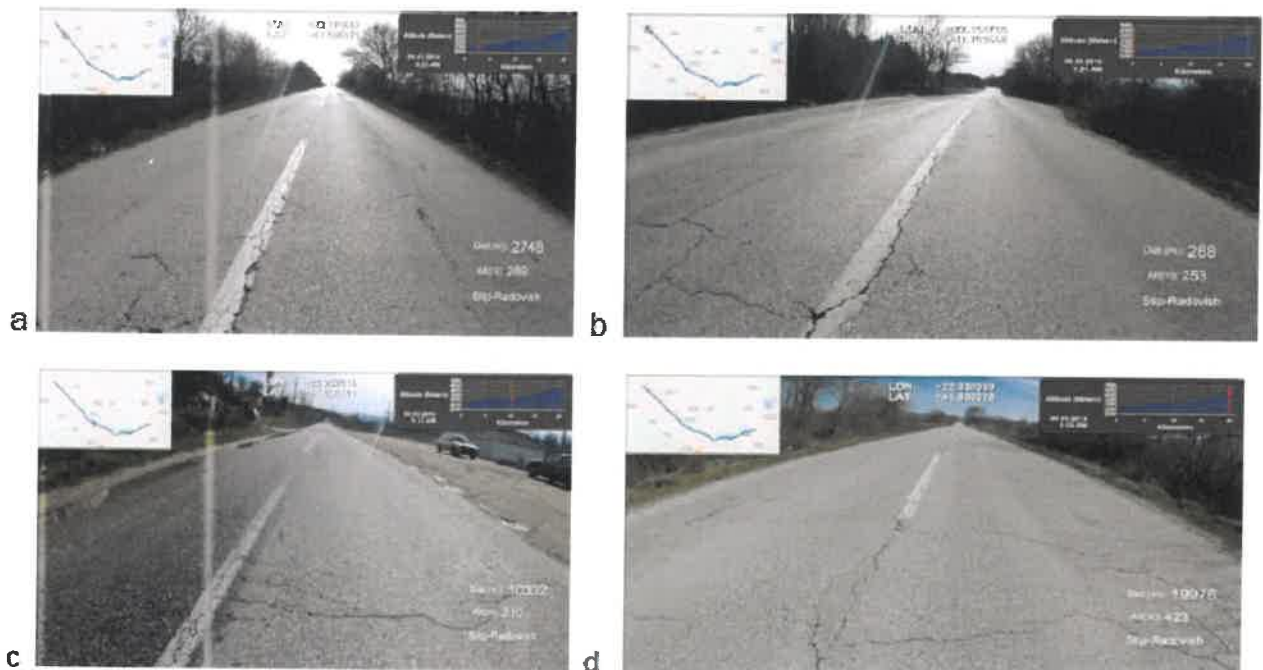


**PUBLIC ENTERPRISE FOR STATE ROADS  
REPUBLIC OF NORTH MACEDONIA**



**ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (ESAR) FOR  
REHABILITATION OF THE NATIONAL ROAD A4 SECTION SH TIP -  
RADOVIS**



Prepared by: *Irena Stefanovska, BSc.Env.Eng.*  
Skopje, October 2019

**Table of contents**

**1. EXECUTIVE SUMMARY ..... 3**

**2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK ..... 4**

**3. PROJECT DESCRIPTION..... 5**

    3.1 TECHNICAL CHARACTERISTICS OF THE PROJECT..... 7

**4. BASELINE DATA ..... 11**

    4.1 DESCRIPTION OF THE ENVIRONMENT AROUND THE PROJECT LOCATION ..... 11

    4.2 GEOLOGICAL FEATURES OF THE REGION..... 12

    4.3 GEOMORPHOLOGICAL PROPERTIES AND BASIC HYDRO – GEOLOGICAL FEATURES OF THE TERRAIN OF THE TERRAIN ..... 13

    ..... 14

    4.4 BASIC TECTONIC AND SEISMIC – TECTONIC FEATURES OF THE TERRAIN ..... 14

    4.5 FEATURES OF THE LOCATION ..... 15

    4.6 FEATURES OF THE AREA (LANDSCAPE)..... 16

    4.7 EXISTING WATER RESOURCES ..... 17

    4.8 CLIMATE CHARACTERISTICS OF THE AREA AND METEOROLOGY ..... 17

    4.9 BIODIVERSITY (FLORA AND FAUNA) IN THE PROJECT AREA PLANNED FOR PERFORMING REHABILITATION ACTIVITIES ..... 18

**5. ENVIRONMENTAL IMPACTS..... 25**

    5.1 AIR EMISSIONS ..... 26

    5.2 WATER POLLUTION ..... 27

    5.3 WASTE GENERATION ..... 27

    5.4 SOIL CONTAMINATION ..... 30

    5.5 NOISE, VIBRATION AND NON-IONIZING RADIATION..... 31

    5.6 BIODIVERSITY (FLORA AND FAUNA) ..... 33

    5.7 SOCIAL IMPACTS..... 33

**6. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)..... 34**

**7. ROLES AND RESPONSIBILITIES FOR IMPLEMENTATION OF ESMMP ..... 41**

## 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 RNM. 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.

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 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 Skopje, North Macedonia (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 of National Roads Project (NRP) is the rehabilitation of the national road A4 Section Shtip – Radovis.

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)<sup>1</sup>.

The Elaborate is prepared in accordance with the Law on Environment (Official Gazette of the RM 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

---

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

approval the body for conducting expert works in the field of environment is competent (Official Gazette of the RM 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 RM No.111/14).

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 RM 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).

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**

### 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 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).

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 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).

The Ministry of Environment and Physical Planning (MoEPP) has been prepared Rulebook for implementing, screening, scoping and review in environmental impact

assessment in the RNM. 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 Shtip - Radovis 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.

#### 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.

Plans mentioned above has been prepared in accordance with the Elaborate for environmental protection to ensure compliance with national legislative and the EBRD environmental and social requirements.

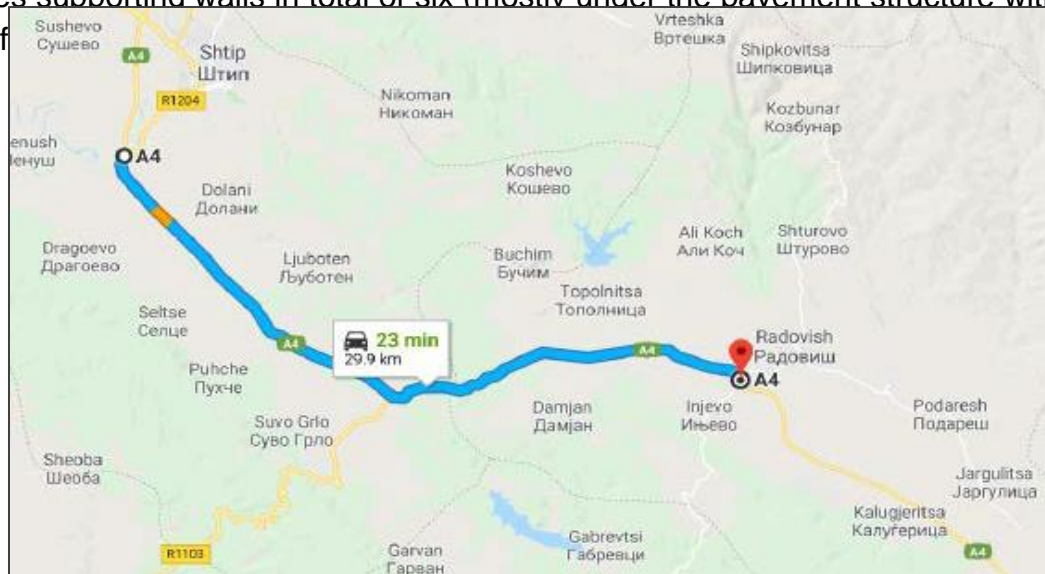
### **3. Project description**

The road section Stip-Radovis is a regional road with number E871. This road section has significant traffic and economic importance of the road network in the Shtip and Radovis and the road network in the Republic of North Macedonia. The subject section is located in the central eastern part of the Republic of North Macedonia.

The current road conditions on this section, at certain places along the section there are intensive network cracks, potholes, longitudinal and traverse cracks and rutting's where determined. Therefore, it is necessary to perform rehabilitation of the road section (without extension), which will be of great importance from healthy and social aspects.

The process of rehabilitation of road section Shtip-Radovis will be carried out in accordance with the purpose of the road, in addition offers safe and uninterrupted traffic, according to the Law on Public Roads ("Official Gazette of RM No. 84/08, 114/09, 124/10, 23/11, 53/11, 44/12, 168/12) and regulations for design and construction. The completion of this rehabilitation process would provide favorable technical features and this route in the future will provide fast, economical, convenient and safe transport. With improvement of the road features the traffic eligibility and capacity will be satisfied.

