive receptors	Licensed company	1.500€
<b>Material supply</b> (asphalt plant, borrow pits)	Approval or valid operating license (IPPC)	On project site;	Inspection	Before rehabilitation activities	Plant operator borrow pit operator	1.000€
<b>Material transport</b>	Truck load covered	On project site;	Visual inspection	During rehabilitation activities	Contractor Supervision Engineer	500€
<b>Construction site</b>	Noise levels  Technical features of the construction equipment	On project site  In authorized services and on site	Noise measurements  Inspection	During rehabilitation activities  During operation of the mechanization	Contractor Supervision Engineer	1.500€
<b>Road safety</b> (Increased vehicle speed)	Traffic signs; vehicle speed limitation	Along the road section	Visual observation; speed detectors	During rehabilitation activities	Contractor Supervision Engineer	1.500€

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## **7. Roles and responsibilities for implementation of ESMMP**

During rehabilitation of the road section Tetovo – Popova Shapka mitigation and monitoring activities will run parallel to the rehabilitation activities. They will commence at the time when employees, equipment and/or materials are moved to the site and will end after the job is completed and all employees, equipment and/or materials are removed from the site and the work at location is complete.

Contractor should provide monthly progress reports to Public Enterprises for State Roads (PESR) for implementation of foreseen environmental and mitigation measures. PESR will prepare quarterly Environmental Monitoring Reports for submission to the World Bank (WB) according to the received data from all Contractors, authorized bodies of state administration for such type of activities.

Roles and responsibilities for implementation of Environmental and Social Management and Monitoring Plan (ESMMP) are given in Table 9.

**Table 8 Roles and Responsibilities for implementation of ESMMP**

Company/Unit	Responsibilities
<p align="center"><b>International Projects Management Unit - IPMU (PESR)</b></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: <b>i)</b> closely coordinate with local authorities in the participation of the community during project preparation and implementation; <b>ii)</b> monitor and supervise ESMMP implementation including incorporation of ESMMP into the detailed technical designs and bidding and contractual documents; <b>iii)</b> be in charge of reporting on ESMMP implementation to the World Bank.</p>
<p align="center"><b>Environmental Protection and Social Aspects Unit (EPSAU) (PESR)</b></p>	<p>This Unit is responsible for monitoring the implementation of WB’s environmental safeguard policies in all stages and process of the project. Specifically, this unit will be responsible for:</p> <p><b>i)</b> reviewing the subproject: ESAR, ESMMP prepared by consultants to ensure quality of the documents; <b>ii)</b> helping IPMU incorporate ESMMP into the detailed technical designs and civil works bidding and contractual documents; <b>iii)</b> helping IPMU incorporate responsibilities for ESMMP monitoring and supervision into the TORs, bidding and contractual documents for selection of Contractor, Supervision, Monitoring contractor <b>iv)</b> providing relevant inputs to the consultant selection process; <b>v)</b> reviewing reports submitted by the Contractor, Supervision, Monitoring contractor; <b>vi)</b> conducting periodic site checks; <b>vii)</b> advising PESR management on solutions to environmental issues of the project; and <b>viii)</b> preparing environmental performance section on the progress and review reports to be submitted to the WB.</p>

Company/Unit	Responsibilities
<p style="text-align: center;"><b>Contractor</b></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, 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 style="text-align: center;"><b>Supervision Engineer</b></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 style="text-align: center;"><b>Ministry of Environment and Physical Planning (MOEPP)</b></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>

## **Appendix 1**

Environmental permit for borrow pit Crkoven Rid" v.Orashac

Б - интегрирана еколошка дозвола: ДПТУ „ПЕТРОС“ ДОО Куманово

Закон за животна средина

## Б – интегрирана еколошка дозвола

Република Македонија - Republika e Maqedonise  
Општина Куманово - Општина e Kumanoves  
Бр. на дозвола: 20-Уп1-159  
09. 07. 2014 год. члб  
Куманово - Kumanovë.

Име на компанијата: ДПТУ „ПЕТРОС“ ДОО Куманово  
Адреса: Локалитет „Црковен Рид“ с. Орашац  
Поштенски број и град: 1300 Куманово

Број на дозволата  
Бр. уп1 - 20-159

Општина Куманово

Датум на издавање на Дозволата

Б - интегрирана еколошка дозвола: ДПТУ „ПЕТРОС“ ДОО Куманово

Закон за животна средина

Дозвола

Закон за животна средина

## Дозвола

Број на дозвола  
Бр. Уп1 20-159

Надлежниот орган за животна средина во рамките на својата надлежност во согласност со член 95 од Законот за животна средина (Сл. весник на РМ бр: 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 51/11, 123/12, 93/13, 187/13 и 42/14), го овластува:

Друштво за производство, трговија и услуги „ПЕТРОС“ ДОО Куманово

со регистрирано седиште на

Адреса : ул. Трајко Јовановски Кмет бр.34  
Поштенски број Град : 1300 Куманово  
Држава : Република Македонија  
Број на регистрација на компанијата : 5448956

да раководи со Инсталацијата:

Друштво за производство, трговија и услуги „ПЕТРОС“ ДОО Куманово

Адреса: Локалитет „Црковен Рид“ с. Орашац  
Општина: Куманово  
Поштенски број Град: 1300 Куманово

во рамките на Дозволата и условите во неа.

