



Eskavatori

CONSTRUCTION COMPANY
Magjistralla Ferizaj-Prishtinë
70000 Ferizaj, Republic of Kosovo
eskavatoricompany@gmail.com



Eskavatori-MK DOOEL

CONSTRUCTION COMPANY
St. Skupi 67/2-floor, 1000 Skopje,
Republic of North Macedonia
office@eskavatorimk.com

Project:	REHABILITATION OF THE REGIONAL ROAD R2133, SECTION Kumanovo – Opae, Length 5.9 km
Employer:	PUBLIC ENTERPRISE FOR STATE ROADS – Skopje, <i>Republic of North Macedonia</i>
Doc. Title:	ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (ESAR)
Doc. No.:	ESAR.01

	NAME	SIGNATURE
PREPARED BY:	Branko Stefanovski	
REVIEWED BY:	Sime Vasilevski	
APPROVED BY:	Haziz Rysha	
REVISION 0	20/08/2019	

Contents

1. EXECUTIVE SUMMARY	4
2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK.....	5
3. PROJECT DESCRIPTION	7
3.1 DESCRIPTION OF THE LOCATION	7
3.2 DESCRIPTION OF THE EXISTING CONDITION OF THE ROAD	7
3.3 TECHNICAL AND TECHNOLOGICAL DESCRIPTION OF THE ACTION OR ACTIVITY	14
4. BASELINE DATA	16
4.1 DESCRIPTION OF THE ENVIRONMENT AROUND THE PROJECT LOCATION	16
4.2 ECONOMIC CHARACTERISTICS OF THE AREA	18
4.3 GEOLOGICAL, HYDROGEOLOGICAL, GEOMORPHOLOGICAL AND PEDOLOGICAL FEATURES OF THE LOCATION	19
4.3.1 <i>Geological features of the region</i>	19
4.3.2 <i>Geomorphological features of the terrain</i>	20
4.3.3 <i>Basic tectonic and seismic – tectonic features of the terrain</i>	21
4.3.4 <i>Characteristics of the location</i>	22
4.3.5 <i>Features of the area (landscape)</i>	22
4.3.6 <i>Existing water resources</i>	23
4.3.7 <i>Climate characteristics of the area</i>	23
4.3.8 <i>Biodiversity (flora and fauna) on the area planned for construction of the project and presence of protected areas</i>	24
4.4 SOCIO - CULTURAL CHARACTERISTICS OF THE PROJECT AREA	25
4.5 SOCIO-ECONOMIC IMPACTS WITH THE REHABILITATION OF THE PROJECT AREA	26
5. IMPACT OF THE PROJECT ACTIVITIES ON ENVIRONMENT AND MEASURES FOR PROTECTION OF THE ENVIRONMENT	27
5.1 EMISSIONS	28
5.1.1 <i>Impacts (emissions) in the air</i>	28
5.2 IMPACTS ON WATER	29
5.3 IMPACTS FROM WASTE GENERATION	30
5.4 EMISSION INTO SOIL	31
5.5 IMPACTS FROM NOISE AND VIBRATION	32
5.6 IMPACTS ON BIODIVERSITY (FLORA AND FAUNA)	34
5.7 SOCIAL IMPACTS	34
6. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP) ..	35
7. ROLES AND RESPONSIBILITIES FOR IMPLEMENTATION OF ESMMP	40

LIST OF ABBREVIATIONS

EIA	Environmental Impact Assessment
EBRD	European Bank for Reconstruction and Development
EU	European Union
ESAR	Environmental and Social Assessment Report
ESMMP	Environmental and Social Management and Monitoring Plan
GoM	Government of the RNM
H&S	Health and Safety
MoEPP	Ministry of Environment and Physical Planning
NTS	National Transport Strategy
NRP	National Roads Project
PESR	Public Enterprise for State Roads
PIU	Project Implementation Unit
PUC	Public Utility Company
PM	Particulate Matter
RNM	Republic of North Macedonia

1. Executive summary

National Roads Project (NRP) is a project supported through a loan financed by the EBRD. This project implements the National Transport Strategy (NTS) of the Republic of North Macedonia.

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.

The key indicator would be the reduction of road user costs after the completion of the works. The road user cost reduction is to be measured by comparing road user costs before and after the road works carried out under the Program.

This Project represents the implementation of the last phase of NRP for the period 2017-2018 and covers the following:

- improvement of condition on state road network by means of rehabilitation of approx. 125 km of the existing state 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 (according to the EBRD Categorization) of National Roads Project (NRP) is the rehabilitation of the Regional road R2133, **section Kumanovo – Opae** in length of 5.9 km.

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 RNM" no.53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13 and 187/13)¹.

The Elaborate should be prepared in accordance with the Law on Environment (Official Gazette of the RNM No. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15 and 39/16), i.e. Decree for amending the decree on actions and activities for which an elaborate must be prepared, and for whose approval the body for conducting expert works in the field of environment is competent (Official Gazette of the RNM No.36/12) and the requirements of the Rulebook on amending Rulebook on form and content of the Elaborate for environmental protection according to the type of actions or activities for which an elaborate is prepared, as well as in accordance with executors of the activity and volume of the activities and actions performed by legal and natural entities, the procedure for their approval, as well as the way of keeping register of approved elaborates (Official Gazette of the RNM No.111/14).

¹ **Article 24** - Elaborate for environmental protection

According to the Decree for amending the decree on actions and activities for which an elaborate must be prepared, and for whose approval the body for conducting expert works in the field of environment is competent (Official Gazette of the RNM No.36/12), the planned project activities fall under chapter XI – Infrastructural projects, item 15. Reconstruction of motorways and regional roads over 10 km.

Elaborate for environmental protection should be approved by Administration of Environment within the Ministry of Environment and Physical Planning (MoEPP).

The competent body for approval of the Elaborate is obligated to adopt a decision with which the Elaborate is approved or not, within 15 days from the day of receiving the Elaborate (Article 24 (11) of the Law on Environment – Official Gazette of the RNM No.53/05, 48/10). If the competent authority for approval of the Elaborate establishes that the Elaborate does not meet the requirements for form and content of the Elaborate, it will require from the legal or natural entity to amend the Elaborate within 15 days (Article 24 (12) of the Law on environment – Official Gazette of the RNM No.53/05, 48/10).

Protection and improvement of the environment is system of measures and activities (public, social, economic, technical, educational etc.) that provide creation of conditions and protection against pollution, degradation and impact on the media and certain areas of the environment.

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.

North Macedonian Framework

Republic of North Macedonia has developed full legal and institutional framework for Environmental Assessments. 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 RNM" 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 details 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 RM" 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).

In accordance with Article 24 of the Law on Environment for the project activities that do not need to carry out the procedure for environmental impact assessment (do not need to prepare full EIA Study), there is no need for an Elaborate for environmental protection to be prepared, before submitting the project implementation, due to a length of the road section less than 10 km.

The Ministry of Environment and Physical Planning (MoEPP) has prepared a Rulebook for implementing, screening, scoping and review of environmental impact assessment in the Republic of North Macedonia. The 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 between Kumanovo

and Opae is **not** covered by the 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) due to its length of 5.9 km only.

EBRD Environmental and Social Policy

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

According the EBRD environmental and social operation policy, the road specific Environmental and Social Assessment Report and Environmental and Social Management Plans and Monitoring Plan has been prepared.

The following plans has been prepared in accordance with the Elaborate for environmental protection to ensure compliance with national legislative and the EBRD environmental and social requirements.

3. Project Description

3.1 Description of the location

The activities provided for rehabilitation of the section Kumanovo - Opae will take place in both municipalities of Kumanovo and Lipkovo, which is part of the North-East planning region. Subject section of R2133 road stretches through settlements of Bedinje, Lopate and ends in Opae village.