The subject section Stip- Radovish is part of the transport corridor 10 and is on the core network. The section road A4 stretches through the territory of municipalities Shtip and Radovish. The subject section is in the central east part of the Republic of North Macedonia. The subject section starts from a crossroads and separates the road to Radovish from Shtip and ends at the separation of the A4 section for Radovish. The entire part is located in the territories of two municipalities of Shtip and Radovish. The subject section passes through several (eight) populated areas, the subject section of its length is about 25 km, contains a total of forty-nine culverts (three types - pipe, boxed and arced - with a total length of 550m), ten bridges (with a total length of 128 m). Protective structures supporting walls in total of six (mostly under the pavement structure with a total length of





**Figure 1 National road A4 section Shtip – Radovis**  
**Figure 2 Location of the road section Shtip - Radovis**

### 3.1 Technical Characteristics of the project

The subject section Shtip - Radovis is part of the transport corridor and is in the basic road network. The part of the subject section A4 is close and parallel with the project for a new express road that connects Shtip with Strumica (through Radovish) and will function as an auxiliary road.

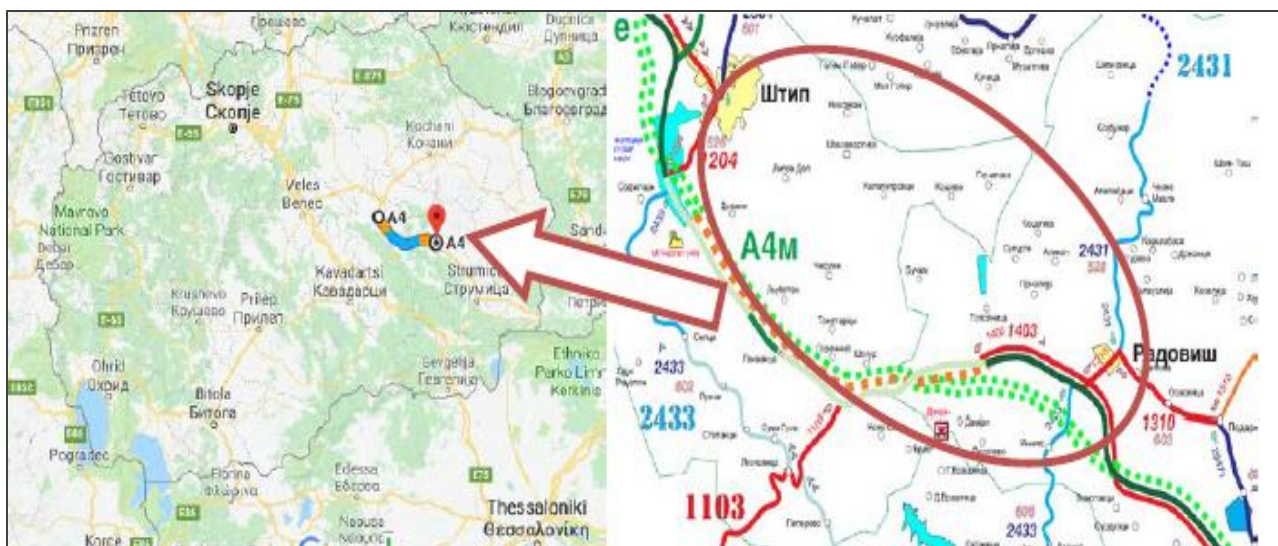
Carriageways characteristics - Single road carriageway with one lane per direction. Road width is approximately 7m, limited down to 6,2m at some points. The traffic lane width varies between 3,0 and 3,5m.

The course starts from a crossroads on the road and a retracement to Radovis (through Lakavica) and ends at the last crossroads for entry into the city of Radovis.

The current road conditions on this section at certain places along the section there are major and minor damages, intensive network cracks, longitudinal and traverse cracks and ruttings where determined. For this reason, it is necessary to improve the condition of the carriageway with the basic goal of raising the level of safe traffic and improving the social situation in that municipality. The route passes through the plain terrain, and in part is a mild hilly terrain with a length of approximately ~ 21 km.

The activities provided for rehabilitation of the section Shtip - Radovis will take place in both municipalities of Shtip - Radovis, which is part of the South -East planning region.

Subject section of A4 road stretches through Lakavica. Generally, the alignment follows the terrain characteristics, which at the middle and the end of the section is partly



mountainous and, in the rest, is frequently flat.



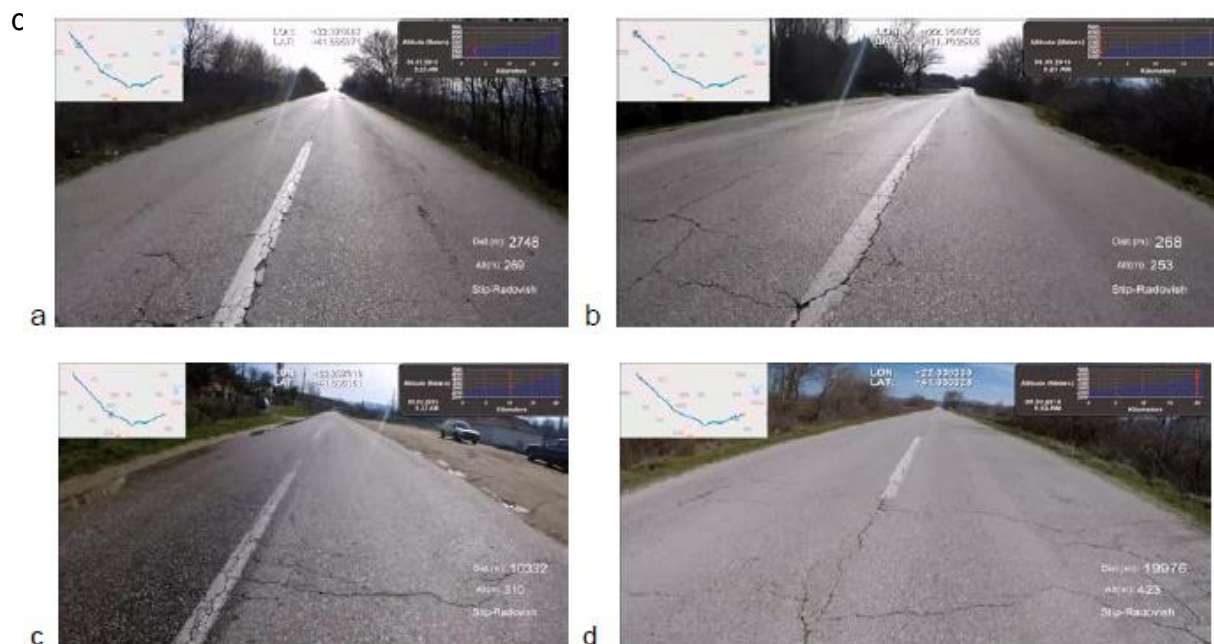
The users of this road section perform long and short travel trips. The road passes through bigger settlements, villages and there are different types of road users and categories. The number of settlements (6) on this section is relatively high.

There are linear settlements with a mixture of local slow traffic and non-motorized road user's fast-moving, heavy and long-distance traffic is mixed together with slower traffic in the built-up area, vulnerable users, pedestrians (especially school children), cyclists, etc.

The shoulder is narrow at some parts. This is more critical where guardrail is present, and the width is not adequate for its proper installation.

On several points of the subject section the shoulder is too narrow, and guardrail is damaged (low height and in bad condition). In addition, a safety problem is the sharp embankment slope.

On the section, on more parts along the road, there is problem with drainage system, which is not maintain properly and therefore not functional. Ditches are filled with



**Figure 3 a, b, c, d / At many points in the subject section, the shoulder is too narrow, not cleaned up, and it is dangerous for the safety of traffic**

Obstacles within the traffic safety zone exist. Exposed rocks and boulders are dangerous obstacles when located too close to the roadway.



**Figure 4 a, b / At several points of the subject section, Rocks enters into the operational width of traffic lane**

The bridges curbs are narrowing the road width. In case of crash with the end of curb a vehicle could be rotated and thrown off the path of movement.

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

1. Increase the width of the road with an unpaved belt, which can confuse drivers,
2. Lack of STOP sign with an additional mark of 20 meters,
3. Possible confusing signs of priority because of their position,
4. There is no lighting on certain important intersections,
5. 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. Also, the signs and road signs should be regularly maintained.

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 in traffic, islands, medians, etc.,
4. Lack of school markings,
5. The identified area for bus stops in the middle section has no markings,
6. The existing one and only bus stop do not have enough space island to stop along the main pavement, and those areas are without paved surface or without proper markings.

The highest risk, in relation to the unsecured bus stops in this section, is when there is no sign (damaged or removed) at a bus station, without any other facilities and the overtaking of that part is forbidden. In such cases, buses stop at the main pavement (according to the driver and passengers), occupying the entire traffic lane, and the rest of the traffic does not stop behind the stopped bus, but overtakes and when it happens in high speed segments, the risk is very high.