Изготвил: Цветанка Арсиќ

Одобрил: Лидија Ланг-Спасовска

Градоначалник  
Зоран Дамјановски

Датум

09.07.2014 г.

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Општина Куманово

Датум на издавање на Дозволата



## **Appendix 2**

### Environmental permit for asphalt plant Orashac

Измена на А- Интегрирана еколошка дозвола

## Измена на А- Интегрирана еколошка дозвола

Име на компанијата:

ДПУТ увоз-извоз ВЕ - ГРУПА ДООЕЛ-  
Радовиш  
Булевар Александар Македонски бр.2-  
1/7

Поштенски број и град:  
Радовиш 2420

Број на дозвола

Бр.

  
РЕПУБЛИКА МАКЕДОНИЈА  
МИНИСТЕРСТВО ЗА ЖИВОТНА СРЕДИНА  
И ПРОСТОРНО ПЛАНИРАЊЕ  
Бр. М-462/4  
14. 02. 2019 год.  
СКОПЈЕ

Министерство за животна средина и просторно планирање

Булевар " Гоце Делчев " бр.18 МТВ , 1000 Скопје

**ВЕРНО НА ОРИГИНАЛОТ**



Училишна на А - Интегрирана еколошка дозвола

## Краток опис на инсталацијата регулирана со оваа дозвола

### Асфалтна база Орашец

#### ♦ Опис на асфалтна база

ВЕ ГРУПА ДООЕЛ Радовиш, инсталира ново набавена опрема со цел модернизација на опремата, зголемување на постојниот капацитетот од 60-70t/h на 160t/h на Асфалтна база Орашец со адреса с. Орашец, Куманово 1300 која поседува А Интегрирана еколошка дозвола.

Основна дејност на компанијата е изградба на патишта и автопати. Со цел зголемување на своето производство компанијата планира зголемување на капацитетот на постојната асфалтна база Орашец. Со зголемување на капацитетот за производство на рафинирани нафтени производи - облоги за покривање на патишта т.е. производство на жешка асфалтна маса претендира да ја задоволи моменталната и идната побарувачка на овие производи на пазарот во Р. Македонија и надвор.

Асфалтната база е лоцирана на јужната страна во близина на локален пат Доброшане - Шупли Камен кој се издвојува од регионалниот пат Куманово - Свети Николе, се граничи источно со обработливо земјиште, западно со приватен објект сепарација на песок, северно со локален пат, а јужно со обработливо земјиште.

Одалеченост од градот сса 10 km или 2,5 km од регионалниот пат, сместена е на југо -источна страна од градот Куманово. Објектот се протега на плац со површина од 4.741 m<sup>2</sup>.

На локацијата се сместени: лабораторија, канцеларија, работилница, магацински простор и технолошката линија за производство на асфалт.

Во околината на локацијата на асфалтната база (северно по локалниот пат Доброшане - Шупли Камен) се наоѓа Прочистителната станица за отпадни води на градот Куманово (далечина од 500 m). Во истата насока се наоѓа и селото Доброшане на далечина од 1500 m,

Министерство за животна средина и просторно планирање

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ВЕРНО НА ОРГИНАЛОТ



Име на А-интегрирана еколошка дозвола

Дозвола  
Закон за животна средина

## Дозвола

Број на дозвола  
Бр.11-1 од

Надлежниот орган за животна средина во рамките на својата надлежност во согласност со член 95 од Законот за животна средина (Сл. весник 53/05,81/05,24/07,159/08,83/09,48/10, 124/10,51/11,123/12,93/13, 187/13,42/14, 44/15,29/15 и 39/16), го овластува

оператор : ДПУТ увоз-извоз ВЕ-ГРУПА ДООЕЛ Радовиш  
регистрирано седиште на Булевар Александар Македонски бр.2-1/7  
Адреса:

Поштенски број Град: 2420 Радовиш  
Држава: Р.Македонија

да раководи со Инсталацијата

Цело име на инсталацијата: ДПУТ увоз-извоз ВЕ-ГРУПА ДООЕЛ Радовиш

Адреса С.Орашец  
Поштенски број Град : Куманово 1300

во рамките на дозволата и условите во неа.

МИНИСТЕР

Sadulla Duraki

14.02.2018



Датум

Министерство за животна средина и просторно планирање



## **Appendix 3**

MINUTES OF PUBLIC CONSULTATION ON THE ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (ESAR) FOR THE PROJECT "REHABILITAION OF THE REGIONAL ROAD R-1209 TETOVO – POPOVA SHAPKA"

## **Appendix 4**

### **Disclosure of public consultation**

## **Appendix 5**

### Ambient air quality and noise measurements report