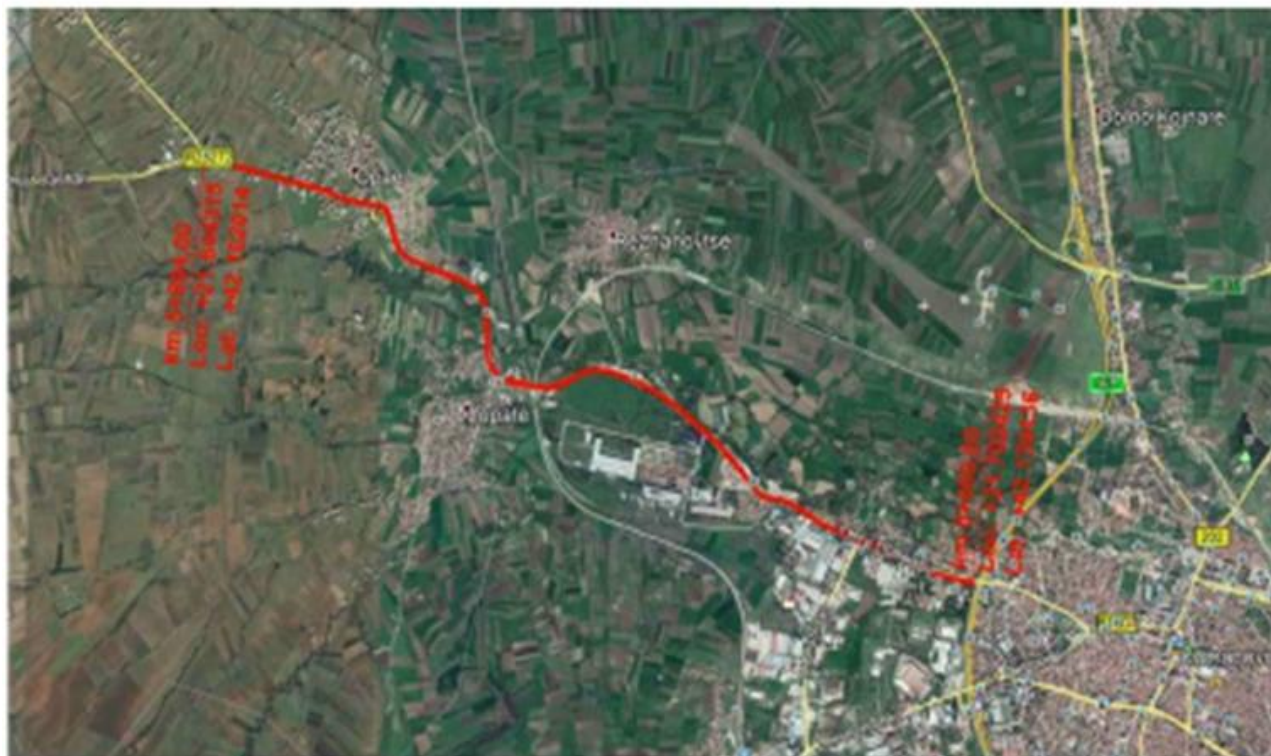


Figure 1 - Location of the Project Kumanovo - Opae

The analysed part of the road extends to flat terrain and mild hilly terrain, and goes through the settlements of Bedinje, Lopate and Opae.

The intersections with local roads to the settlements that are in the vicinity of the road are not properly marked with adequate vertical and horizontal signalization, and there are only two bus stops noticed between the settlements of Bedinje and Lopate, at km 1+906, at the left and right side of the road.

Along the alignment, there are settlements of Bedinje, Lopate and Opae, with commercial and residential buildings that are close to the carriageway and represent an insecurity in the safety of traffic on the road, due to lack of sidewalks at the left or right side of the alignment. On or near the carriageway, services across the entire section, car parks and places for public transport vehicles take place, which significantly impairs traffic safety and inactive participants on it. At this section, there are gas stations, supermarkets, etc.

3.2 Description of the existing condition of the road

The analysed part of the road goes through flat terrain and slightly hilly terrain, and crosses through the settlements of Bedinje, Lopate and Opae. Throughout the section, there are settlements with commercial and residential buildings that are close the carriageway and represent an insecurity in the safety of traffic on the road. Services across the entire section, car parks and places for public

transport vehicles take place on or near the carriageway, which significantly impairs traffic safety and inactive participants in it. At this section, there are gas stations, supermarkets, etc.



Figure 2 – Photos from the alignment

- a, b)** km 0+ 569, km 1+416 - crossroads with local settlements - danger for pedestrians and people, reducing road safety.
- c, g, d, f, e, h)** km 2+077, km 2+562, km 3+783, km 4+306, km 4+218, km 5+052 - incorrect road and neighbourhood approaches for small factories or warehouses, without adequate signalling - reducing road safety and complete traffic along with pedestrian movement.
- i)** km 5+874 - crossroads with local road for settlements - separation to the town of Opae, - danger for pedestrians and people using public transport, reducing road safety.

Having in mind the class of the road (Regional road) but with general function of a residential street in settlements of Bedinje, Lopate and Opae, physical separation of pedestrians from road users should be provided along the settlements. At the settlement of Bedinje there are some pedestrian sidewalks at the beginning of the alignment in good condition. At all the other settlements the sidewalks are damaged and destroyed, and on some places they are without kerbs, and it should be recommended to the Municipalities of Kumanovo and Opae to build them. Locations of the pedestrian crossings should be examined, and pedestrian crossings should be marked (nearby places of attraction like playgrounds, bus stops if planned, etc.).

The design for rehabilitation foresees construction of sidewalks but the location of those sidewalks is at places where there are already existing sidewalks (Settlement of Bedinje). Generally, construction of sidewalks is an obligation of the Municipalities, so with this project no sidewalks will be constructed.

There is no drainage of the road in the settlements, and out of the settlement there are four culverts, three pipe culverts and one box culvert for transfer of the water from one to the other side of the road.



Figure 3 - Photos from the alignment

a, b, c, d, e, f, g, h) km 0+157; km 0+719; km 0+996; km 1+033; km 1+337 km 3+264; km 3+429; km 3+46 9, absence of sidewalks on the whole section, where there are unprotected sidewalks, parts have irregular access to buildings, which reduces the safety of all traffic participants

i, j) km 4+828 km; 4+896 - improper parking of motor vehicles, disrupting the safety of all traffic participants, in areas where there is a greater movement of pedestrians

At the section, at several parts along the alignment, there is a problem with drainage system (ditches), which are not maintained properly and therefore not functional. Ditches are filled with deposited material (grass, trees, debris). Recommendation is to improve regular maintenance with special attention to the drainage system, which should be Municipalities obligation.

With this project all the existing ditches will be cleaned, and some new ditches will be excavated.

Most of the shoulders are non-functional, higher than road surface and/or filled with vegetation (for the whole alignment).

With this project all the existing shoulders will be rehabilitated, and new shoulders will be constructed in order to have proper shoulders along the alignment.



Figure 4 - Photos from the alignment

a, b) km 0+247; km 0+405; curbs along the section that are non-functional, higher than the surface of the road and / or filled with vegetation, which reduces the safety of all traffic participants and results in faster damage to the carriageway. Recommendation, regular maintenance and cleaning of the same.

c, d) km 0+819; km 2+280 - impurities on the road, which reduces the safety of all participants in the traffic. Recommendation, raising the awareness of the population for dumping of communal waste and construction waste in a suitable place as well as regular maintenance and cleaning.

At km 3+150 there is a passage through a railway, and the damage in this part of the road is significant and presents a danger to the traffic safety, especially at night.

This passage will be completely rehabilitated.



Figure 5 - passage through the railway and the damaged carriageway in this part of the road is significant and danger for the traffic safety, especially at night. Inadequate deviation of the road in front of the railway itself.

Road equipment including traffic signalisation and street lighting in the settlements along the section or at bus stops, is not on a sufficient level to ensure the safe participation of pedestrians, cyclists and other vulnerable categories of road users.



Figure 6 - Photos from the alignment

a, b, c, d) km 3+044; km 3+568; km 3+705; km 4+737, reducing the safety of all traffic participants due to inadequate fences and barriers on all 4 bridges along the section. Recommendation, raising road safety by setting appropriate barriers and crossing for pedestrians.

The section is characterized by mixed traffic users: passenger vehicles, trucks, tractors (agricultural plant) and pedestrians. Also, the section has many illegal connections (crossroads) with some small settlements, agricultural, forest or other land, which is particularly unsafe from the aspect of road safety and social aspects that can contribute to the emergence of serious crashes in form of side crashes. Along the section there are parked cars on both sides of the road or on the road, which additionally contribute to insecurity from the aspect of road safety and the social aspect that can contribute to the emergence of serious accidents.



Figure 7 – Photos from the alignment

a, b, c) km 1+015; km 1+639; km 8+456; - mixed traffic of: passenger vehicles, trucks, tractors (agricultural plant) and pedestrians. The section has many illegal and/or non-transparent access roads and intersections with some small settlements, agricultural, forest or other land. Parked cars on both sides of the road or on the road, which additionally contribute to insecurity from the aspect of road safety and the social aspect that can contribute to the emergence of serious accidents.