Pedestrians generally use existing carriageway and narrow shoulders for walking, which in combination with operating speeds and heavy traffic, is a highly unsafe condition. It is recommended to construct pedestrian facilities at all settlements, in order to separate

vulnerable road users from motor traffic. It is recommended to survey the road in order to determine safe places for the reallocation of bus stops and to design safe bus stops, on the both sides in the road, and to provide appropriate design solutions for safe bus stops, with accelerated lanes, with appropriate signs, etc. 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 should be introduced at specific places with proper signage and if possible, safety islands/medians, and only at locations with speed limits lower than 60 km/h. 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.

On urban parts of sections, it is necessary to provide proper pedestrian sidewalk on bridge structures to protect pedestrians from vehicular traffic. Guardrail should be installed before and after the bridge as well so it would have sufficient length and provide additional safety for vehicles. Installation of safe guardrail entails widening of the road as well as pedestrian path on the bridge.



**Figure 5 Bridges on the respective section are without an adequate system for retaining and protection**

The section is characterized by mixed traffic users: passenger vehicles, trucks, tractors (agricultural machinery) and pedestrians. Also, section has a large number of illegal and/or non-transparent connectors 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 6** The section has many illegal and/or non-transparent access roads with some small settlements, agricultural, forest or other land, which is particularly unsafe from the aspect of road safety and the social aspect which can contribute to serious accidents in the form of lateral collisions

## 4. Baseline data

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

Municipality Radovis is located in the southeast part of the Republic of North Macedonia. It borders with several municipalities: Municipality Konce south-west, Municipality Berovo on east, Municipality Vasilevo on south, Municipality Stip north-west and Municipalities Karbinci and Vinica on north.

Municipality Shtip is located in the south east part of the Republic of North Macedonia, in the central catchment area of the river Bregalnica. It covers area of 893km<sup>2</sup>, i.e. 3.1% of the area of the Republic. Number of inhabitants in the municipality – 47.798. Municipality Shtip has seventy-one settlements; it borders with seven municipalities: Konce, Negotino, Gradsko, Lozovo, Sv. Nikole and Karbinci.

Shtip is the largest urban agglomeration in the eastern part of North Macedonia, serving as the economic, industrial, entertainment and educational focal point for the surrounding municipalities. Shtip is the largest textile production center in the country, center of the fashion industry in North Macedonia, as well as the location of the sole public university in eastern North Macedonia, Goce Delčev. From total of thirty-five rural settlements, only twenty villages are alive, and six villages are totally empty. The municipality is relatively well-connected in sense of traffic - on north-west with Shtip (distance of 36 km), and south-east with Strumica (distance of 29 km).



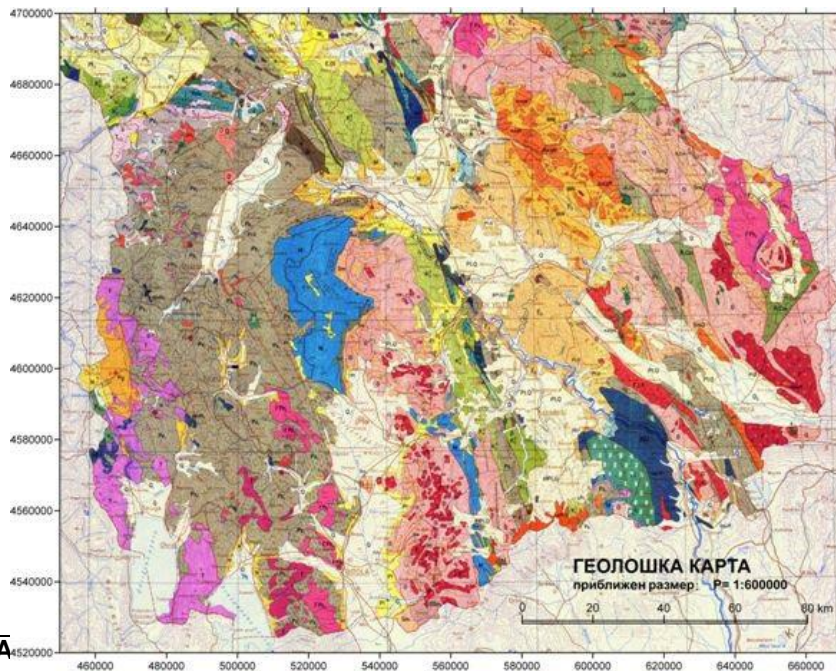


Figure 7 Project location within statistical regions in the Republic of North Macedonia

## 4.2 Geological features of the region

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 RNM 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.



**Figure 8 Geological map of the Republic of North Macedonia with characteristically geological zones**

### **4.3 Geomorphological properties and basic hydro – geological features of the terrain of the terrain**

At this section the terrain is plain with small uplifts and the terrain elevation varies from 330m to 500m. The hydrography is developed on the researched field. The morphology at this region is relatively modest. On the terrain are not registered manifestations and impacts from tectonic, neotectonic 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.



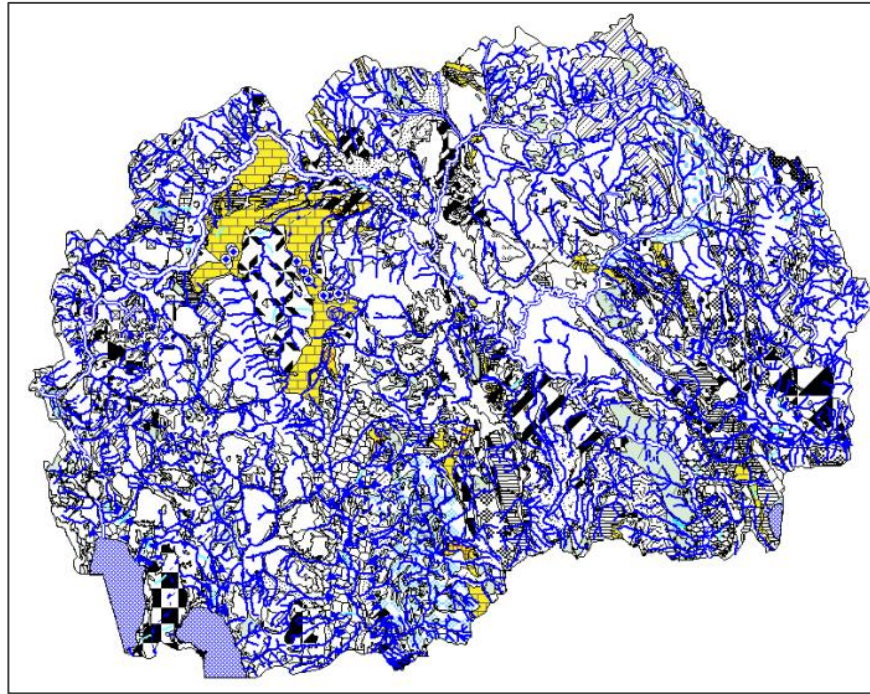


Figure 6 Relief map of the Republic of North Macedonia

#### 4.4 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 RNM represents part of Vardar and Serbo-Macedonian zone as larger geotectonic unit, figure no.6 and 7. According its tectonic evolution is instable, due to the complexes of old Paleozoic 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 RNM 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 Mercali, Cancani and Zieberg). In attach seismological card of Republic of North Macedonia.

Figure 10 Geotectonic Reonization of Republic of North Macedonia



#### 4.5 Features of the location

The northern part of the municipality of Radovis belongs to the mountain Plackovica, the southern part of Mount Smrdesnik, to the northwest is the hilly part of the Juruklok

area or Damjansko pole, and the southeast extends the alluvial plane of the river Radovishka.

Municipality Radovis has good geographical position and traffic connection, because through its south-western part passes the highway Ship-Radovan-Strumica-Novo Selo. It is connected with the Middle Povardarie through the regional highway Negotino-Krivolak-Leskovica-Radovis, which leads through Konecka Planina, and it is long about 50km. The most attractive road from the local road network, long 21km, is the one which connects the central settlement of Radovis with wonderful mountain regions in Plaskovica and leads up to the southern slopes of the mountain Lisec.

The area of Shtip is predominantly mountain and hilly location, with the exception of the Kocani, Ovcepole and Lakavica valleys with the valleys of the rivers Bregalnica and Lakavica. The average altitude difference, in general between the mountain ranges and the plains in the course of the rivers, is 1,300 and the average altitude is 250 meters.

The mountain Plachkovica is forty kilometers from the town of Shtip. It belongs to the old grand mountain range. The composition of the field is most often a granite with crystalline shales and younger eruptive rocks. On the mountain there are rich flora and fauna with several species that live only on this mountain. On the mountain Plachkovica there are also three beautiful canyons: Kamnik, Kozjak and Zrnovka, where beautiful natural beauties are found such as rivers, waterfalls, sloping, high rocks.

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

Area is topographically defined territory which is consisted of a 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 subject area 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.

## 4.7 Existing water resources

Hydrographic view of the municipality of Radovis is interesting, with the appearance of underground waters, springs and surface watercourses as well as with smaller artificial reservoirs. Besides the sources of drinking water in the municipality, there are mineral waters, but without some economic exploitation.

The hydrographic network of the municipality of Radovis is divided into two river basins. Through Radovishka river the waters flow into the basin of Strumica, while through the river Kriva Lakavica in the basin of Bregalnica. Rivers in the city Radovis are: Old river (also known as Radovishka river), as well as the smaller Sushica and Marlada.