The existing bridges are narrowing the road width. Those bridges are located at km 3+035, km 3+570, km 3+710, and km 4+740. It is recommended to place a proper signalisation to inform drivers about dangerous roadside obstacles and supplement with sign for "Narrowing road lanes", which will be done during the rehabilitation of the road.

In many parts of the roadway, especially for unauthorized entry and exit approaches, several security issues are noted:

1. STOP sign with an additional mark of 20 meters,
2. Possible confusing signs of priority because of their position,
3. There is no lighting on certain important intersections,
4. Road markings are wrong and in poor condition (not adequate visibility).

It is recommended that these security problems be perceived and resolved according to the rules and regulations for safe and secure traffic. Complete new signalisation will be placed during the rehabilitation of the road

At certain points and intersections, the following security problems are noted:

1. Wide and insecure pavement, without defined traffic lanes,
2. No suitable pedestrian crossings and other pedestrian facilities,
3. No pedestrian shelters at traffic, islands, medias, etc.,
4. Lack of school markings,
5. The identified area for bus stops in the middle of the section has no markings,

Generally, on these subject sections, a pedestrian crossing in settlements are missing, and is more crucial at places where a greater presence of pedestrians is expected. Pedestrian crossings will be marked during the rehabilitation of the road.

Regarding passive safety, all bridges on the sections are without proper restraining system. The existing fence on the bridges is not able to keep vehicles on the road in the case of vehicles running-off. To protect the run-off vehicles at bridges on rural parts of the section, installation of adequate guardrail should be implemented, but this item is not part of the Project except the bridge at km 4+740.

3.3 Technical and technological description of the action or activity

Carriageways characteristics - Single road carriageway with one lane per direction. Road width changes along the alignment from 11 meters at the beginning to 5.50 meters at the end of the section. The traffic lane width varies between 5.50 and 2.75 m.

The length of the section Kumanovo – Opae is 5.90 km It begins at the exit from the City of Kumanovo, right after the overpass over National Road A1, and ends at the exit of village of Opae.

The characteristics of the road are as follows:

- Design speed 40 km/h
- Number of lanes 2 lanes
- Width of lane various, from 6.50 m to 2.75 m
- Carriageway width various, from 13.00 m to 5.50 m
- Distance of lateral barriers 1.0 m
- Type of pavement asphalt
- Condition of the road 80% bad, 20% good
- Degree of frazzle of the road (%) 90%
- Longitudinal slope (%) max. 4%
- Min: Radius of the horizontal curve (m) 40m (30m)
- Average curvature 40°/100m
- Visibility for safe overtaking(%) 60%
- Character of the terrain flat terrain
- Altitude max.450
- Split belt /
- Ups and drop 0,5m/km

The width of the shoulders and gutters for this road category should be 1.00 m and 0.50 m, respectively.

Due to the configuration of the terrain, there are no shoulders and gutters alongside the whole road, and the existing shoulders are with variable width. There are berms alongside gutters only on a few parts of the road.

During the rehabilitation process the following activities will be done:

- Mechanical roughing of the pavement, mechanical cleaning of the roughed surface, blowing the surface with compressor and filling the visible cracks (>3mm) with diluted bitumen RB200. If on the certain parts of the road major and complex damages are present, the scraping of the pavement will be done;
- Construction of new bitumen layer BNS - 22sA with thickness 8 cm;
- Construction of asphalt-concrete layer AB-11s with binder bitumen, with thickness 4 or 5 cm;
- Spraying with semi-permanent emulsion for connecting the joints of different asphalt layers and coating the vertical asphalt joints with diluted bitumen RB 200.

If on a certain place of the road major damage is present, for which intervention in a lower load bearing surface of the road is needed, the rehabilitation activities will be as follows:

- Demolition and removal of the existing asphalt layer;
- Demolition and removal of the existing blinding layer;
- Intervention in the sub-grade layer;
- Building in new blinding layer of crushed rock material with diameter of the rocks >60mm and its compaction till minimum compressibility of 80 MPa;
- Constructing bitumen layer(s) type BNS - 22sA with needed thickness to the elevation of 4cm;
- Constructing asphalt-concrete layer AB-11s with binder bitumen, with thickness 4 or 5 cm;
- Spraying with semi-permanent emulsion for connecting the joints of different asphalt layers and coating the vertical asphalt joints with diluted bitumen RB 200.

During the rehabilitation the gutters, berms and shoulders will be cleaned from vegetation and organic waste (fallen leaves, branches etc.) in/on them.

During the construction works materials will be used from existing excavation sites and asphalt facilities located on a location different from the location of the construction works.

The nearest asphalt facilities to the section Kumanovo - Opae, are near the town of Kumanovo. Environmental issues for the issuance of the IPPC permit are comprehensively considered and installations for asphalt material have IPPC permit in accordance with the relevant regulations in the Law on Environment, issued by the MoEPP.

The operation of installation is monitored by the MoEPP according to the legislation, and authorized inspectors regularly visit installation to control the activities taking place in the installation. Additionally, the facilities are situated on a sufficient distance from the place of rehabilitation, settlements and environmentally sensitive areas, that there will be no occurrence of Cumulative impacts on environmental media from the rehabilitation process and the work of the facilities.

4. Baseline data

4.1 Description of the environment around the project location

The activities provided for rehabilitation of the section Kumanovo - Opae will take place in the Northern part of North Macedonia in the municipalities of Kumanovo and Lipkovo, which are part of the Northern Planning Region.

Kumanovo Municipality is located in the northern part of the Republic of North Macedonia and in the eastern basin of the river Pcinja and particularly rivers Konjarska, Lipkovska and Kumanovska. It covers an area of 297.3 km² or 4.9% of the total territory of the Republic of North Macedonia. The municipality on north is bordering with Serbia, on the east side with Staro Nagoricane, Klecovce and Orasec, while on the south and southwest bordering with municipalities Petrovec, Ilinden and Aracinovo, and at the west is the territory of the municipality of Lipkovo.



Figure 8 - Municipality of Kumanovo

According to the census of 1994 in the municipality of Kumanovo there were 94.589 inhabitants, while according to the 2002 census - 105.484 inhabitants. Within the municipality the population is concentrated in thirty districts, of which twenty-nine are rural and one is an urban settlement.

The municipality has sixteen primary schools. In the town of Kumanovo there are nine primary schools with 1.900 pupils and the rest of the elementary schools are in: Dolno Konjare, Karpos, Dobrosane, Tabanovce, Umin Dol - Ljubodrag, Lopate, Romanovce with a total of 11.915 pupils. There are five high schools with a total number of pupils - 4.653 and one university institution (State University of Tetovo - Dispersed studies in Kumanovo). In the village Dolno Konjare there is an

agricultural high school. In the city, there are two student dormitories with a capacity for accommodation of sixty students.

The basis of health care is the medical center. The principal activities of JZP MTS Kumanovo: outpatient polyclinic and outpatient care, stationary care, medical rehabilitation, dental health care and more. In terms of internal organization and twenty-seven business units covering a network of twenty ambulances in the city and seventeen village health stations. The health system operates in Kumanovo and JZP Institute for Health as a preventive medical facility with regional offices in Kratovo and Kriva Palanka.

nationality	No. of inhabitants
Macedonians	63746
Turkish	292
Roms	4256
Albanians	27290
Vlas	147
Serbians	9062
Bosniacs	20
Others	671

Table 1 – Population in Kumanovo Municipality

Lipkovo Municipality - a municipality in the north-eastern part of the Republic of North Macedonia, enters the group of medium-sized rural municipalities in the Republic of North Macedonia.



Figure 9 - Municipality of Lipkovo

The administrative center of the municipality is the village of Lipkovo with 2644 inhabitants, to which the other village settlements gravitate. The largest settlement in the municipality is the village of Slupcane with 3.789 inhabitants. The municipality covers an area of 267.82 km², with twenty-two village settlements on the slopes of Skopska Crna Gora and the Macedonian part of the Zegligovo valley, along the course of the Lipkovska Reka, which is the right passage of the Kumanovo river. The average altitude of settlements in this municipality is 365m. Population density is 101.03 inhabitants per km². It is larger in the flatlands, in contrast to the hilly- mountainous neighbourhoods that have a larger butterfly, but fewer inhabitants. The population is 27.058 (2002 census), of which the majority are Albanians. In households live on average four to six members. Of the total population, 13.701 (52%) are men and 13.348 (48%) are women.