Municipality of Shtip is rich with springs, streams and rivers. In the city there are two rivers. The bigger is Bregalnica (length 43 km) that passes through Stip on the way to the estuary in the river Vardar.

## 4.8 Climate characteristics of the area and meteorology

In both municipalities Radovis and Shtip the climate is mildly continental, with certain influence of changed Mediterranean. Because of the considerable height difference (from 340m to 1600m altitude above sea level) on the high mountain ranges (Plackovica), there is influence of mountainous climate, while in the field it is changed Mediterranean climate.

The average annual air temperature in the plains is 12-13°C and on the highest parts from the mountain ranges up to 7,5 °C. Warmest months of the year are July and August with average monthly temperature of 23,5°C in July, and the coldest month is January with average monthly temperature of 1,2°C. The absolute minimal temperature is -21°C and the absolute maximal is 40,1°C. The spring is always cooler than autumn. The frost period is 139 days, and 13 day is snowy. Averagely per year there are 117 clear, 162 cloudy and 87 gloomy days and 12 days with fog.

The total number of sunny hours in region is 2326 sunny hours per year.

Winds are common from all directions. The average annual speed is estimated 5,7 m/sec and the maximal speed reaches up to 27,0 m/sec. It appears quite balanced during the whole year but with greater frequency in July and August.



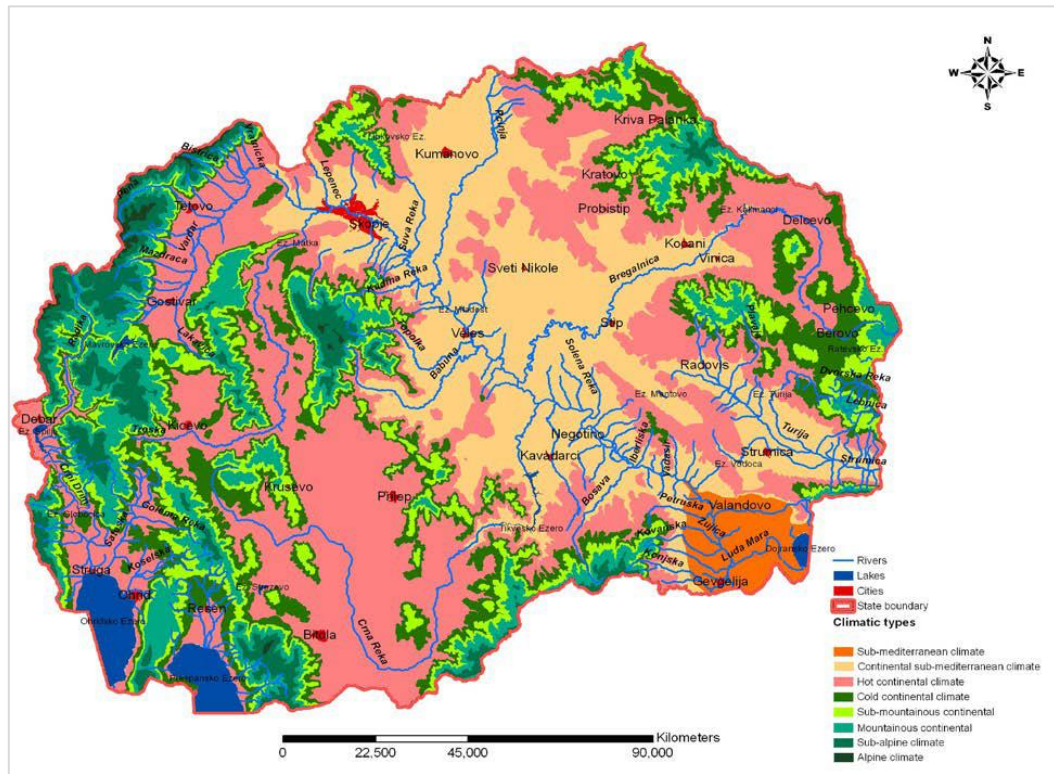


Figure 11 Climatic types in Republic of North Macedonia

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

The first belt of low mountain pasture or low mountain grass belt starts from the southern frame of the valley and extends up to 750 meters above sea level. In the lower part of it there are the blackberries and thorns, and in the higher curved bushes of hornbeam, juniper and prnar, and quite rarely by some elm. Only the fruit trees are represented in the cultural plants.

In the Animal Fund, these two municipalities are numbered with hunting-type species (more than 50 animal species are recorded), which are mainly made up of animals such as deer, wild cat, wild eagle, eagle rabbit, vet, white vulture, wolf, wild duck, wild boar, fox, rabbit, hedgehog, turtle. Fewer are represented: the badger, the protein (kuna) and the otter. The last bear, according to the records, was killed in 1891. From the reptiles, the lizards and snakes were dashed (water and terrestrial). There are many birds, the nightingale, the sparrow, the cuckoo, the duck, the harvan, and the higher peaks and the hawk, the falcon and the eagle. Domestic animals are present in rural areas along the road. Wild animal species can be found in a very small number.

Also, the subject location Shtip - Radovis does not belong to any Primary Butterfly Areas – PBA, Distribution of protected areas (without individual trees) in the RNM, nor to World heritage areas and Ramsar areas in the RNM. The project location in relation to these important areas is presented on figures below.

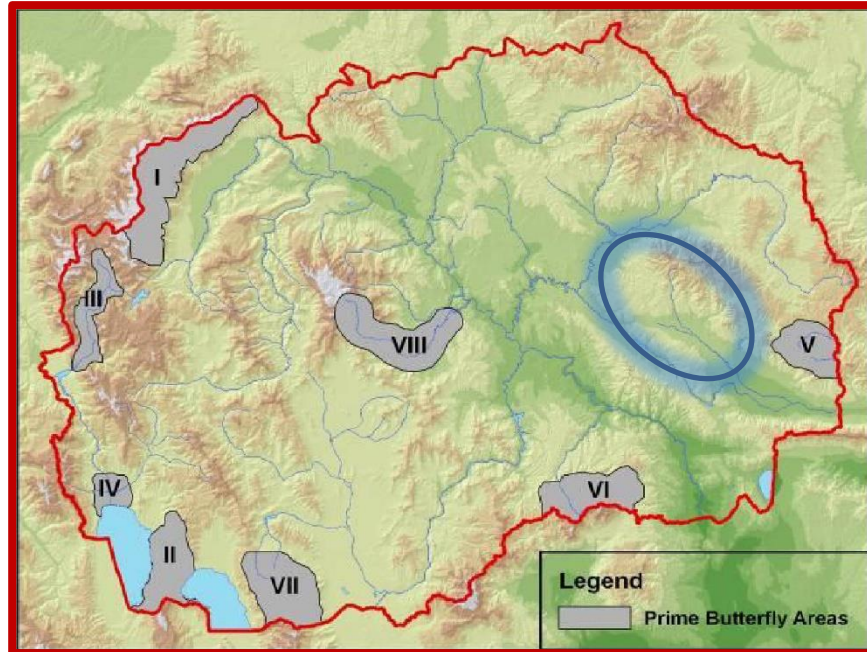


Figure 12 Prime butterfly areas in the Republic of North Macedonia marked wider area of the subject section

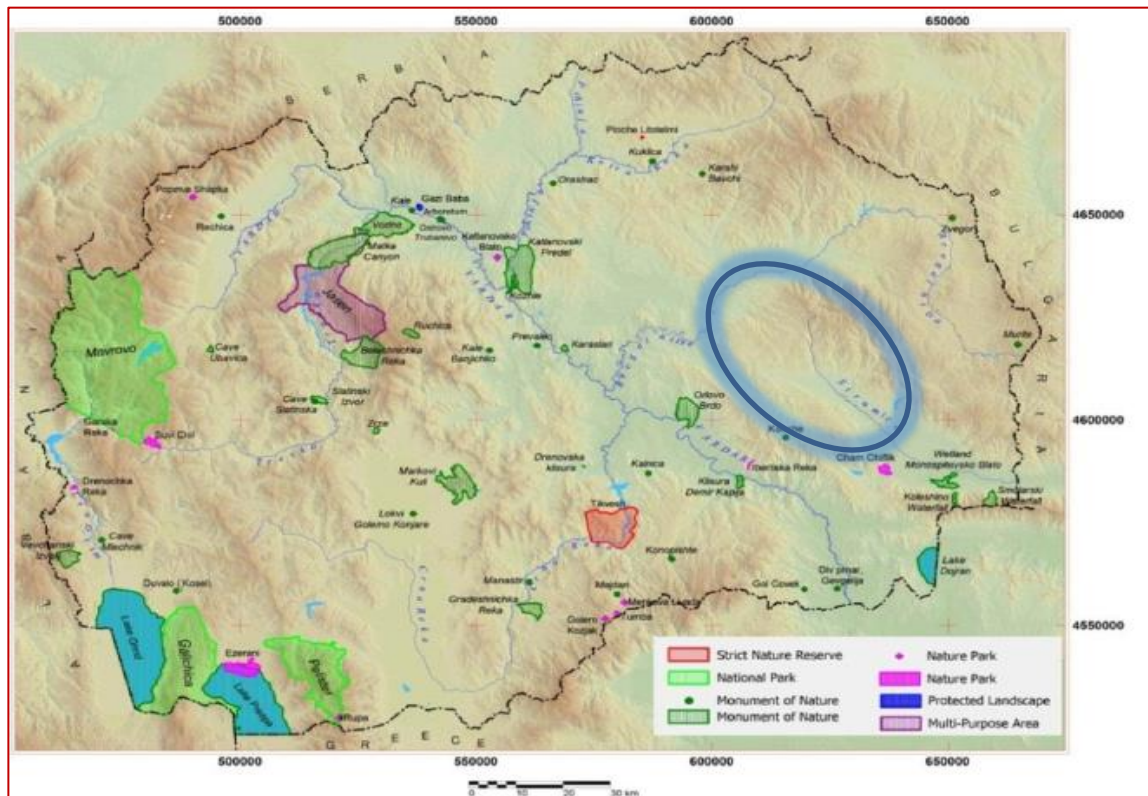


Figure 13 Distribution of protected areas (without individual trees) in Republic of North Macedonia