Nationality	No. of inhabitants	Percent %
Macedonians	162	0,63%
Turkish	0	0,00%
Roms	0	0,00%
Albanians	26 255	97,42%
Vlas	1	0,00%
Serbiacs	370	1,37%
Bosniacs	4	0,02%
Others	133	0,56%

Table 2 – Population in Lipkovo Municipality

The municipality of Lipkovo has a health, social and educational structure, as well as a sports tradition.

4.2 Economic characteristics of the area

Municipality of Kumanovo – It has developed an industry which is a center of industrial production in north-eastern Macedonia. Shoe industry in the city has a huge tradition persisted for decades. Today in the town there are over sixty companies producing shoes, making the city center of the shoe industry in North Macedonia and beyond.

In the Municipality of Kumanovo there are zones of small business in the settlements and near them. Agriculture is the main occupation of the population. In the municipality, there are livestock farms, pig farms, mills, fish farms.

Common hired industrial zone is 169.08 ha area built for industrial facilities and 32.3 ha of warehouses, commercial and construction features. Most industrial facilities are located in the western part of the city of Kumanovo. Mini industrial facilities occur in the northern and eastern zone of the city in the surrounding neighbourhoods, as well as in the city itself. Zones of smallholder operations have near Dolno Konjare, Bedinje and Karpos.

The number of legal entities in the municipality is 5.300. After dominating the greatest number of legal entities for the production of textile products, but most staffing firms dominate production of footwear.

The production of food products is evident in the production of bread and pastry, processing and preserving of meat and milk, and production of refreshments. In the municipality of Kumanovo operate more agricultural-industrial enterprises, cattle farms, pig farms, slaughterhouses, mills, farms.

Municipality of Lipkovo - The main economic activity in the municipality of Lipkovo is agriculture where 95% of the population is engaged. Agriculture is cultivated on an area of 22.599 ha, of which 8.256 ha or 36.5% are agricultural land that is partially irrigated by the Lipkovo hydro system. Pastures occupy an area of 4.375 ha, while forests are spread over an area of 9.968 ha. One of the main features of this municipality are the two artificial lakes, the Lipkovo Lake, which is used for irrigation, drinking and domestic use by the inhabitants of the municipality of Kumanovo and Lake Glaznja, which is generally used for irrigation and fishing.

4.3 Geological, hydrogeological, geomorphological and pedological features of the location

4.3.1 Geological features of the region

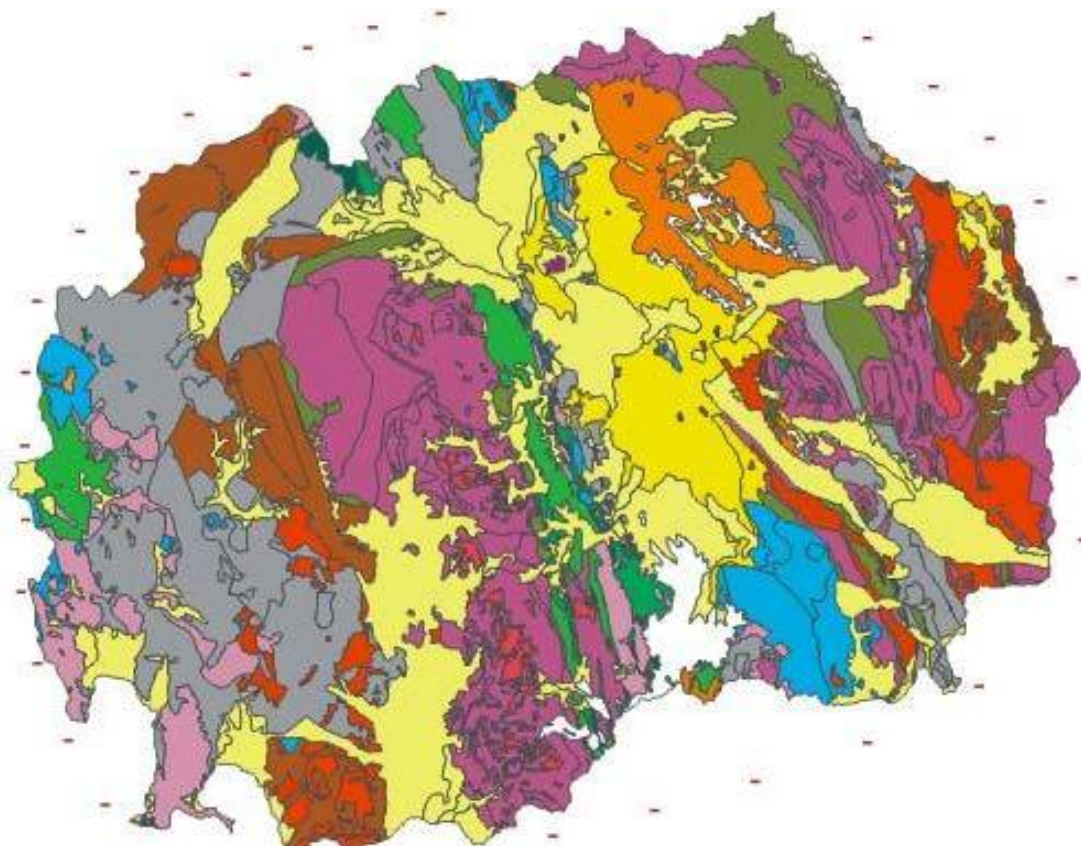


Figure 10 - Geological map of the Republic of North Macedonia with characteristic Geological zones

The Republic of North Macedonia has a very complex geological structure. Thus, according to the geological evolution and the geological composition, on the territory of the Republic of North Macedonia there are rocks of almost all geological eras and periods from pre-preamble to the youngest quartile period.

The diversity of geological, relief and vegetation opportunities, and especially the impact of man and climatic conditions allow for the meeting of many types of soils.

4.3.2 Geomorphological features of the terrain

At this section the terrain is plain with small uplifts and the terrain elevation varies from 330 m to 400 m.

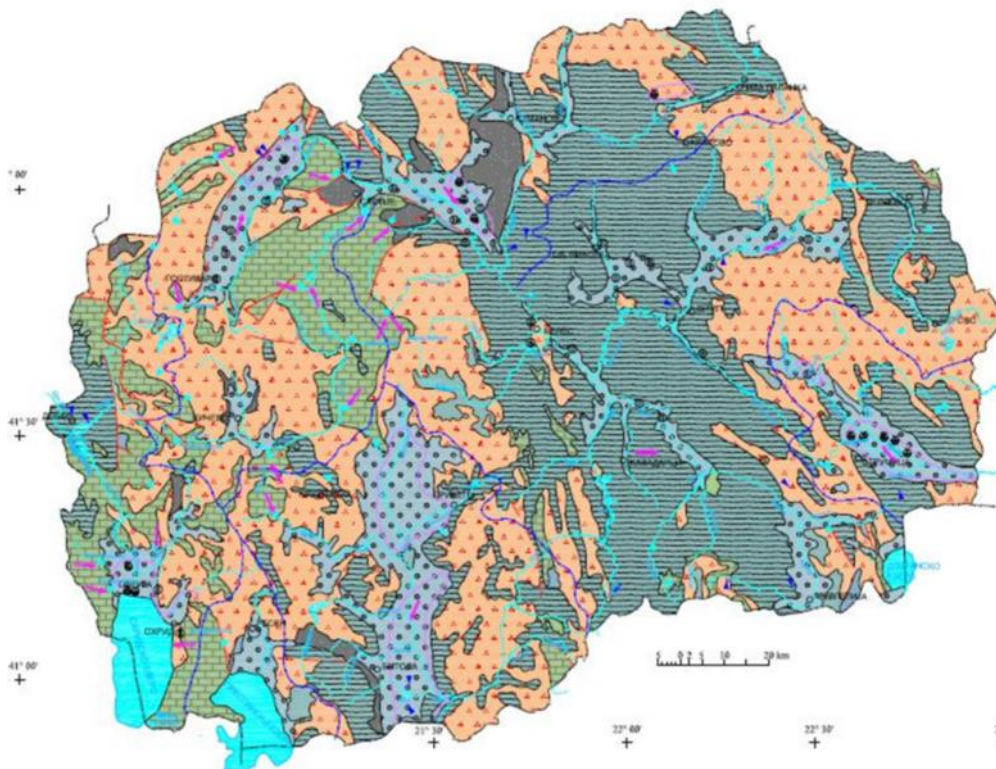


Figure 11 - Basic geo-hydrological map of the Republic of North Macedonia

The hydrography is poorly developed on the researched field. The morphology at this region is relatively modest. On the terrain are not registered manifestations and impacts from tectonic, neotectonics processes and appearances; only on particular places exists contemporary processes of decomposition which contributed in the phase of creation of the present relief.