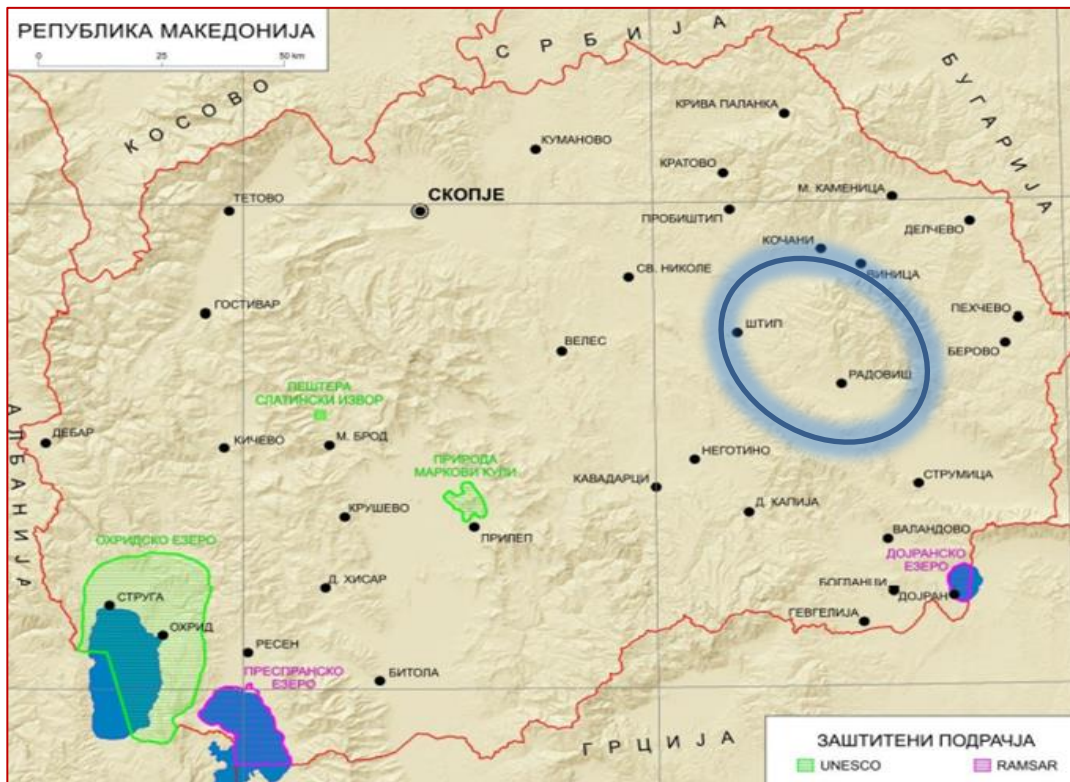


Figure 14 World heritage areas and Ramsar areas in Republic of North Macedonia

#### 4.10. Socio-economic aspects

The private sector in the Municipality of Radovis consists of: mining, catering, textile, forestry, meat industry, wholesale and retail trade, crafts (repair of motor vehicles, watches, shoes, white goods, etc.), canning industry, nonmetal industry, tobacco industry, cosmetic-pharmaceutical, gold and silver processing. Private business is 90% of the total economy.

Agricultural land takes 37,5% (26406,2 ha) of the total area from which 16,855 ha (61,2%) is arable land and 11610,5 ha (38,6%) are pastures. In the structure of the arable land, largest share has plow lands and gardens with 89% (15,077 ha). The vineyards cover 4,5% (752 ha), and orchards 3,6% (686 ha) in relation to the total arable land area.

In the Municipality of Shtip there are more agro industrial enterprises, livestock farms, a slaughterhouse with a refrigerator, a distillery, etc. The total agricultural area in the municipality of Shtip is 31,757 ha, of which 9,906 ha are cultivable areas.

The most important sectors are the textile industry, the wood industry and shoe industry, trade and agriculture. The main feature of the economy in Shtip is the textile industry that has been successfully operating on the Shtip for more than half a century. Shtip is one of the leading, according to the number of employees in the textile industry.

#### **4.11. Hydrology**

Municipality of Radovis is divided into two river basins. Through Radovishka river the waters flow into the basin of Strumica, while through the river Kriva Lakavica in the basin of Bregalnica. Rivers in the city Radovish are: Old river (also known as Radovishka river), as well as the smaller Sushica and Marlada.

In the Municipality of Shtip is rich in springs, streams and rivers. In the city there are two rivers. The bigger is Bregalnica (length 43 km) that passes through Stip on the way to the estuary in the river Vardar. Smaller, however, divides the city into two parts, and is called Otinja (3 km).

#### **4.12. Road infrastructure**

The municipality of Stip passes the highway M-5 Stip-Kocani - Delcevo, which is connected to the E-75 highway (Skopje - Gevgelija) via the road Shtip - Veles and the regional road R-6 Stip - Karbinici - Plachkovica mountain.

The road network in the municipality of Stip has a total length of 377,4km, of which 47,0km (12,45%) are national roads, 22,4km (5,94%) are regional roads and the remaining 308,0km (81,61%) are local roads. From the entire road network of the municipality of Stip, 230,4km (61,05%) of roads comprise the street network in urbanized settlements. The remaining 147,0km (38,95%) belong to roads connecting settlements within the municipality.

There is infrastructure for the rail transport of passengers and goods throughout the municipality through the branch line of the Macedonian Railways AD Skopje - Veles - Stip - Kocani. The main train station is in the town of Shtip.

#### **4.13. Education**

There are four primary schools and six high schools in the Shtip. In 2007, the fourth state university in Macedonia - Goce Delcev University was opened in Stip. In 2012, there were 13 faculties with about 16,000 students. The University consists of the following faculties: Faculty of Natural and Technical Sciences, Faculty of Educational Sciences (Formerly Faculty of Pedagogy), Faculty of Philology, Faculty of Agriculture, Faculty of Music, Faculty of Law, Faculty of Law Faculty of Technology, Faculty of Electrical Engineering, Faculty of Mechanical Engineering, and Faculty of Tourism and Business Logistics.

There are five institutions within of municipality of Radovis. One is a combined preschool, two elementary schools with multiple regional facilities, one secondary school gymnasium and one faculty.

#### 4.14. Health institution

Within the Shtip municipality operates one modern clinical center and several public health institution and private primary health care and dental health care facilities.

Within the Radovis municipality operates public health institution "Health Home - Radovis", and about seven outpatient clinics in the settlements managed by the health center. The city operates at least 15 private primary health care and dental health care facilities.

#### 4.15. Population

Municipality Radovis is located in the southeast part of the RNM. It borders with several municipalities: Municipality Konce south-west, Municipality Berovo on east, Municipality Vasilevo on south, Municipality Shtip north-west and Municipalities Karbinci and Vinica on north. The number of populations is 28,244.

There are eight institutions in the field of education and upbringing. One is a pre-school combined institution, five primary schools with several regional offices, one high school in the area of secondary education and one faculty. In the area of public enterprises there are PE "Plavija", PE "Makedonski Sumi" - branch "Plachkovica" - Radovis, PE Water management "Radovishko Pole".

The basis of health care is the medical center. The principal activities of JZP MTS Radovis: outpatient polyclinic and outpatient care, stationary care, medical rehabilitation, dental health care and more.

**Table 1 Number of inhabitants and nationality in Municipality of Radovis**

Nationality	No. of inhabitants	%
Macedonians	23752	82
Turks	4061	14,4
Albanians	80	0,38
Vlahs	26	0,08
Roms	271	0.5
Serbian	71	0,3
Bosniaks	1	0
Others	54	0,2

There are twelve institutions in the field of education and upbringing. One is a pre-school combined institution, four primary schools with several regional offices (2), five high schools in the area of secondary education and one university.