Considering the geological structure of the investigated terrain and the existing lithological members, from hydro-geological point of view we can conclude that there are lithological members with variable hydro geological functions.

Hence, along the investigated terrain there are materials which according its hydro- geological properties they belong into the group of relative hydro-geological collectors, hydro- geological complexes and hydro-geological isolators.

- Relative hydro-geological collectors - In this hydro-geological group belong the sands as part of Miocene and Pliocene sediments and sandy-clayey-gravel material of quarter surface defragmented material. They are weakly water permeable and with weak water bearing capacity.
- Hydro-geological complexes - In this hydro-geological group belong sandy - silty and sandy - clayey materials and clayey gravels as part of Pliocene sediments and part of sandy - clayey materials from surface defragmented material. They are weakly water permeable and with weak water bearing capacity. Mainly they are classified as hydro-geological complexes.
- Relative hydro-geological isolators - In relative hydro-geological isolators belong Miocene and Pliocene sediments, in the part of clayey materials as sandstones and conglomerates,

which represent relative hydro-geological isolators. Here also belong the sandy and clayey materials from surface defragmented material. They are waterproof. Mainly they can be classified as relative hydro-geological isolators. Typical hydro-geological isolators represent clayey-marl materials in the lower part of the Miocene sediments.

4.3.3 Basic tectonic and seismic – tectonic features of the terrain

In correlation with the geological development of the terrain and the geological processes, there are tectonic and seismic-tectonic field properties. Considering that in the largest part the terrain is covered with Neocene sediments and fragmented material, it cannot be noticed some significant tectonic structures (faults, covers etc.).

The investigated field according the geo-tectonic regionalization of Republic of North Macedonia represents part of Vardar zone as larger geotectonic unit, figure no.11. The Vardar zone according its tectonic evolution is instable, due to the complexes of old Palaeozoic and Alps structural floor, with already inherited original structure. The Miocene sediments lay discordant over the older formation and have mild monocline fall toward west and south-west. Over these sediments there are Pliocene sediments in horizontal position. They have disjunctive tectonic, but after the faults the youngest effusive rocks erupted.

According the existing Seismologic map of Republic of North Macedonia for a return period of 500 years (recommended for application according Euro code 8 until the creation of national document for application in seismic field), we can conclude that the area along the road is located in regions with intensity I=VIII°MKS (according the scale of Mercalli, Cancani and Zieberg). In attach seismological card of R. of North Macedonia.



Figure 12 - Geotectonic divisions of R. of North Macedonia

4.3.4 Characteristics of the location

The relief structure in the wide Kumanovo Valley where also Municipality of Lipkovo belongs, differs in its features due the various relief forms: mountains, valleys, canyon, etc. The

Kumanovsko Pole occupies the central part of the area with elevation of 200 - 500 m, surrounded with the mountains Skopska Crna Gora, Ruen, Kozjak. On the western side of the Kumanovsko Pole extend the branches of Skopska Crna Gora where the highest point is the hilltop Ramno with elevation of 1.651 m. On the east side of Skopska Crna Gora there is ridge Dlsko and sections from Gradiska Mountain. In the northern parts extend parts of the Ruen mountain with his hilltop of 968 m. On the east side of Ruen extend Kozjak Mountain and Stara Planina. These mountains are expressed, and they belong in the Rhodopes type. The remain parts of the wide territory are at elevation between 230 and 550 m. In general, the morphology of the terrain is plain (80 %), and in the northern and east area there are small hills (20 %).

The Municipality of Lipkovo with its geographical configuration of the terrain is predominantly hilly and mountainous, and much of the territory belongs to the catchment river areas of the Lipkovska, Lojanska, Slupcanska, Otljanska, Matejevka and Vaksinska river. The Municipality of Lipkovo is on the eastern slopes Skopska Crna Gora mountain. The western part is a mountainous, while the eastern part is more flatland.

In the north, it borders with Kosovo and Serbia, to the east with the municipality of Kumanovo, to the south with Aracinovo, and to the west with Skopje. Municipality has been set up in the river slopes of the river Pcinja. The most important watercourse is the Lipkovo river with the same name lake, which is in the basin of river Pcinja.

The altitude ranges up to 450 meters, the highest peak of the surrounding hilly exaltations. Most of the territory of the municipality extends to a height of 250-320 meters. Considering the relief structure, the largest number of villages is flat, while there are several mountain settlements.

The **Municipality of Lipkovo** faces major infrastructure problems. One of the most serious problems is the lack quality of drinking water. There is almost no water supply system. The rural settlements do not have a water supply network, but they mostly supply water through individual wells and through hilly-mountainous sources. In the plain part of the municipality, five villages in the municipality of Lipkovo have partial temporary water supply networks of poor quality and poor water quality. The sewage system exists in only two villages, that is, the majority of the villages are not covered by the sewerage network, but septic tanks are used. Therefore, a significant problem is the wastewater that pollutes groundwater, individual sources (wells), soils, yards, etc.

Environmental problems - the quality of drinking water is the biggest problem for the residents of the municipality of Lipkovo. Drinking water in the plains areas is a special problem because it is polluted with arsenic, antimony and chromium concentrate and other heavy metals, as well as from faecal waters. These waters are not controlled by sanitary and health facilities. The problem with a non-urbanized wild landfill occurs in the municipality of Lipkovo.

4.3.5 Features of the area (landscape)

Area is topographically defined territory which is consisted of mutually dependent characteristic ecosystems that may be or have been the subject of specific human activities. The area is mainly defined as a piece of land that can be covered by taking a view. One area type can own fully natural

features or to be completely changed by human and does not to cover any natural ecosystem. Through the area is studying the functioning of the relations between human- nature and are defining the reasons for the current look and layout of the ecosystems in the area.

The area subject to analysis in this report is mainly represented with an area of hilly pastures. Under the influence of the relief, under the centuries-old influence of the local population it has been transformed into agricultural, arable land.

Along the route of the section, agricultural land is the dominant landscape element, a meshwork of villages and local paths. Also, smaller forest stands of oak dominant as community can be found. Among the more important are elements and rural settlements which are located near the road.

The Municipality of Lipkovo has rich natural resources. Especially emphasizes the forest and lake potential. Mineral resources and ores are particularly important for the development of the municipality. The municipality has antimony and arsenic from the Lojane mine, as well as marble and granite from the populated places Matejce and Nikustak. Development potentials are mainly seen in the development of tourism, the use of fertile land (agriculture and animal husbandry) and the rational exploitation of ore resources.

4.3.6 Existing water resources

The hydrographic network of Municipality of Kumanovo consists of middle and lower river course of rivers Pcinja, Kumanovo and Kriva Reka and some smaller streams that fully belong to the basin of river Pcinja. Pcinja is the largest and most important river in this region. Springs from Dukat mountain on altitude of 1.660 m and flows into Vardar in Taorska gorge at an altitude of 191 m. The largest tributaries are Kumanovska river, which is the most important, Kriva Reka, river Bistrica, river Dragomanska, Petrosnica and Luka. Torrential flows are registered to the city and the villages Dobrosane, Banevo Trio which are not regulated.

In hydrologic terms, a large part of the territory belongs to the catchment areas of the river Lipkovska, Loyan, Slupchanska, Otljanska, Matejacka and Vaksinska rivers. The main features of this municipality are the two artificial lakes, the Lipkovo Lake, which is used for irrigation, drinking and use in the household of the inhabitants of the municipality of Kumanovo and Lake Glaznja, which is generally used for irrigation and fishing.

4.3.7 Climate characteristics of the area

The territory of Municipality of Kumanovo is under influence of moderate continental climate in the lowland's parts and continental climate in the higher areas of the Municipality, with an average annual temperature of 12 °C. In the lowland's parts according to the space and natural features of the Municipality, effects of warm and cold air masses can be felt which affect the climate in regard to allocate two seasons: the cold and wet winter and hot and dry summer that is characteristic of moderate continental climate. The air temperature has different daily and monthly values and its annual value is 11.4 °C.

Average annual rainfall is 500 mm with a maximum in November (72 mm), in May (66 mm) and June (65 mm) and a minimum in August (33 mm), September (29 mm) and February (35 mm).