The basis of health care is the clinical center. His main activities are: clinics, outpatient polyclinic and outpatient care, hospital care, medical rehabilitation, dental health care, etc.

**Table 2 Number of inhabitants and nationality in Municipality of Shtip**

Nationality	No. of inhabitants
Macedonians	41670
Turkish	1272
Roms	2195
Vlahs	2074
Serbians	294
Bosniacs	11
Albanians	12
Others	265

#### 4.16. Industrial objects

Within the municipality of Radovis the largest employers in the public sector are the Public Enterprise "Macedonian Forests" - Branch "Plachkovica", Public Enterprise "Plavaja", Police Station Radovis, PHI Health Center, education sector (kindergartens, schools and faculty), court, municipality and regional ministries. In the private sector, these branches are represented: Mining through the Bucim Mine - copper, gold and silver mine. With 550 workers, the mine is the largest employer of the population in the municipality of Radovis.

The textile and apparel industry have developed in the city. About 20 varieties work, the largest of which are: Mardi, Connelly, Super Hit, Markos, FairTex and others. Much of the population in the city and municipality is engaged in planting and producing tobacco. Jaka Tabak (the so-called monopoly) is a company that buys, processes and sells tobacco.

In Radovis there is also a company for production and sale of gold jewelry - Goldmak. Metal processing industry, the most important companies are Metal Trading and Sammy.

The construction and design industry is represented by the following companies: "Tech", "Alpha Engineering", "Bino", "Techno Engineering" and others.

There are several dairies, and the largest is Dairy Gorgievs (former dairy Co). Wood industry and furniture production and sale through the companies "CIK", "Modern House", "Asti 2007", "Auto Kec" and others.

Today, Shtip is the center of the country's textile and fashion industry. Formerly the home of such industrial giants in Former Yugoslavia like the Cotton Industry "Makedonka" - Štip, with its enormous suburban campus, and the Fashion Industry "Astibo".

#### **4.17. Culture Heritage**

According to the Law on Protection of Cultural Heritage (Off. Gazette of RM no. 20/04, 115/07, 18/11, 148/11 and 23/13), types of immovable cultural heritage are: monuments, monument wholes and cultural areas. According to official data in the national organization responsible for protection of cultural heritage and its regional units, in the RNM, it has been registered total of 11.200 immovable cultural monuments.

In North Macedonia, it has been registered 1.726 churches, with more than 150.000 m<sup>2</sup> under frescoes, 1.213 buildings from old urban and rural architecture, 47 towers, fortresses and bridges, 1.026 monuments and memorials, 126 Islamic architecture buildings, 24 old bazaars and other historical, urban and architectonic wholes, 32 commercial buildings and several other types of buildings and properties.

Along the range of the road section there are no protected areas or areas proposed for protection.

## 5. Environmental impacts

Rehabilitation of the road section Shtip - Radovis 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 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 in to 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 PM<sub>10</sub>, 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 micrometers PM<sub>10</sub> has been measured on representative roadside receptors at the beginning of the project activities (April 2019), by the authorized company Tehnolab DOO Skopje and the complete measurements report is given in the Appendix 1. Measurement places has been determined in accordance with the Rulebook for use of noise indicators, additional noise indicators, how to measure the noise assessment methods with noise indicators (Official Gazzete of RNM No.117/08).

**Table 3 Limits and margin of tolerance for suspended dust PM<sub>10</sub>**

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
PM <sub>10</sub>	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 4 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

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 can be physical, chemical and biological:

- 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 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 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 in to 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 fecal waste water, solid waste and non-proper maintenance and cleaning of the mechanization.

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

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

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 management and monitoring plan as integral part of the project documentation for the realization of the project.

### **5.3 Waste generation**

The waste management is one of the most serious environmental problems in the RNM. 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 RNM and the National Strategy for Waste Management of RNM 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) "Isar" and Public Utility Company (PUC) "Plavaja" - Radovis are responsible for collection and disposal of municipal waste for the settlements in Municipality of Shtip and Municipality of Radovish.

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 RNM" 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). 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:

**Table 5 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 "Isar" PUC "Plavaja"
	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

## 5.4 Soil contamination

Impacts on soil during the process of rehabilitation of the road section Shtip - Radovis 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 expect from:

- Fugitive emission/imission of dust for the process of asphalt removal, and such parts that would be deposited on the soil;
- Leakage of fuels and lubricants from construction machinery, which, in addition to affecting the soil, by their spillover 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 machinery, it is necessary to act in accordance with the Law on Waste Management ("Official Gazette of the RNM" no.68 / 04,71 / 04, 107/07, 102/08, 143/08, 124/10, 09/11, 123/12 and 163/13), 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 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 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 noise level has been measured on representative roadside receptors at the beginning of the project activities (April 2019), by the authorized company Tehnolab DOO Skopje and the complete noise measurements report is given in the Appendix 1. Measurement places has been determined in accordance with the Rulebook for use of noise indicators, additional noise indicators, how to measure the noise assessment methods with noise indicators (Official Gazzete of RNM No.117/08).

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.

**Table 6 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 RNM "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 7 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 RNM 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 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.

### **5.6 Biodiversity (flora and fauna)**

During preparation and rehabilitation phase of the road section Shtip - Radovis impacts on flora and fauna will be insignificant due to the rehabilitation nature of the proposed project. During the preparation phase vegetation clearance such cleaning site from bushes, roots and trees and clearance of gutters has been performed.

The project area is not passing through any environmental protected zone or area proposed for protection.

At constructive phase, 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 2) 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) identify 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 can be eliminated or minimized.

Table 8. Environment and Social Management Plan

Phase	Issue/impacts	Mitigation measures	Responsibility	Comments
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	/
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 RNM" No.92/07).</li> </ul>	Contractor	/
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	/
Rehabilitation	<i>Traffic safety</i> Traffic Management, Placement of traffic signs	<ul style="list-style-type: none"> <li>- Providing adequate signalization,</li> <li>- Traffic safety signs.</li> </ul>	Contractor	Traffic management plan shall be prepared by the Contractor and approved by Ministry of Interior affairs.
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 RNM" No.92/07) a <i>Plan for Occupational, Health and Safety</i> for temporary mobile construction site should be develop.</li> </ul>	Contractor	/
STRABAG AG Subsidiary STRABAG Skopje			35	

<p>Rehabilitation</p>	<p><i>Air pollution</i></p> <ul style="list-style-type: none"> <li>- Fugitive emission of dust,</li> <li>- emission of exhaust gases from construction mechanization</li> </ul>	<ul style="list-style-type: none"> <li>- Use of standardized fuels for mechanization,</li> <li>- Minimizing 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 exhausted gases and fugitive dust emissions,</li> <li>- Avoid working on machinery in so called "idle",</li> <li>- Implementation of Traffic Management Plan,</li> <li>- Turn off mechanization when is not necessary,</li> <li>- Reduce the formation of dust during milling and scratching the asphalt by using sprays that do not contain chemicals and are based on water.</li> </ul>	<p>Contractor</p>	<p>/</p>
<p>Rehabilitation</p>	<ul style="list-style-type: none"> <li>- Soil pollution</li> <li>- Potential pollution of soil and</li> <li>- groundwater contamination of surface water</li> </ul>	<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 sand and removal of polluted soil layer. Polluted soil layer would be treated as a hazardous waste,</li> <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,</li> <li>- Proper handling of lubricants, fuel.</li> </ul>	<p>Contractor</p>	<p>/</p>

<p>Rehabilitation</p>	<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>- 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 in coordination with local authorities.</li> </ul>	<p>Contractor</p>	<p>Contract with authorized legal/physical entities.</p>
<p>Rehabilitation</p>	<p><i>Noise and vibrations</i> from construction activities</p>	<ul style="list-style-type: none"> <li>- Limit activities to daylight working hours,</li> <li>- Turning off the engines of vehicles and construction machinery when they are not in use,</li> <li>- Maintenance of vehicles and construction mechanization in a technically correct condition.</li> </ul>	<p>Contractor</p>	<p>Control of technical features of the construction mechanization.</p>
<p>Rehabilitation</p>	<p>Biodiversity</p>	<ul style="list-style-type: none"> <li>- Using technically correct and regularly controlled and serviced construction mechanization, and use of adequate fuels;</li> <li>- Localization of movement for workers within the scope of the construction site in order to avoid disturbance of the local flora and fauna;</li> <li>- Cleaning of the existing culverts of the</li> </ul>	<p>Contractor</p>	<p>/</p>



		<p>section for their uninterrupted use from the representatives of fauna;</p> <ul style="list-style-type: none"> <li>- Prohibition to light a fire;</li> <li>- Compliance with the regulations for waste management and proper storage of waste.</li> </ul>		
<p><b>a</b></p> <p>Rehabilitation</p>	<p><i>Worker's health and safety</i></p>	<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 RNM" No.92/07),</li> <li>- Health and safety training for the engaged personnel.</li> </ul>	<p>Contractor</p>	<p>/</p>

**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
<b>Traffic safety</b> Safety during rehabilitation activities	Existence of Traffic Management Plan	On project site;	Visual inspection	During rehabilitation phase	Contractor Supervision Engineer
<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
<b>Air pollution</b> (fugitive emission of dust, emission of exhaust gases from construction mechanization)	Exhaust fumes, Dust	On project site;	Measurement of PM10 on representative roadside receptors at the, by the authorized company Tehnolab DOO Skopje	During rehabilitation phase	Contractor Supervision Engineer
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 phase	Contractor Supervision Engineer

<b>Waste generation</b> (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
<b>Noise and vibrations</b>	Noise levels	On project site;	Nosie measurement on representative roadside receptors at the, by the authorized company Tehnolab DOO Skopje	Selection of measurements points near sensitive receptors	Licensed company
<b>Material transport</b>	Truck load covered	On project site;	Visual inspection	During rehabilitation activities	Contractor Supervision Engineer
<b>Road safety</b> (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 Shtip - Radovis 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.