The average amounts of sun are 2.200 hours while on the other planning terrains that number is higher. Annual average number of clear days is 84 with max.in August averaged 16 clear days a year while the average 97 cloudy days with a max. of 16 cloudy days in January.

The climate in the municipality of Lipkovo with its configuration and geographical location is moderately continental with sharp lines because of the mountain character of the municipality.

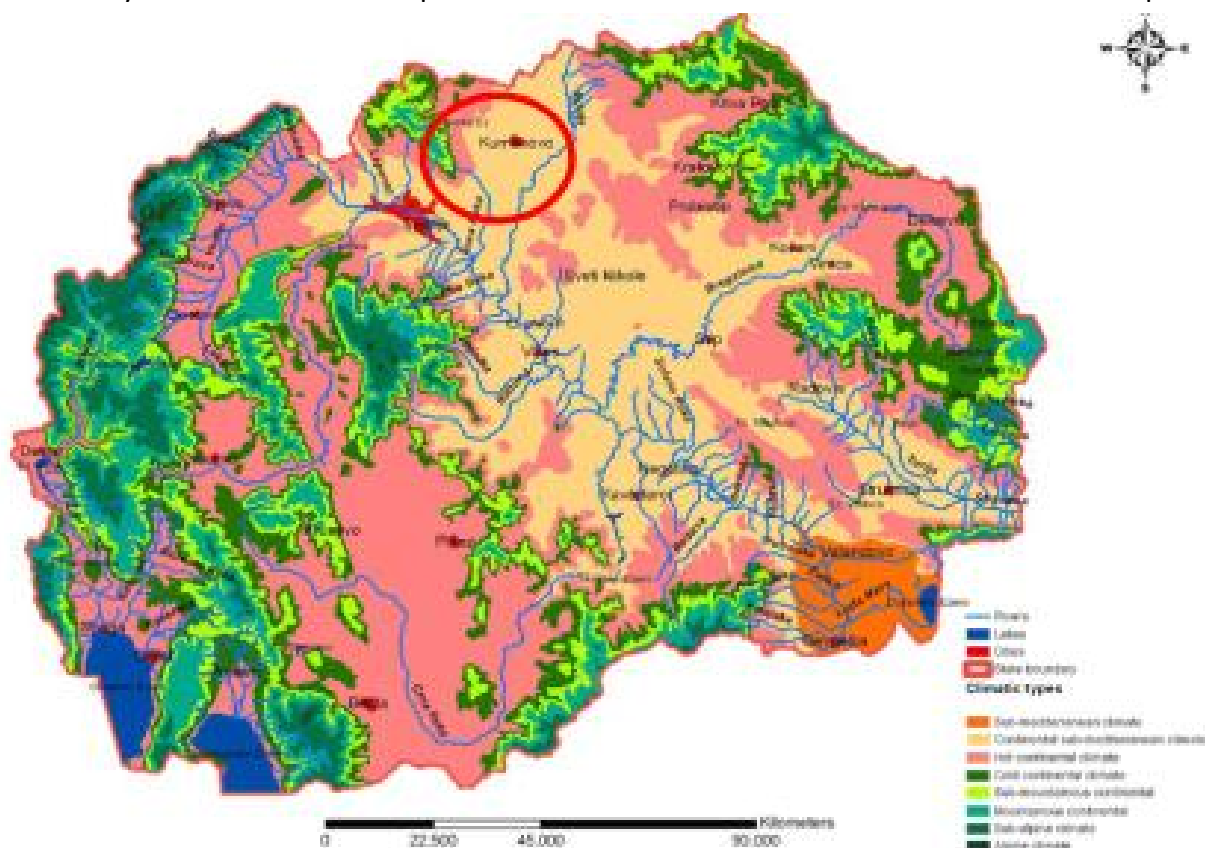


Figure 13 - Climatic types in R. of North Macedonia

4.3.8 Biodiversity (flora and fauna) on the area planned for construction of the project and presence of protected areas

Along the analysed project area, several plant communities can be distinguished: plant community of oak and oriental hornbeam (ass. *Quercus-Carpinetum orientalis macedonicum* Rud. 39 apud Ht. 1946), plantations with acacia, agricultural arable land and community of ruderal plant species.

1. Plant community of Downy oak and Oriental Hornbeam (acc. *Quercus-Carpinetum orientalis macedonicum* Rud. 39 apud Ht. 1946) originally existed in past centuries but with more activities of the inhabitants of these areas it is modified and has obtained today's appearance. Over-exploitation in the past, has led to changes in the basic plant composition and the appearance of certain shrub species such as Christ's thorn (*Paliurus spina - Christi*), *Pyrus amygdaliformes* and *Prunus spinosa*. Wood species, and the emergence of grassy plant species, from which most characteristic is *Minuartia glomerata*, *Cornus mas*; *Euphorbia myrsinites*, *Ajuga laxmanii*, *Knautia orientalis*, *Tunica illyrica*, *Altea sp.* etc.

The composition of above-mentioned community has an impact on the composition of the wildlife that is found in it. From the group of mammals on the location it can be found eastern hedgehog, rabbits, striped field mouse, rats, and from the large mammal species: fox, wolf, weasel, wild cat etc. Bird species which are found in the area are: Collared Dove, cuckoo, common sparrow, common owl, wild pigeons, crows, Common Buzzard, magpie, raven, etc. From amphibians are found fire salamander, green toad, common toad, Yellow-Bellied Toad, and from the reptiles Hermann's tortoise, wall lizard, green lizard, European copper skink, slow worm and Caspian whipsnake. In the

group of insects, representatives from several groups can be found, of which the most important are the representatives of daily butterflies and grasshoppers.

2. Along the alignment on several locations, acacia plantations are present. These plantations mainly are planted to prevent appearance of erosion and to enable horticultural arrangement of the slopes along the road.

Fauna that is found in acacia plantations is the same with fauna which is present in the oak community.

3. Agricultural farmland- The Cultivated land is found on the entire length of the respective section, on which can be found vine plantations, orchards and crops with cereal and garden crops. In the areas between the field borders, plantations of Canadian Poplar can be found and several plant species from oak community.

Fauna that is found here is the same with fauna from oak community

4. Ruderal plants - By its length the road is passing through the territory of several villages in which by the influence of the population, specific plant communities represented by ruderal plant species has occurred. A ruderal species is a plant species that is first to colonize disturbed lands. The disturbance may be natural - for example, wildfires or avalanches - or a consequence of human activity, such as construction (of roads, of buildings, mining, etc.) or agriculture (abandoned fields, irrigation, etc.).

Domestic animals are present in rural areas along the road is, wild animal species can be found rare in a very small number.

4.4 Socio - cultural characteristics of the project area

In Municipality of Kumanovo there are many professional cultural institutions: libraries, National Museum, National Theatre and Cultural Center. Sport and recreation are represented by forty clubs, basketball, handball, boxing, cycling clubs and more.

In the Municipality of Lipkovo, primary education is organized in six central and seven regional primary schools. A new building of the school in Nikustak was built. In the municipality of Lipkovo there is one school for secondary education which is located in the municipal center Lipkovo. In the municipality of Lipkovo there is no institution for pre-school education and education for children (kindergarten), nor a home for the elderly. The elderly who live in mountain villages where there is almost no basic infrastructure (water, roads, public transport, etc.) are particularly vulnerable, as well as those elderly whose younger family members went to work abroad.

Unemployment is the biggest problem for the residents of the Lipkovo municipality, and especially for women. Of the total working population of Lipkovo municipality, only 25% are employed, of which only 7% are women.

Health services on the territory of the municipality are provided through private health institutions: eleven private offices with general practitioners and one dental office. There are two pharmacies on the territory of the municipality of Lipkovo

In the Municipality of Lipkovo institutions are lacking to satisfy the cultural needs of the citizens. The network of cultural institutions at the local level has not been developed at all. There is no theatre, cinema, and museum. The library has a part of the central primary schools, but there is a lack of a central, municipal library. The procedure for building a new cultural home is under way. There is a

sports hall in the village of Slupcane and six sports fields in the municipality of Lipkovo. There are six sports clubs, one of which is a football club.

4.5 Socio-economic impacts with the rehabilitation of the project area

Foreseen construction activities for the rehabilitation will be limited only on certain parts.

Socio - economic aspect over of the rehabilitation works will not cause negative impacts, because it is not foreseen to widen the road at this section, which means there will be no demolition activities along the route, as well as conversion of agricultural land and changes in the landscape.

Positive socio-economic impacts are expected after the implementation of construction activities and commissioning of the section which will be upgraded and rehabilitated. The increased safety and security of the transport will provide a positive economic development on local, municipal and regional level.

5. Impact of the project activities on environment and measures for protection of the environment

This ESAR has been made in order to locate and determine the existence of potential negative impacts on the environment as a result of the project activities that will proceed with rehabilitation at the road section Kumanovo - Opae.

Rehabilitation of the road section Kumanovo - Opae 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 Environmental and Social Assessment Report (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 rehabilitation/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 shall be undertaken organizing of movement and work of construction plant, 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 plant;
- Noise and vibrations from the work of the construction plant;

Construction phase - rehabilitation of the existing section

From the described activities that will be undertaken in Main Design for rehabilitation at the section Kumanovo - Opae the possible sources of emissions in the basic media and areas in the environment from the aspect of their environmental impacts shall be considered.

The following environmental impacts are expected during **rehabilitation phase**:

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

5.1 Emissions

In the Construction phase (rehabilitation) of the section Kumanovo- Opae the following emissions are expected:

1. Impacts on the air - fugitive dust emission from construction activities- cleaning the location, exhaust gases from construction plant;
2. Impacts on water - waste water from construction activities and storm water;
3. Impacts on environment from waste production - communal and construction waste and demolition waste;
4. Impacts on the soil;
5. Impacts from noise, vibration and non-ionizing radiation- noise and vibration from the operation of construction plant;
6. Impacts on biodiversity (flora and fauna)- impact on biodiversity (disturbance of fauna).

In the phase of exploitation of the section or in the operational phase the following emissions are expected:

1. Impacts on the air - emissions from mobile sources of pollution (vehicles);
2. Impacts on the water and soil - storm wastewater;

5.1.1 *Impacts (emissions) in the air*

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 micrometres PM₁₀, according to the National Plan for protection of ambient air in the RNM 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 micrometres PM₁₀ has been measured on representative roadside receptors and air quality measurements report is given in the Appendix 2.

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
PM10	24 hours	50 µg/m ³	35	0 µg/m ³	50 µg/m ³	
	1 year	40 µg/m ³	0	0 µg/m ³	40 µg/m ³	

Table 3 - Limits and margin of tolerance for suspended dust PM10

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.

SO₂, CO₂, H₂O and aromatic hydrocarbons occur during the complete combustion of fuel, while Pb₂O₃, 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:

Motor power	CO (g/kWh)	HC(g/kWh)	NOx (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

Table 4 - Limits on pollutants emitted from construction plant (Directive 97/68/EC)

5.2 Impacts on water

The execution of the foreseen construction activities during the rehabilitation of the section includes a series of activities that are potential sources of emissions that can affect the water and sewage.

Water pollution in the rehabilitation of the relevant section Kumanovo- Opae can be:

- Physical - Physical pollution is manifested by the presence of solid particles of debris on the ground, sand, solid particles from rubbing tires, debris from crashes etc. Physical contamination of liquid substances is the presence of fats and oils. Solid particles with flushing of road surface sediment in culverts where they can cause clogging of the same, while oils float to the surface and come to the recipient. Here are creating a film and they prevent the supply of oxygen in the water flow which prevents normal development of flora and fauna in the recipient.
- Chemical - Chemical pollution is result from the dissolution of pollutants present in the air. They can be the result of thrown out food from irresponsible traffic participants, windblown leaves

and other biodegradable waste, feathers and other materials that are present in the immediate environment.

- Biological - Biological contamination is a consequence of the decay of organic substances that serve as foods to various microorganisms. These pollutants are the result of emissions from vehicles, imitation of pollutants from possible close industrial and processing facilities, dissolution of the individual components of the surrounding country, application of agrochemical and pesticides, animal and plant waste. They may be the result of discharged dishes from unscrupulous traffic participants, blown away by wind sheets and other biodegradable waste, feathers and other substances present in the immediate environment.

Mechanical impurities by washing the soil with heavy rainfall and flow into the surface water will cause filling the riverbeds with sediments and turbidity of the water, which will reduce the penetration of light into larger depths and change the living conditions in streams.

The most dangerous pollutants to surface and groundwater are difficult degradable components of organic matter and harmful metals.

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

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

Pollution of groundwater may occur in case of accidents and accidents. All these possible negative impacts that may occur during the rehabilitation of the section will be minimized for all measures that will be adequately envisaged in the Implementation and Monitoring Plan as an integral part of the project documentation for the realization of the project.

5.3 Impacts from waste generation

Waste management is one of the most serious environmental problems in the Republic of North Macedonia. Regular service for collecting waste is limited to urban areas, while very little attention is paid to rural settlements, 70% of the total urban population receives regular service for collecting waste, while only 20% of the population in rural areas is covered by service.

Municipal waste management is fully in the competence of the local self-government, it is directly related to the planning documents for the use of the local land and should be in accordance with the national strategic documents - the National Waste Management Plan and the National Waste Management Strategy and other documents that plan its management.

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

During the construction activities for the rehabilitation of the respective section, mixed municipal waste from the workers and waste will be generated as a result of the construction activities and waste from the cleaning of the existing omissions etc.

Construction phase

In the process of rehabilitation of the section that is the subject of analysis in this Elaborate, mixed municipal waste from the employees and waste as a result of construction activities, will be generated.

Waste generators shall, to the greatest extent possible, to avoid waste generation and reduce the harmful effects of waste on the environment, human life and 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). 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 authorized company for hazardous waste management.

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:

Phase	Number	Waste type	No. from the List of types of waste ("Official Gazette of RM" No. 100/2005)	Waste quantity on annual level expressed in tones and litres	Manner of waste treatment (processing, storage, transferring, removal, etc.)	Name of the legal entity that treats the waste and location where the waste shall be disposed of (landfill)
Preparatory and constructive 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.	PCE of the municipality
	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/ removed asphalt	17 03 02	Cannot be determined at this phase	The scrapped asphalt will be reused for local roads, etc. PESR will be manage with the scrapped asphalt.	PESR

Table 5 - Types and quantities of waste

5.4 Emission into soil

Impacts on soil during the process of rehabilitation of the road section Kumanovo - Opae are expected to be insignificant, because expanding of the subject section is not foreseen and it is an existing road on which in the past intensive traffic took place.

The effects on the soil caused by the traffic in the course of the section are caused by some degradation, as well as: salination, reduction of the content of organic material, loss of soil biodiversity, etc.

Such impacts on the quality of the soil during the rehabilitation of the road, resulting from construction activities that are part of this phase and can be expecting from:

- Fugitive emission/imission of dust for the process of scratch, asphalt removal, and such parts that would be deposited on the soil;
- Leakage of fuels and lubricants from construction plant, which, in addition to affecting the soil, by their spill over and filtering through the soil, results in pollution of groundwater;
- Pollution of groundwater and soil can occur in case of accidents and emergencies.

In case of oil leakage from the construction plant, it is necessary to act in accordance with the Law on Waste Management ("Official Gazette of the Republic of North Macedonia" no.68 / 04,71 / 04, 107/07, 102/08, 143/08, 124/10, 09/11, 123/12 and 163/13), i.e. it is necessary to dig the contaminated soil and treat it like hazardous waste and take all necessary measures to prevent such a leak or when it is not possible to limit environmental impact.

5.5 Impacts from noise and vibration

During the preparation and rehabilitation phase of the road section, the maximum allowed noise levels is expected to be exceeded as result of the project activities i.e. rehabilitation of the road section. 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.

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

Emission source	Type of emission (noise, vibration or non-ionizing radiation)	Equipment - a device with description of the maximum power	Intensity of noise emitted in (dB), expressed through equipment value	Intensity of vibrations and non-ionizing radiation emitted	Periods of emission (number of hours per day)
Heavy vehicles (construction machinery)	Noise (84 dB)	Bulldozer, excavator, trucks for material transportation	/	/	8

Table 6 - List of sources: noise, vibration and non-ionizing radiation

The limit values for the basic indicators for environmental noise are defined in the Rulebook for limit values of noise level ("Official Gazette" No. 147/08). According to the degree for protection against noise limit values for basic indicators of environmental noise caused by various sources should not be higher than:

Field differentiated according to the level of noise protection	Noise level expressed in dB (A)		
	Ld Day (period 07:00 - 19:00h)	Lv Evening (period 19:00 - 23:00h)	Ln Night (period 23:00 - 07:00h)
Area of I degree - Area of I degree of noise protection is area intended for tourism and recreation, area nearby hospitals, areas of national parks and natural reserves;	50	50	40
Area of II degree - 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.	55	55	45
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.	60	60	55
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.	70	70	60

Table 7 - Level of noise by area

Subjected road section belongs to area of 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 centres for administrative, commercial, service and catering activities.