Roles and responsibilities for implementation of Environmental and Social Management and Monitoring Plan (ESMMP) are given in Table 10.

**Table 10 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 Environmental Protection and Social Aspects Unit (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 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 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</p>



Company/Unit	Responsibilities
<b>Contractor</b>	<p>submitted to the Bank.</p> <p>Based on the approved ESMMP, the Contractor will be responsible for establishing a CESMP 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, labour 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 CESMP requirements and the environmental specifications.</p>
<b>Supervision Engineer</b>	<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 CESMP. 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>
<b>Ministry of Environment and Physical Planning (MOEPP)</b>	<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 No.1**

## **Ambient air quality and noise measurements report**



## ТЕХНОЛАБ доо Скопје

Екологија, безбедност и заштита при работа, технологија, природа

ЛАБОРАТОРИЈА ЗА ЕКОЛОШКИ ИСПИТУВАЊА И БЕЗБЕДНОСТ ПРИ РАБОТА

П.фах 827; Бул. К. Ј. Питу бр. 28/3 лок. 24, Скопје; тел/факс: 02 2 448 058; 070 384 194  
www.tehnolab.com.mk; e-mail: tehnolab@tehnolab.com.mk

Друштво за технолошки, лабораториски испитувања,  
проектирање и услуги

ТЕХНОЛАБ доо - Скопје

ПРИМЕНО:	15.05.2019		
Орг. ед.	Број	Прилог	Врста
08	351/1		



### Лабораториски Извештај бр. 125/19

од извршени мерења на квалитет на амбиентен воздух и ниво на бучава по  
должина на делница Штип – Радовиш  
"СТРАБАГ" АГ, Подружница СТРАБАГ Скопје

ИЗРАБОТУВАЧ:

"ТЕХНОЛАБ" доо СКОПЈЕ

Директор

М-р Магдалена Трајковска Трпеска дипл. хем. инж.





## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



**Нарачател:** "СТРАБАГ" АГ, Подружница Страбаг Скопје

**Адреса:** ул. Мирче Ацев бр.2 Скопје

**Лице за контакт:** Велибор Поповиќ

**Датум на извршени мерења:** 02.04.2019 год.

**Мерењата ги извршија:** Александар Милорадовиќ дипл. инж. по заш. на жив. сред  
Даниел Петковски дипл.маш.инж.

**Датум на вршење на анализа:** 04.04.2019 год.

**Датум на обработка на податоците:** 10.04.2019 год.

**Датум на издавање на извештајот:** 12.04.2019 год.

**Одговорен:**

Даниел Петковски дипл.маш.инж.

**Проверил:**

Елена Трпчевска дипл. инж. тех.

**Одобрува:**

М-р Магдалена Трајковска Трпевска дипл. хем. инж.

Број на копии: 6

Број на копија: 2

Број на страни: 11



## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



### СОДРЖИНА

1.0. ВОВЕД .....	4
2.0. МЕТОДОЛОГИЈА, МЕРНИ МЕСТА И ИНСТРУМЕНТИ ЗА ИЗВЕДУВАЊЕ НА ИСПИТУВАЊА .....	5
3.0. РЕЗУЛТАТИ ОД ИЗВРШЕНИ СНИМАЊА И АНАЛИЗИ .....	10

### СЛИКИ

1. Слика бр. 1: Инструмент за мерење на бучава Cirrus тип CR:161C .....	5
2. Слика бр. 2: Инструмент за мерење на фракција на суспендирани цврсти честички (ЦЧ10).....	6
3. Слика бр. 3: Аналитичка вага Sartorius CPA-225D-ОСЕ.....	7
4. Слика бр. 4: Локација на местото каде се извршени мерења на концентрација на фракција ЦЧ10 на суспендирани цврсти честички и мерења на ниво на бучава во животна средина.....	8

### ТАБЕЛИ

1. Табела бр. 1: Резултати од извршени мерења на бучава.....	9
2. Табела бр. 2: Резултати од извршени мерења на квалитет на амбиентен воздух.....	10





## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



### 1.0. ВОВЕД

Врз основа на барање од од фирмата "СТРАБАГ" АГ подружница Скопје, "Технолаб" доо Скопје како акредитирана лабораторија за еколошки испитувања и безбедност при работа, превзеде обврска да изврши мерење на концентрации на цврсти честички ЦЧ10 во амбиентниот воздух и нивото на бучава во животна средина на делница Штип – Радовиш.

Методолошкиот приод за мерење на нивото на бучава и концентрации на цврсти честички ЦЧ10 во амбиентниот воздух се прикажани во поглавје 2.0. и 3.0.

Резултатите од снимањата и анализите се дадени во Поглавје 4.0.

Резимето од испитувањата е дадено како мислења и толкувања од резултатите добиени од извршените мерења и анализи во животната средина и истите не се дел од опсегот на акредитација.



## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



### 2.0. МЕТОДОЛОГИЈА, МЕРНИ МЕСТА И ИНСТРУМЕНТИ ЗА ИЗВЕДУВАЊЕ НА ИСПИТУВАЊА НА БУЧАВА ВО ЖИВОТНА СРЕДИНА

Методолошкиот приод за мерење на нивото на бучава го дефинира начинот на одредување на нивото на звучен притисок преку директно мерење со цел да се направи проценка на бучавата во животната средина согласно методата МКС ISO 1996-2:2018.

Мерењето на нивото на бучава во животна средина е реализирано во согласност со методата МКС ISO 1996-2:2018 Акустика - Опис, мерење и оценка на бучава во животната средина - Дел 2: Одредување на нивоата на бучава во животна средина.

При мерење на нивото на бучава потребно е да се дефинираат следните чекори:

- изборот и бројот на мерни места (локација),
- времетраење на мерењето,
- избор на инструменти за мерење.

Мерењата се вршени со калибриран инструмент за мерење бучава Cirrus тип CR:161C кој се подесува со калибриран звучен калибратор Cirrus тип CR:515



Слика бр. 1: Инструмент за мерење на бучава Cirrus тип CR:161C



## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



### 3.0. МЕТОДОЛОГИЈА, МЕРНИ МЕСТА И ИНСТРУМЕНТИ ЗА ИЗВЕДУВАЊЕ НА ИСПИТУВАЊА НА КВАЛИТЕТ НА АМБИЕНТЕН ВОЗДУХ

Методологијата која беше применета при изведување на мониторингот на квалитетот на амбиентниот воздух е во согласност со барањата наведени во применетите стандарди и референтни методи.

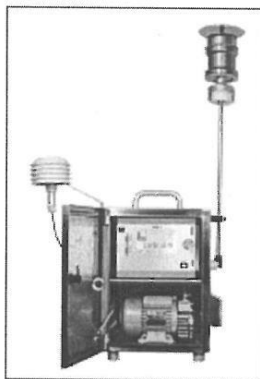
Изборот на мерните места е направен од страна на стручни лица на "Технолаб" во соработка со стручни лица од Страбаг АГ, Скопје. Избрани се две локации по должина на патот Штип – Радовиш. Местоположбата на мерните места се прикажани на Слика бр. 4.

Опремата, уредите и инструментите за мерење и земање примероци за мониторинг на квалитетот на амбиентниот воздух се во согласност со барањата наведени во применетите стандарди и референтни методи.

Во наведениот период беа извршени мерења на суспендирани цврсти честички во воздухот, фракција ЦЧ10 (PM10).

Одредувањето на концентрацијата на цврсти честички во воздухот, фракција ЦЧ 10 (PM10) е извршена согласно стандардот МКС EN 12341:2014 - Амбиентен воздух - Стандардна метода на гравиметриско мерење за одредување на ЦЧ10 (PM10) или ЦЧ2,5 (PM2,5) масена фракција од суспендираните цврсти честички.

Земањето мостри е вршено со употреба на инструмент Comde derenda LVS 3.1 (Слика бр. 2).



Слика бр. 2: Инструмент за мерење на фракција на суспендирани цврсти честички (ЦЧ10) - Comde derenda LVS



## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



Составни делови на инструментот се:

- Глава/сепаратор за мострирање (за честички со големина до 10 микрометри) снабдена со покривка за заштита на аспирирачкиот отвор од дожд и снег,
- држач за филтер и филтер,
- сонда за поврзување на главата и држачот за филтер со системот за контрола на протокот (пумпа),
- Метеоролошка станица,
- Софтверски дел за снимање на податоците,
- Опрема за промена на филтри,
- Опрема за складирање на филтрите.

Земањето мостри е вршено со проток од  $2,3 \text{ m}^3/\text{h}$  ( $38,3 \text{ l/min}$ ), на кружен филтер (тип Micro quartz fibre со ефикасност на одвојување  $\geq 99,5$  за честички со пречник од  $0,3 \mu\text{m}$ ) со дијаметар од  $47\text{mm}$ , во текот на номинален период на мострирање од  $24\text{h}$ .

Волуменот на земениот воздух е сведен на референтни услови ( $293 \text{ }^\circ\text{K}$  и  $101,3 \text{ kPa}$ ).

Одредувањето на концентрација на ЦЧ10 и ЦЧ2,5 (PM10 и PM2,5) е со гравиметриска метода, согласно препораките дадени во стандардот MKC EN 12341:2014.

За одредување на масата на филтрите користена е аналитичка вага Sartorius CPA-225D-OCE, I класа со мерен опсег до петта (5) децимала (Слика бр. 3).



Слика бр. 3: Аналитичка вага Sartorius CPA-225D-OCE

Интерпретација на добиените резултати е во согласност со Уредбата за гранични вредности за нивоа и видови на загадувачки супстанции во амбиентниот воздух и прагови на алармирање, рокови за постигнување на граничните вредности, маргини на толеранција за гранична вредност, целни вредности и долгорочни цели (Сл. Весник на РМ бр. 50/2005 год.).



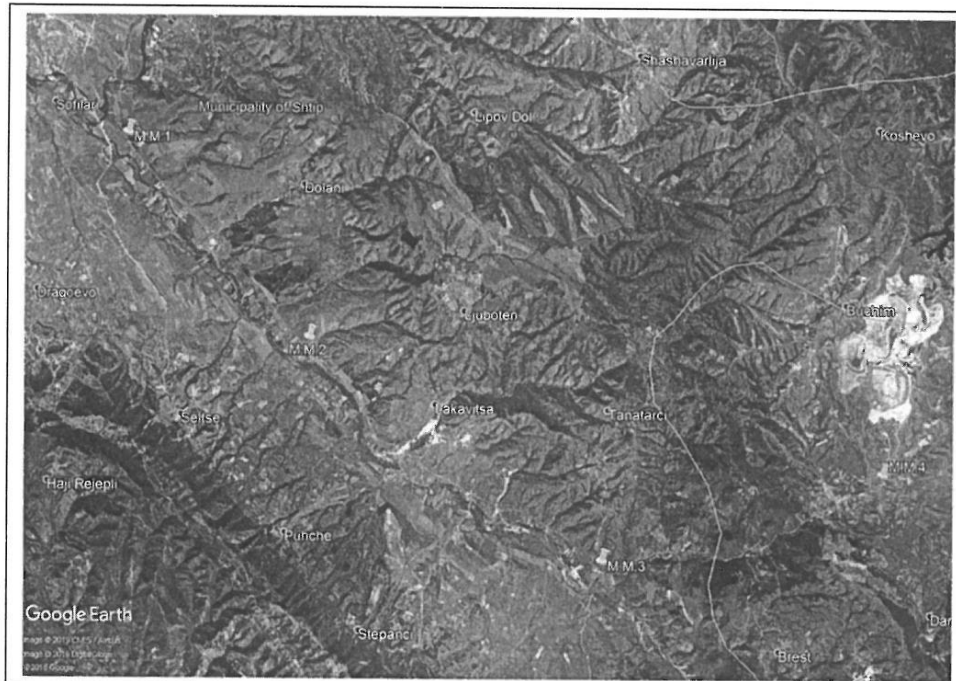


## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



Местата на кои е извршено мерењето се прикажани на слика бр. 4.



Слика бр. 4: Локација на местото каде се извршени мерења на концентрација на фракција ЦЧ10 на суспендирани цврсти честички во амбиентниот воздух и ниво на бучава во животна средина





## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



### 4.0. РЕЗУЛТАТИ ОД ИЗВРШЕНИ СНИМАЊА И АНАЛИЗИ

Табела бр.1 : Резултати од извршени мерења на бучава

Објект	"СТРАБАГ" АГ, Подружница Страбаг Скопје делница Штип - Радовиш						
Дата и време на мерење	02.04.2019 год. 11 <sup>00</sup> h						
Метода на мерење	ME 10.6, MKC ISO 1996-2:2018						
Инструмент	Cirrus CR 161		Калибратор		CR 515		
Период на мерење	Ден 07 <sup>00</sup> - 19 <sup>00</sup>						
Време на одзив	брзо						
Метеоролошки услови							
Брзина на ветар [m/s]			Температура [°C]			Влажност [%]	
1,39			17,4			36	
N <sup>o</sup>	Мерно место	Географски координати	Теренска ознака	LAeq	Гранична вредност* LAeq	LAmax	Гранична вредност LAmax
				[dBA]	[dBA]	[dBA]	[dBA]
1.	М.М. 1	N 41.70207 E 22.15512	A1 125/19	69,97	60,00	87,00	110,00
2.	М.М. 2	N 41.66280 E 22.20269	A2 125/19	71,37	60,00	84,80	110,00
3.	М.М. 3	N 41.62083 E 22.27822	A3 125/19	66,49	60,00	81,50	110,00
4.	М.М. 4	N 41.63729 E 22.34908	A4 125/19	64,82	60,00	76,80	110,00

\*Реон изложен на интензивен патен сообраќај

М.М.1 – 100m од почеток на делница и 45m од приватна куќа на источна страна

М.М.2 – 74m од објект на источна страна и 40m од приватен објект на јужна страна.

М.М.3 – 25m од крстосница, 37m од југоисточна страна

М.М.4 – 100m од објект на југоисточна страна, 16m од крстосница



## ТЕХНОЛАБ доо Скопје

Лабораторија за еколошки испитувања и безбедност при работа



Табела бр.2 : Резултати од извршени мерења на квалитет на амбиентен воздух

Објект	"СТРАБАГ" АГ, Подружница Страбаг Скопје				
Тело одговорно за станиците	„ТЕХНОЛАБ“ ДОО Скопје				
Мерно место - М.М.1	Во близина на винарија				
Мерно место - М.М.2	Во близина на патот за с.Љуботен				
Мерно место - М.М.3	Во близина на патот за с.Лесковица				
Мерно место - М.М.4	Во близина на рудникот Бучим				
Вид на мерна станица	Сообраќајна				
Цел на станицата	Локална				
Географски координати	N 41,70207; E 22.15512 N 41,66280; E 22.20269 N 41,62083; E 22.27822 N 41,63729; E 22.34908				
Надморска височина	257m, 293m, 339m и 443m				
Вид на зона	Рурална				
Карактеризација на зоната	Станбена, земјоделска, природна				
Главни извори на емисија	Патен сообраќај				
Дата на извршени мерења	02.04.2019 год.				
Загадувачки супстанции кои се мерени	Суспендирани цврсти честички во воздухот со големина до 10 микрометри (ЦЧ10)				
Метеоролошки услови во периодот на вршење на мерењата					
Дата на мерење	Просечна температура [°C]	Просечна влага [%]	Атмосферски притисок [hPa]	Брзина на ветер [m/sec]	Врнежи [да/не]
02.04.2019 год.	9,70	36,2	996	1,39	не
02.04.2019 год.	10,50	35,4	996	1,80	не
02.04.2019 год.	10,10	36,5	996	2,11	не
02.04.2019 год.	10,90	35,8	996	1,57	не
Резултати од извршени мерења на концентрација на суспендирани цврсти честички во воздухот со големина до 10 микрометри (PM10)					
Опрема за мерење	Инструмент Comde derenda LVS 3.1				
Метода	МКС EN 12341:2014				
Аналитички принцип	Гравиметриска метода				
Загадувачка супстанција	Суспендирани цврсти честички во воздухот со големина до 10 микрометри (PM10)				
Мерно место	Теренска ознака	Лабораториска ознака	Измерена вредност [µg/m <sup>3</sup> ]	Гранична вредност [µg/m <sup>3</sup> ]*	
М.М.1	A1 125/19	11 125/19	44,79	50,00	
М.М.2	A2 125/19	12 125/19	40,84	50,00	
М.М.3	A3 125/19	13 125/19	36,53	50,00	
М.М.4	A4 125/19	14 125/19	49,70	50,00	

24-часовна гранична вредност за заштита на човековото здравје

**Забелешка:** Резултатите прикажани во овој извештај важат само за условите и режимот на работа за време на вршење на мерењата. Умножувањето на овој извештај е дозволено само како целина. Делови од овој извештај несмеат да се умножуваат без писмено одобрение од "ТЕХНОЛАБ" доо, Скопје.

- КРАЈ НА ИЗВЕШТАЈОТ -

## **Appendix No.2 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:

## **Appendix No.3**

# **Subject section on the overview map**