5.6 Impacts on Biodiversity (flora and fauna)

During preparation and rehabilitation phase of the road section Kumanovo – Opae, 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. The project area is not passing through any environmental protected zone or area proposed for protection.

At constructive 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. Due to the use of construction machinery increased intensity of noise and vibration and increased amounts of emitted exhaust gases are expected, emission of dust that will cause impact on the surrounding flora and fauna.

Noise, vibrations and exhaust emissions from driving fuels are impacts that will certainly occur in the operational phase. 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.

5.7 Social impacts

The project does not acquire expropriation 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.

The Grievance Mechanism has been implemented for the affected parties and stakeholders. The Grievance Form (given in Appendix 3) will be available in the Contractor offices.

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 8 - Environment and Social Management Plan (ESMP)

Phase	Issue	Mitigation measures	Responsibility	Comments
Preparation	Environmental and Social Management Plan	Development of an Environmental and Social Management Plan with environmental and social plans included. Mitigation measures to reduce the environmental and social impacts during the rehabilitation of the road section.	Contractor	/
Preparation	<i>Traffic safety</i>	- Information to the public about rehabilitation activities, Procedure for providing adequate information road signs.	Contractor	/
Preparation	<i>Health and safety</i>	Develop the Plan for Occupational health and safety for temporary construction mobile sites according to Law on occupational health and safety ("Official Gazette of RNM" No.92/07).	Contractor	/
		Setting mobile toilets along the route and signing a contract with an authorized company.	Contractor	/
Preparation	Procedure for providing construction materials (sand gravel and asphalt)	Providing materials (asphalt) from the facility (asphalt plant Huljusi, at distance ~5 km from the subject section) that have obtained IPPC permissions from MoEPP 1.	Contractor	/
Rehabilitation	<i>Traffic safety</i> Traffic Management, Placement of traffic signs	- Providing adequate signalization, - Traffic safety signs.	Contractor	Traffic management plan shall be prepared by the Contractor and approved by Ministry of Interior affairs.
Rehabilitation	<i>General Work Safety</i>	According to the Macedonian legislation in field of occupational, health and safety (Law on occupational, health and safety - "Official Gazette of RNM" No.92/07) a <i>Plan for Occupational, Health and Safety</i> for temporary mobile construction site should be develop.	Contractor	/
Rehabilitation	<i>Air pollution</i> Fugitive emission of dust, emission of exhaust gases from construction mechanization	- Use of standardized fuels for mechanization, - Minimising emissions through regular spraying with water during the construction works, - Using technically correct machinery, - Route planning and factor of loading and unloading to reduce of fuel consumption and emissions of exhaust gases and fugitive dust emissions,	Contractor	/

Phase	Issue	Mitigation measures	Responsibility	Comments
		<ul style="list-style-type: none"> - Avoid working on machinery in so called "idle", - Implementation of Traffic Management Plan, - Turn off mechanization when is not necessary, Reduce the formation of dust during milling and scratching the asphalt by using sprays that do not contain chemicals and are based on water.		
Rehabilitation	Potential pollution of <i>soil and groundwater/</i> contamination of surface water	<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, - Washing of the construction mechanization to be done on proper location, - Waste disposal on nearest permitted locations, Proper handling of lubricants, fuel.	Contractor	/
Rehabilitation	<i>Waste generation</i> (municipal waste from engaged employees, construction waste etc.)	<ul style="list-style-type: none"> - Implementation of key principles for sustainable waste management, - Placement of appropriate containers for collection of municipal waste on location, - Handling waste to authorized legal/physical entities, - Transportation of collected waste to the nearest landfill in coordination with local authorities, - Contracting with authorized companies for collecting and further management of different types of waste; - Hazardous waste to be undertaken by the authorized company for hazardous waste management, Waste produced by the workers (municipal waste) to be landfilled on a nearest landfill for municipal waste in coordination with local authorities.	Contractor	Contract with authorized legal/physical entities.
Rehabilitation	<i>Noise and vibrations</i> from construction activities	<ul style="list-style-type: none"> - Limit activities to daylight working hours, - Turning off the engines of vehicles and construction machinery when they are not in use, 	Contractor	Control of technical features of the

Phase	Issue	Mitigation measures	Responsibility	Comments
		Maintenance of vehicles and construction mechanization in a technically correct condition.		construction mechanization.
Rehabilitation	Biodiversity	<ul style="list-style-type: none"> - Using technically correct and regularly controlled and serviced construction mechanization, and use of adequate fuels; - Localization of movement for workers within the scope of the construction site in order to avoid disturbance of the local flora and fauna; - Cleaning of the existing culverts of the section for their uninterrupted use from the representatives of fauna; - Prohibition to light a fire; Compliance with the regulations for waste management and proper storage of waste.	Contractor	/
Rehabilitation	<i>Worker's health and safety</i>	<ul style="list-style-type: none"> - Provide workers with safety instructions and appropriate protective gear such as protective clothing, safety boots, helmets, gloves, goggles, ear protection, etc., - 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 RNM" No.92/07), Health and safety training for the engaged personnel.	Contractor	/
Rehabilitation	<i>Traffic Mangement</i>	Develop of the Traffic Management Plan for regulation of traffic during the project activities.	Contractor	/

Table 9 - 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
Traffic safety Safety during rehabilitation activities	Existence of Traffic Management Plan	On project site;	Visual inspection;	During rehabilitation phase	Contractor Supervision Engineer
General Work Safety 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 workplace; appointed person/officer for health and safety on site.	During rehabilitation phase	Contractor Supervision Engineer
Air pollution (fugitive emission of dust, emission of exhaust gases from construction mechanization)	Exhaust fumes, Dust	On project site;	Visual inspection, Measurement of PM10	During rehabilitation phase	Contractor Supervision Engineer
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)	During rehabilitation phase	Contractor Supervision Engineer
Waste generation (municipal waste from engaged employees, construction waste etc.)	Proper waste management	On project site;	Visual inspection, contracts with authorized legal/ physical entities	During rehabilitation activities	Contractor Supervision Engineer
Noise and vibrations	Noise levels	On project site;	Visual inspection, Noise measurements	Selection of measurements points near sensitive receptors	Licensed company
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 inspection	During rehabilitation activities	Contractor Supervision Engineer

7. Roles and responsibilities for implementation of ESMMP

During rehabilitation of the road section Kumanovo – Opae 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 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 11.

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 World Bank.</p>
<p align="center">Environmental Protection and Social Aspects Unit (EPSAU) (PESR)</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>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 WB.</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, excavation, labor safety, etc. before civil works) following current national regulations.</p>

Company/Unit	Responsibilities
	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.
Supervision Engineer	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.
Ministry of Environment and Physical Planning (MoEPP)	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.

Appendix No.3 Grievance Form

COMPLAINT FORM A1 / Образец за жалба -Приговор A1

Complaint No./Жалба-Приговор бр.	
Date:/Датум:	
Name and surname / Име и Презиме	
Contact info/Контакт податоци:	
Indicate the way in which a person wants to be contacted-mail, phone... / Наведете на кој начин странката сака да биде контактирана – по пошта, телефон	
Confidential/Доверливо Yes-Да /No-Не	
The Complaint is delivered (underline the way of delivering the complaint): in person, by phone, during the local communitys meeting, by e-mail, other way (describe) Жалбата/приговорот е доставен (подвлечете го начинот на доставување на жалбата): лично, по телефон, на состанок на локалната заедница, електронска пошта, на друг начин (опишете)	
Complaints Description (details) / Опис на жалбата (детали за истата)	
What is considered to be the solution to this problem? / Што сметате дека е решение за овој проблем?	
REPLY / ОДГОВОР:	
Date / Датум:	
Undertaken activities / Превземени активности:	
Name and Surname of the office Clerk/ Име и Презиме на службеното лице:	
Forwarded to the Client / Проследено до Инвеститорот:	
Date / Датум:	
Letter No./Бр. на писмото:	
Forwarded to the Contractor / Проследено до Изведувачот:	
Date / Датум:	
Letter No./ Бр. на писмото:	
Date/Датум:	Signature/Потпис: