



**ENVIRONMENTAL AND SOCIAL  
MANAGEMENT PLAN FOR THE  
PROJECT OF THE IMPROVEMENTS  
OF THE TUNNEL “VRANDUK II” AND  
BRIDGE OVER BOSNA RIVER  
“BOSNA IV”**

November, 2017

## Table of Contents

EXECUTIVE SUMMARY.....	5
1. INTRODUCTION .....	10
2. METHODOLOGY AND OBJECTIVES OF ESMP .....	11
3. LOCATION DESCRIPTION .....	12
3.1. Traffic data .....	13
4. PROJECT DESCRIPTION .....	15
4.1. EXISTING TUNNEL CHARACTERISTICS .....	15
4.2. NEW DESIGN.....	16
4.3. EXISTING BRIDGE CHARACTERISTICS.....	17
4.3. NEW DESIGN.....	19
5. BASELINE OF PARTICULAR INTEREST.....	21
5.1. GEOGRAPHIC CONDITIONS .....	21
5.2. CLIMATE FEATURES.....	22
5.3. AIR QUALITY .....	23
5.4. WATER AND WATER QUALITY.....	24
5.5. NOISE LEVELS .....	25
5.6. LAND AND LAND USE .....	26
5.7. FLORA AND FAUNA .....	26
5.8. PROTECTED AREAS.....	27
5.9. POPULATION AND SETTLEMENTS .....	27
6. DESCRIPTION OF POSSIBLE IMPACTS DURING PRE-CONSTRUCTION CONSTRUCTION, OPERATION AND MAINTENANCE .....	29
6.1. IMPACTS DURING PRE-CONSTRUCTION .....	29
6.2. IMPACTS DURING CONSTRUCTION .....	30
6.3. IMPACTS DURING OPERATION AND MAINTENANCE.....	34
6.4. POSITIVE IMPACTS .....	35
6.5. Enhancement measures.....	36
7. MITIGATION MEASURES.....	37
7.1. MITIGATION MEASURES IN PRE-CONSTRUCTION PHASE .....	38
7.1.1. Contractor Management.....	38
7.2. MITIGATION MEASURES IN CONSTRUCTION PHASE .....	40
7.2.1. Environmental Management .....	40
7.2.2. Health and Safety .....	41

PC Roads of FBH	November 2017
7.2.3. Traffic and Road Safety .....	44
7.2.4. Construction Site Safety .....	48
7.3. MITIGATION MEASURES IN OPERATIONAL PHASE .....	48
7.4. SUMMARY OF MITIGATION MEASURES.....	49
8. ENVIRONMENTAL MONITORING PROGRAM .....	58
9. IMPLEMENTATION AND REPORTING .....	64
9.1. PROJECT IMPLEMENTATION .....	64
9.2. REPORTING PROCESS .....	64
9.2.1. Contractor to PC Roads FBH.....	64
9.2.2. Supervision Engineer to PC Roads FBH .....	65
9.2.3. PC Roads FBH to WB .....	65
10. PUBLIC DISCUSSION AND INFORMATION DISCLOSURE .....	66
10.1. PUBLIC CONSULTATION .....	66
10.2. INFORMATION DISCLOSURE .....	66
10.2.1. Grievance Mechanisms .....	66
11. Requirements for start of works .....	68
APPENDICES.....	69
APPENDIX 1. GRIEVANCE FORM.....	70
APPENDIX 2. GRIEVANCE REGISTRATION TEMPLATE TABLE.....	71
APPENDIX 3. REPORT ON PUBLIC DISCUSSION .....	72

## LIST OF FIGURES

Figure 1: The geographical location of the project.....	12
Figure 2: Lookup Map of Wider Area with the Project Location .....	13
Figure 3: AADT in 2015.....	14
Figure 4: Normal cross section of the reconstructed profile.....	17
Figure 5: Normal cross section of the exiting bridge .....	19
Figure 6: Normal cross section of the new design.....	20
Figure 7: Geographical Map of Wider Area with the Project Location .....	21
Figure 8: Geologic Map of the wider area of the Project .....	22
Figure 9: Hydrographic Map of the wider area of the Project.....	25
Figure 10: Land use in the wider area of the project according to CORINE model .....	26
Figure 11: location of the project bridge and tunnel.....	28
Figure 12: Location of land plot nr. 3506/6, 3506/8 .....	29
Figure 13: Location of land plot nr. 3496/1.....	30

Figure 14: Location of land owned by the invest that can be used for lodging machinery and materials .....	33
Figure 15 (a,b): Photographs made during the walkover survey on November 9 <sup>th</sup> , 2017 .....	34
Figure 16: Tunnel on the alternative bypass route1.....	44
Figure 17: Possible alternative routes .....	45

## LIST OF TABLES

Table 1: Traffic prognosis for M17, section Nemila- Junction Donja Gračanica .....	14
Table 2. Average temperature and precipitation for the multi-year period.....	23
Table 3: Numbers of daily exceedances of tolerant and limit values of SO <sub>2</sub> and TSP at the monitoring station „Tetovo“ (2006. – 2015.).....	23
Table 4. Overview of average air pollution data for monitoring station “Tetovo” in the period of 2006. – 2015. ....	24
Table 5: Enhancement measures .....	36
Table 6: Environmental and Social Impacts Management Plan.....	49
Table 7: Environmental and Social Monitoring Program.....	59

## LIST OF ABBREVIATIONS

<i>BH</i>	- <i>Bosnia and Herzegovina</i>
<i>CFD</i>	- <i>Central Feedback Desk</i>
<i>CSOP</i>	- <i>Construction Site Organization Plan</i>
<i>EIB</i>	- <i>European Investment Bank</i>
<i>EIA</i>	- <i>Environmental Impact Assessment</i>
<i>EMP</i>	- <i>Environmental Monitoring Program</i>
<i>ESMF</i>	- <i>Environmental Social Management Framework</i>
<i>ESMP</i>	- <i>Environmental and Social Management Plan</i>
<i>EP</i>	- <i>Environmental Permit</i>
<i>FBH</i>	- <i>Federation of Bosnia and Herzegovina</i>
<i>FMoET</i>	- <i>Federal Ministry of Environment and Tourism</i>
<i>IFI</i>	- <i>International Financial Institutions</i>
<i>MP</i>	- <i>Main project</i>
<i>MPCA</i>	- <i>Management Plan in Case of Accidents</i>
<i>OP</i>	- <i>Operational Policy of the World Bank</i>
<i>PAP</i>	- <i>Project Affected Person</i>
<i>PPE</i>	- <i>Personal Protective Equipment</i>
<i>PCRoadsFBH</i>	- <i>Public Company Roads of the Federation of Bosnia and Herzegovina</i>
<i>RAP</i>	- <i>Resettlement Action Plan</i>
<i>RPF</i>	- <i>Resettlement Policy Framework</i>
<i>TD</i>	- <i>Tendering Documentation</i>
<i>TMP</i>	- <i>Traffic Management Plan</i>
<i>WB</i>	- <i>World Bank</i>
<i>WMP</i>	- <i>Waste Management Plan</i>
<i>AEHS</i>	- <i>Annual Environmental Health and Safety</i>

## EXECUTIVE SUMMARY

### INTRODUCTION AND OBJECTIVES OF ESMP

*This Project of the Improvements of the tunnel "Vranduk II" and bridge over Bosna River "Bosna IV" (the Project) for which this ESMP is developed, is one of the sub-projects under the FBH Road Sector Modernization Project co-financed by the WB and EIB. Improvements of the tunnel "Vranduk II" and bridge over Bosna River "Bosna IV", on the road M-17, section Topčić polje – Lašva 0, is screened as a category B project according to the Operational Policies (OP 4.01 on Environmental Assessment) of the WB as well as the screening procedure outlined in the project-specific ESMF. As such, this activity needs to have an ESMP developed, whereas pursuant to the local legislation this project does not require a water permit, an environmental assessment or an environmental permit - whether federal or cantonal. PC Roads FBH will ensure all required local permits for this Project are obtained.*

### LOCATION AND TRAFFIC DESCRIPTION

The tunnel "Vranduk II" and bridge over Bosna River "Bosna IV" is situated on the main traffic direction of Zenica city, on the major road M-17, section Topčić polje – Lašva 0. The nearest relevant traffic count device is located in Donja Golubinja 10 km north from the project tunnel and bridge and it shows the AADT for 2015 equals 8621.

### PROJECT DESCRIPTION

The tunnel «Vranduk 2», was built in 1973 at the Main Road M17, section Doboj – Zenica, at the stretch known as Canyon Vranduk. Hydrogeological conditions of the massif through which the tunnel leads are extremely unfavorable. The total length of the tunnel is 1062m. In major part the tunnel is located in circular curve with  $R=1000,0$  m radius. The exit part leading towards Zenica lies straight. Level line gradient is ascending towards milepost i.e. from entrance to the exit with average gradient of 0,6534%. Terms of Reference dictate coming up with apt and optimal solutions, especially considering the following:

- Ensuring the required traffic profile,
- Placement of permanently high-quality roadway,
- Protection of usable surface from underground water,
- Ensuring favorable stability conditions, and
- Overview and proposal of manner and conditions of rehabilitation realization

The bridge over river Bosna (M17) is located at the road M17 border with R Croatia –B. Šamac — Sarajevo – Čapljina – border R Croatia, at section Doboj – Zenica - Lašva, milepost km 63+795. The Bridge Design was compiled by PZ "Traser" Sarajevo, and it was actually constructed in 1973 by "ŽGP" Sarajevo, OOUR „Gradnja“ Zenica. At the existing bridge, road axis is located in the curve with level line ascending by 0.28%. Roadway width at the bridge is 2\*3.5 m with border lines of 2\*0.35 m and safety line of 2\*0.5 m, and with bilateral service

passages 2\*0.70 m. Service passages are enclosed by elastic buffer railing 0,22 m wide and safety railing with cornice 28 cm wide. Total width of the bridge is B=11.10 m. Cross gradient of the roadway towards the bridge is variable and ranges from  $i=1,5\%$  to  $i=4,88\%$ .

Basic reconstruction of the bridge implies continuation of spanning structure i.e. transforming string of simple beams into continual support in order to form one continuous structure with four spans and other structure with independently rested RC slab (static system of the structure above local road shall remain unchanged) with expansion joint above middle pier No.5. continuation of spanning structure will be achieved by additional roadway slab placed at the upper surface of the existing spanning structure 12,5 cm thick, and by placing additional slab within the zone of middle pier at the level of lower flange 15 cm thick and by creating new crossmembers at middle piers. Prior to concreting this new part of roadway slab, it is necessary to remove protective concrete layer from upper surface of the slab and from prestressed supports. Negative bending moment above middle supports in roadway slab is neutralized by concrete steel RA 400/ 500-2. By continuing spanning structure RC joints at middle piers are cancelled, the same spots which represent weak points allowing water to penetrate and to disintegrate structure. By the same token, solidity of spanning structure is increased and deformations are minimised.

#### **BASELINE OF PARTICULAR INTEREST**

The terrain of the Project is mostly with an attitude in the range from 200 to 400 meters above sea level. It can be said that this area is mostly under the influence of the humid continental climate, with smaller areas under the influence of the subalpine and alpine climate. The nearest monitoring station is located in Tetovo in Zenica, about 7 kilometers south from the tunnel Vranduk II and bridge over Bosna. The following pollutants are measured at this monitoring station: sulfur dioxide ( $SO_2$ ), and total suspended particles (TSP). The bridge "Bosna IV" stretches over the Bosna River. The river Bosna is the third longest river in Bosnia and Herzegovina, and is considered one of the country's major internal rivers. The Bosna River also makes up the Bosna River Valley, the country's industrial center and home to close to a million people. In close proximity to the Project area, there are no facilities for residential purposes (houses) and business purposes (stores). According to the Law on Noise Protection, they fall under the sixth zone, where allowed noise levels are 70 dBA during day and 70 dBA at night. There are no sensitive receptors (hospitals, health resorts etc.) around the area that could be impacted by an increased noise level. The dominant purpose of the surrounding area is forest and agriculture, and in the immediate vicinity of the tunnel and bridge we cannot find residential or business facilities *according to the CORINE methodology*. The location of the Project is not located within a protected area. The nearest National monument is the Old Town Vranduk, located approximately 350 meters of air distance from the southern entrance into the tunnel.

The city of Zenica has a population of 110.663 people who live in the area of 558,50 km<sup>2</sup>. The population density equals 198,1 people per km<sup>2</sup> which makes it one of the densest

populated municipalities in FBH. The location of the project tunnel is uninhabited in a radius of 300 m, while the location of the project bridge is not populated in a radius of 1km. The project is located on the western part of the Zenica-Doboj canton and presents the fastest and most convenient connection between Zenica and Doboj the two largest cities in the canton. Based on the above said the importance of the project for local population is immense. Being situated on one of the most important main roads in FBH, the M17, the tunnel and the bridge are the fastest and most convenient way for inhabitants of the northern part of the Canton (towns Žepče, Maglaj, Tešanj, Doboj) to reach the cantonal capital and administrative, educational and health center of the region as well as one of the biggest cities in FBH Zenica. The project has huge importance for transit traffic too, being the fastest and most adequate connection of the southern part of the country to the Bosnian-Croatian border on the river Sava. In the direct vicinity of the entrance to the project tunnel works for the construction of the Hydropower plant Vranduk have started. It has been detected that the works are on standstill because of a dispute between the Investor (Elektroprivreda BH) and the Contractor.

### **IMPACTS DURING PRECONSTRUCTION**

**Socio economic impacts:** No permanent land acquisition of private land or resettlement will occur in this project.

### **IMPACTS DURING CONSTRUCTION**

**Impact on traffic safety and traffic flow:** Complete traffic stoppage over the Project Bridge and Tunnel is planned during the entire time of construction works. Thus temporary bypasses on existing regional road R4013 and a nearby local road will be made available.

The main impacts associated with the construction works include: emissions from the machinery used on site, dust generation from works, potential increases in noise and vibration levels, impact on soil and water from accidental leaks and spills and safety impacts. The contractor is bound by the provisions of this ESMP to conduct a baseline of the biological and natural resources specific to the site, and to adapt the measures of the ESMP and their work performance based on such findings.

**Socio-economic impacts:** At this time, it is not expected that it will be necessary to temporarily occupy any privately owned land plots for lodging machines and disposal of materials. Machines and materials will be disposed on land owned by the Investor. However, if additional temporary occupation of private land is needed during construction activities, this will be agreed upon with respective land owners and compensation will be paid in accordance with provisions determined in the RPF before the land is accessed. New business opportunities are expected to be created for local businesses such as transporters, suppliers and other service providers. This impact is considered to be short-term and small

Following adverse impacts on living conditions during construction are expected: noise increase, construction waste disposal, short-term disruptions of utilities. On November 9th, 2017 social specialist of the Project Implementation Team (PIT) conducted a walkover survey on the location of the Project Tunnel (Vranduk) and the Project Bridge (bridge over river Bosna, bridge IV).. It has been noted that public land plots required for temporarily storage of machines and materials are not being used in any way, neither formal nor informal, and do not require clearance.

### **MITTIGATION MEASURES**

The mitigation measures focus on the major identified impacts during works, such as emissions from the machinery used on site, dust generation from works, potential increases in noise and vibration levels, impact on soil and water from accidental leaks and spills and safety impacts, waste management, impacts on living conditions, temporary occupation and restrictions on land use, impacts on local traffic.

### **ENVIRONMENTAL MONITORING PROGRAM**

The monitoring measures focus on the major identified impacts during works, such as emissions from the machinery used on site, dust generation from works, potential increases in noise and vibration levels, impact on soil and water from accidental leaks and spills and safety impacts, waste management, impacts on living conditions, temporary occupation and restrictions on land use, impacts on local traffic.

### **IMPLEMENTATION AND REPORTING**

PC Roads FBH is the implementer of the project and will be responsible for the implementation and compliance of the project in line with ESMP. The Contractor will be responsible for the implementation of the environmental mitigation measures during construction.

### **PUBLIC DISCUSSION AND INFORMATION DISCLOSURE**

Public consultation of the subject ESMP was organized in Zenica (MZ Vranduk) after the WB approved the draft of the ESMP. The results of the public consultation are incorporated into the final ESMP. ESMP draft was available on the website of PC Roads ([www.jpcfbih.ba](http://www.jpcfbih.ba)) and on the website of the World Bank.

### **Grievance Mechanism**

PC Roads FBH will ensure and form a special Grievance Redress Mechanism in collaboration and direct involvement of the Zenica municipality. Grievance Redress Mechanism designed for this project is the Central Feedback Desk (CFD). All grievances will be archived in the register and assigned a number, and acknowledged within 3 working days. The CFD will make all reasonable efforts to address the complaint upon the acknowledgement of grievance. If the CFD is not able to address the issues raised by immediate corrective action,

a long-term corrective action will be identified. The complainant will be informed about the proposed corrective action and follow-up of corrective action within 14 working days upon the acknowledgement of grievance.

### **Requirements for start of works**

The Contractor shall establish all required baseline data before the commencement of works (air quality data, surface water quality data, soil quality data, survey of the site for any endangered and endemic species and other environmental issues in zone of corridors of direct and indirect impacts).

The Contractor shall develop a Construction Site Organization Plan (CSOP) that is made up of a Implementation Plan of this ESMP, a detailed Waste Management Plan (WMP)], Study on Safety (includes Elaborate on Safety at Work and Elaborate on Protection From Fire and Explosions) and a Traffic Management Plan (TMP) must be developed, which will be created by the Contractor prior to the beginning of construction works.

## 1. INTRODUCTION

Based on the guidance and requirements from the Environmental and Social Management Framework (ESMF has been disclosed and available to the public in local language on the website of PC Roads FBH in March 2016., <http://jpcfbih.ba/bs/aktivnosti/modernizacija-magistralnih-cesta/38>), this site-specific Environmental and Social Management plan (ESMP) has been prepared.

The Public Company Roads of Federation of Bosnia and Herzegovina (further in the document PC Roads FBH) has initiated an overarching program for the project "Modernization of Major roads in the Territory of the Federation of Bosnia and Herzegovina" (The Program) to ensure appropriate road infrastructure by 2020. For this purpose, it has been requested from the Government of the FBH to ensure credit funds from international finance institutions (IFI).

In the framework of the abovementioned umbrella Program, the Public Company "Roads of FBH" (PC Roads FBH), a limited liability company wholly owned by the Government of FBH, has initiated the FBH Road Sector Modernization Project. FBH filed an application for a credit/loan from the European Investment Bank (EIB) and from the World Bank (WB) in total amount of 103,38 million EUR for funding abovementioned Project.

FBH Road Sector Modernization Project comprises several small and mid-sized investment schemes including:

1. This component includes reconstruction of roads:
  - Construction works for completion of the construction of major road M17.3 Neum–Stolac (in total 32,9 km);
  - Construction of third lanes for slow vehicles (in total 40 km on 8 sections of major roads);
  - Reconstruction of roadway, correction of axes (in total 18 km on 5 sections of major roads, where a correction of axes is to be done on one section only in the length of 1 km),
  - Reconstruction of 3 tunnels (with a total length of 1,86 km);
  - Reconstruction of 7 bridges (with a total length of 0,55 km).
2. Interventions on improving road safety: The reconstruction of intersections, which are classified as "black spots" on major roads, in total 9;
3. Institutional reforms: Road Management in the FBH with a particular focus on sustainability of investments and road safety;
4. Project Implementation Support: Construction supervision and capacity building of the PC Roads FBH.

*This Project of the Improvements of the tunnel "Vranduk II" and bridge over Bosna River "Bosna IV" (the Project) for which this ESMP is developed, is one of the sub-projects included in the first group of sub-projects co-financed by the WB and EIB.*

## 2. METHODOLOGY AND OBJECTIVES OF ESMP

*Improvements of the tunnel "Vranduk II" and bridge over Bosna River "Bosna IV", on the road M-17, section Topčić polje – Lašva 0, is screened as a category B project according to the Operational Policies (OP 4.01 on Environmental Assessment) of the WB as well as the screening procedure outlined in the project-specific ESMF. As such, this activity needs to have an ESMP developed, whereas pursuant to the local legislation in force this project does not require a water permit, an environmental assessment or an environmental permit - neither federal nor cantonal<sup>1</sup>. PC Roads FBH will ensure all required local permits for this Project are obtained*

This ESMP aims at identifying all of the potential environmental and social impacts associated with this project activity. As such, the ESMP includes mitigation measures for all identified potential impacts that are to be undertaken throughout the different phases of the project including preparation, implementation and operation of the facilities. The measures set forth in this ESMP are meant to avoid, neutralize or diminish adverse environmental and social impacts if not completely then to a satisfying level.

ESMP identifies feasible and cost-effective measures which can reduce potentially negative impacts on the environment and society to an acceptable level. If mitigation measures are not possible, profitable or sufficient, compensation should be included as the last measure.

In order to ensure the mitigation measures have been implemented, fully or partially, the ESMP sets forth a monitoring plan to be implemented during the specific stages of project preparation/designing and implementation. Monitoring during project preparation and implementation provides information on the key environmental and social aspects of the project, particularly on the environmental and social aspects of the project and efficiency of mitigation measures. Prior to commencement of works, in accordance with requirements of the ESMP, and a minimum of monitoring requirements, described in this ESMP, without limitation to these requirements, the Contractor shall prepare detailed list of mitigation measures and parameters to be monitored.

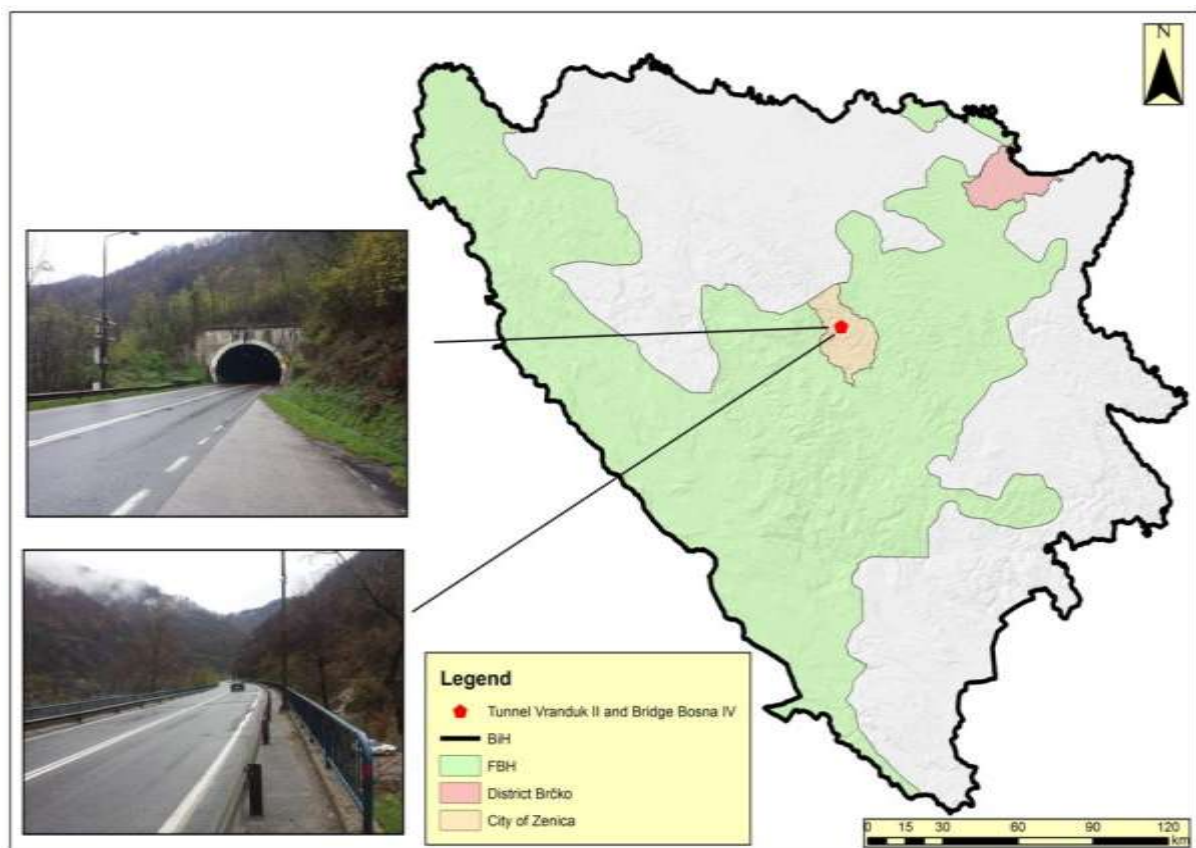
---

<sup>1</sup> In FBH investments requiring EIA are identified by the Regulation on Plants and Facilities Subject to Obligatory Environmental Impact Assessment, and Facilities Which May be Constructed and Commissioned Only if Granted Environmental Permit (Official Gazette of FBH No. 19/04). In Zenica-Doboj Canton investments requiring an EP are regulated by Regulation on Activities, Plants and Facilities Which May be Constructed only if Granted Environmental Permit (Official Gazette of Zenica-Doboj Canton, No. 14/13).

### 3. LOCATION DESCRIPTION

The tunnel "Vranduk II" and bridge over Bosna River "Bosna IV" is situated on the main traffic direction of Zenica city, on the major road M-17, section Topčić polje – Lašva 0. The reconstruction is positioned nearby and on the important traffic routes for Zenica, as well as for BH. The major road M-17 is a part of the south European route E73 connecting Central Europe i.e. Hungary and eastern Croatia to BH and the Adriatic sea in the area of the port of Ploče, and it is one the most important roads in the country.

*Figure 1: The geographical location of the project*



*Source: PC Roads Federation of BH (Pictures: November 2016)*

There are no public facilities located near the tunnel and bridge. This tunnel and the bridge is used by the local population, by tourist coming directly to the area, and it is used as a transit since it lies on the most important direction to the capital city of Sarajevo from the direction of the border crossing with Republic of Croatia in Bosanski Brod.

Figure 2 shows the location of the tunnel and bridge in a wider surrounding area on a topographical map.

Figure 2: Lookup Map of Wider Area with the Project Location



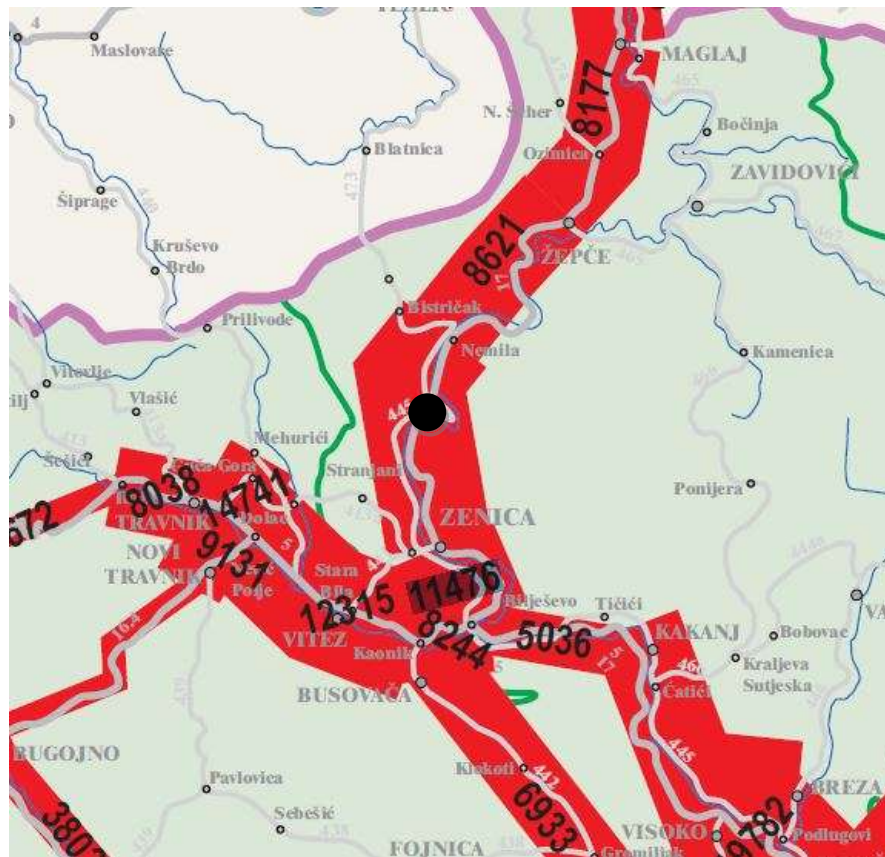
Source: PC Roads Federation of BH

### 3.1. Traffic data

PC Roads FBH has installed automatic traffic counting devices along the main traffic network throughout FBH. Automatic traffic counting is done since the 2005 and, last report<sup>2</sup> was published in 2016 with data for the previous year. The nearest relevant traffic count device is in Donja Golubinja, approximately 10 kilometers north from the project tunnel along the M17, and it shows that, in 2015, 8621 (Average Annual Daily Traffic-AADT) vehicles were passing daily (Figure 3). According to the Traffic count this number rises to 9611 vehicles a day in summer months (Average Summer Daily Traffic- ASDT).

<sup>2</sup> "Traffic count on major roads in Federation of BiH in 2015", PC Roads Federation BiH, Sarajevo 2016

Figure 3: AADT in 2015



Source: PC Roads FBH, 2016

By the request of PC Roads FBH, traffic prognosis for the traffic network was developed by IPSA Institute Sarajevo in 2014<sup>3</sup> for the period 2013 to 2040. Analyze of the traffic flow was made for every year by applying "equilibrium" procedure. The concerned tunnel and bridge have been analyzes trough the section Nemila- Junction Donja Gračanica. For this particular section, the amount of predicted annual average daily number of vehicles is shown in the *Table 1* below.

Table 1: Traffic prognosis for M17, section Nemila- Junction Donja Gračanica

Major road	Section name	AADT									
		2016	2018	2020	2022	2023	2025	2030	2035	2037	2040
<b>M17</b>	Nemila- Junction Donja Gračanica	10884	11732	1299	1377	1417	1503	1722	1944	2028	2016

Source: PC Roads FBH, 2014

<sup>3</sup> „Justification studstudy for modernization of major roads in FBiH programme“, IPSA Institute Sarajevo, 2014

Table 1 depicts an 85% decrease in the number of vehicles in year 2020. Reasons for such a rapid and sudden change in the AADT prognosis is the planned<sup>4</sup> built of the corridor Vc<sup>5</sup> and other alternative corridors which would lead to a decrease of vehicles on the project section. However, the need for reconstruction of the project tunnel and bridge is shown by the high current AADT and ASDT, as well as in the importance of the project section and the bad current condition of the tunnel and the bridge.

## 4. PROJECT DESCRIPTION

### 4.1. EXISTING TUNNEL CHARACTERISTICS

The tunnel «Vranduk 2», was built in 1973 at the Main Road M17, section Doboj – Zenica, at the stretch known as Canyon Vranduk. Hydrogeological conditions of the massif through which the tunnel leads are extremely unfavorable. The total length of the tunnel is 1062m.

Main Road M17 takes prominent place in main road network of Bosnia and Herzegovina, seeing rather heavy traffic, and thus needs to preserve its adequate and reliable condition.

The tunnel saw periodical, urgent interventions of different types, mainly without desired results. For example, (pursuant to unearthed project documentation -August 1987), visible damages to the tunnel were rehabilitated at ≈ 90,0 m from exit portal. Currently that very section is covered by dimpled membrane and is not available for inspection. At the entry part of the tunnel for the length of ≈150,0 m (from P-1 to P-30) dimpled membrane is placed. At the part of the tunnel with intensive water inflow (P20-P23), plastic pipes were placed. Dimpled membrane is also placed at the exit part of the tunnel as well in the length of ≈130,0 m. This particular intervention was performed in order to temporary protect the traffic profile from seepage water. In the course of tunnel inspections, it was not possible to remove this membrane so the paneling in calotte part at the tunnel sections in question could not be inspected.

Both construction technology and building materials production were such at the time of the tunnel construction that structure finally erected is constantly adversely affected by leaking of groundwater. Presence of water at the roadway makes this tunnel unsafe for traffic especially during cold periods when black ice forms. Apart from that, seepage water is conducive for formation of icicles on ceilings and abutments' sides which is also traffic

<sup>4</sup> according to the motorway in Corridor Vc; Feasibility Study

<sup>5</sup> Corridor Vc connects Kiev (Ukraine) with Adriatic sea through Lvov and Budapest (Hungary). It is consisted out of three parts and Vc is the part that follows European lane from Budapest (Hungary) to Ploče (Croatia), over Osijek (Croatia) and Sarajevo (BH). The longest part of the corridor Vc - 335 km passes through the territory of BH and it is laid on the most populated and most developed territory (over 50% of the BH population lives in 40 km range of the corridor Vc and earns over 60% GDP of the BH).

safety hazard. Additionally, freezing of water at the structures' surfaces (closer to clear spans) causes surface and at places, even structural destruction of basic mass especially in those sections where during construction no required quality was achieved.

In major part the tunnel is located in circular curve with  $R=1000,0$  m radius. The exit part leading towards Zenica lies straight. Level line gradient is ascending towards milepost i.e. from entrance to the exit with average gradient of 0,6534%.

Analysis of cross sections resulted in design of new axis and level lines in tunnel. In the vicinity of tunnel exist section, a bridge over the river Bosna is located which was reconstructed in 1991. Reconstruction of the bridge saw "rising" of level line for approx.15 cm. This explains the fact that thickness of asphalt at exit part of the tunnel is up to 30.0 cm.

## **4.2. NEW DESIGN**

Terms of Reference dictate coming up with apt and optimal solutions, especially considering the following:

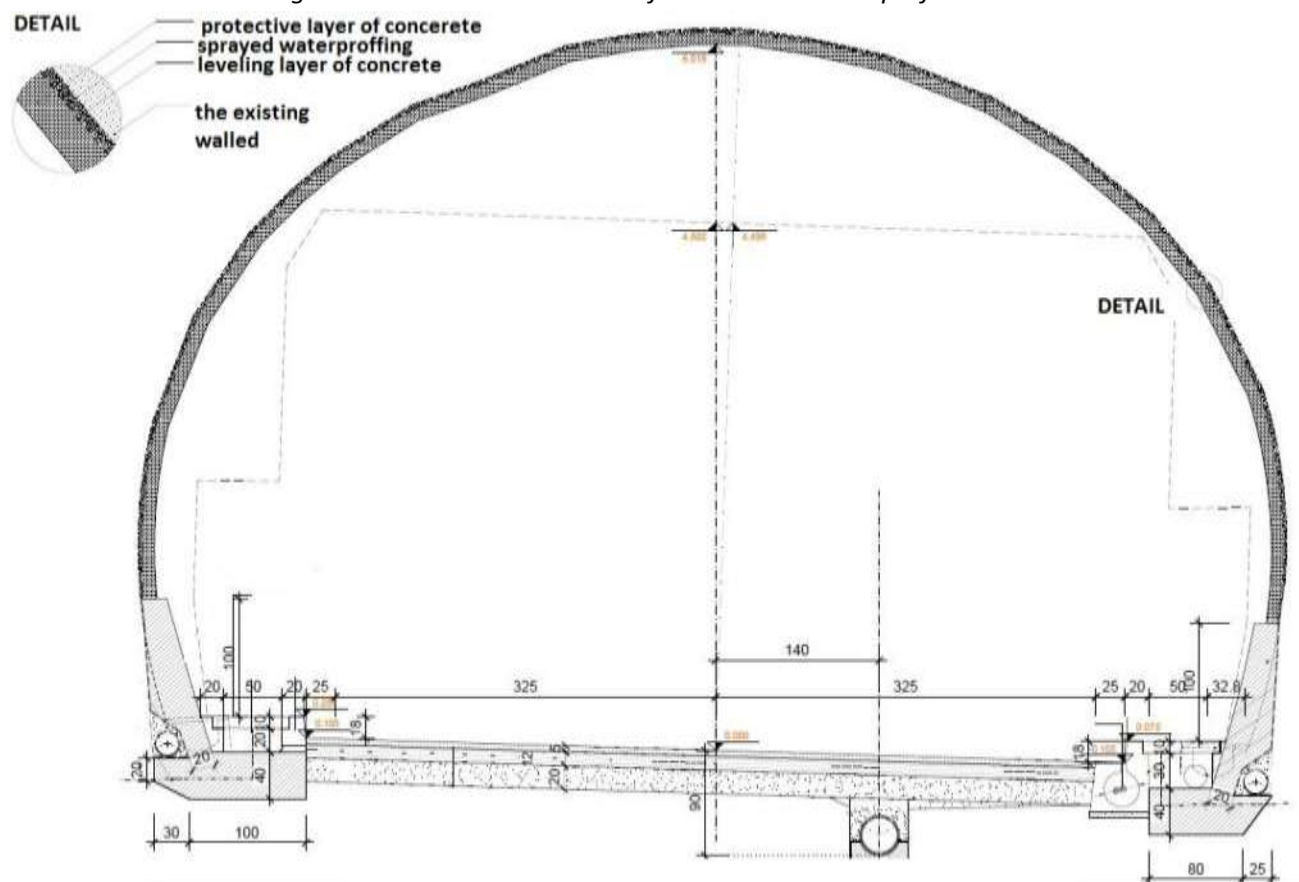
- Ensuring the required traffic profile,
- Placement of permanently high-quality roadway,
- Protection of usable surface from underground water,
- Ensuring favorable stability conditions, and
- Overview and proposal of manner and conditions of rehabilitation realization

The final goal being getting the structure in a condition in which all its functions will meet the level of modern tunnel structures constructed at the roads of the same class.

It is obvious that any activity intended for solving the issue at hand needs to have newly defined geometrical relationships between the road and the level line (compared to the existing state) established and to analyze conditions in which the designed concept can be realized.

Tunnel section is protected from seepage water by modern hydro insulation and appropriate drainage system. Designed drainage system is separate i.e. rock water inlet by system of lateral polypropylene drainage pipes  $\varnothing$  200 mm and the main drainage pipe of the collector  $\varnothing$  300 mm, via which water is exhausted from the tunnel. The proposed drainage system as a whole represents the modern way of accepting and draining water from the tunnel. It is envisaged that every visible water phenomenon is carried out by sealing foil to the height of the drainage concrete surrounding the lateral drainage tube and carried out in the side drainage pipes. It is envisaged to install a grease and oil separator in the tunnel.

Figure 4: Normal cross section of the reconstructed profile



Source: Main design; Divel Ltd; 2017.

#### 4.3. EXISTING BRIDGE CHARACTERISTICS

The bridge over river Bosna (M17) is located at the road M17 border with R Croatia –B. Šamac — Sarajevo – Čapljina – border R Croatia, at section Doboј – Zenica - Lašva, milepost km 63+795. The Bridge Design was compiled by PZ "Traser" Sarajevo, and it was actually constructed in 1973 by "ŽGP" Sarajevo, OOUR „Gradnja“ Zenica.

Databank of bridges which was compiled in 1998 classified this bridge into category of structures with minor damages sustained. Loadbearing capacity of the bridge as compared to standardized load of PTP No.5 is  $K=1,0$ . Loadbearing capacity rating is  $R_1=328<500$ , with partial rating of equipment being  $R_2=188$ . Total bridge rating is  $R= 538$ , which classified this bridge into category of structures with minor damages sustained. This bridge also sees frequent extraordinary traffic, approx. 75 a year if up to 4570 kN (year 1988). Detailed inspection of bridge elements was undertaken in the course of compiling the design of bridge reconstruction.

The bridge spans the river Bosna and local road Nemila-Vranduk with five spans and two independent structures. The first spanning structure spans the river Bosna with four spans 30 m long. Second spanning structure spans local road with one span 11,8 m long.

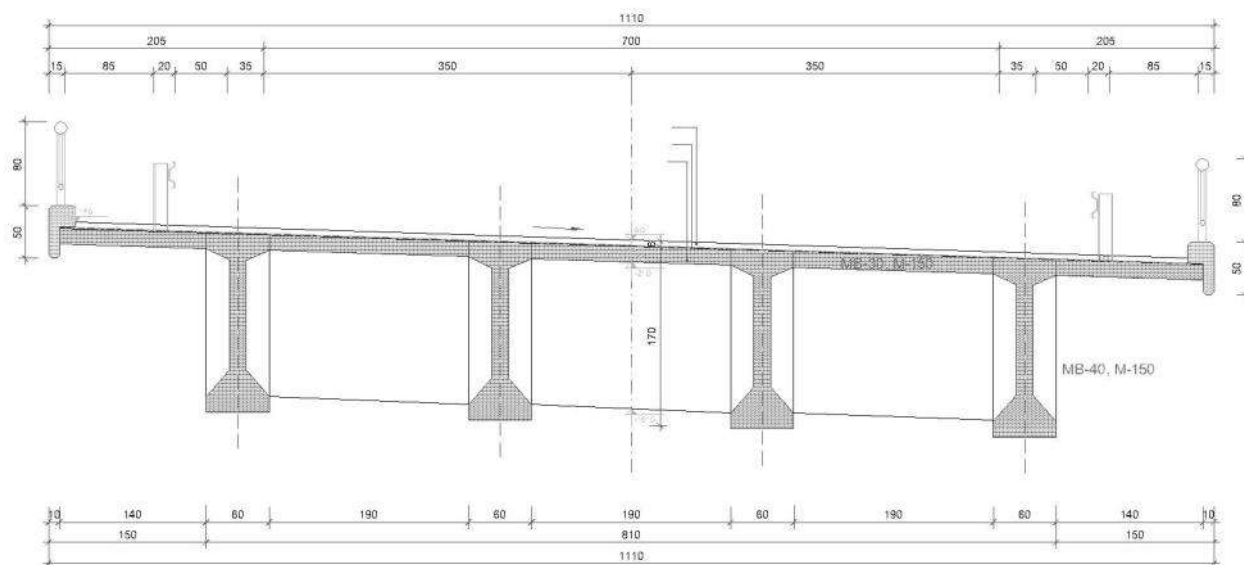
Spanning structure over the river Bosna is discontinuous system made of four prestressed supports interconnected by crossmembers placed over supports and in one third of the span. Roadway and consoles are countersunk. Structure constructed in this manner makes for "grillage" unit. The height of prestressed supports is 170 cm and they are placed 250 cm apart. Width of supports at all support points is 60 cm while at the other parts of the span ribs are narrowed to 16 cm. Thickness of counterstruck RC slab and of console is 15 cm. Over middle piers No. 2. and 3. and 4. (at the first bridge structure) continuity is achieved by RC joints located in roadway.

At the existing bridge, road axis is located in the curve with level line ascending by 0.28%. Roadway width at the bridge is 2\*3.5 m with border lines of 2\*0.35 m and safety line of 2\*0.5 m, and with bilateral service passages 2\*0.70 m. Service passages are enclosed by elastic buffer railing 0,22 m wide and safety railing with cornice 28 cm wide. Total width of the bridge is B=11.10 m. Cross gradient of the roadway towards the bridge is variable and ranges from  $i=1,5\%$  to  $i=4,88\%$ .

Inspection at the site revealed following damages to the bridge:

1. Fire damage to the fourth field of the spanning structure.
2. Corrosion of concrete at consoles, destroyed console edges (revealing reinforcement)
3. Water leakage at consoles, abutment and middle piers
4. Segregation of concrete at the major part of concrete surface of middle pier No.5 caused by poor craftsmanship.
5. Steel expansion joint at abutment No.1 and at middle pier No. 5 are damaged and sealed with sprinkling
6. Joint of roadway structure and the bridge is poorly done with overgrown and neglected head slopes, with support walls damaged by river Bosna and poor craftsmanship in general.
7. Bridge equipment is exhausted (railing, side beams and expansion joints)

*Figure 5: Normal cross section of the existing bridge*



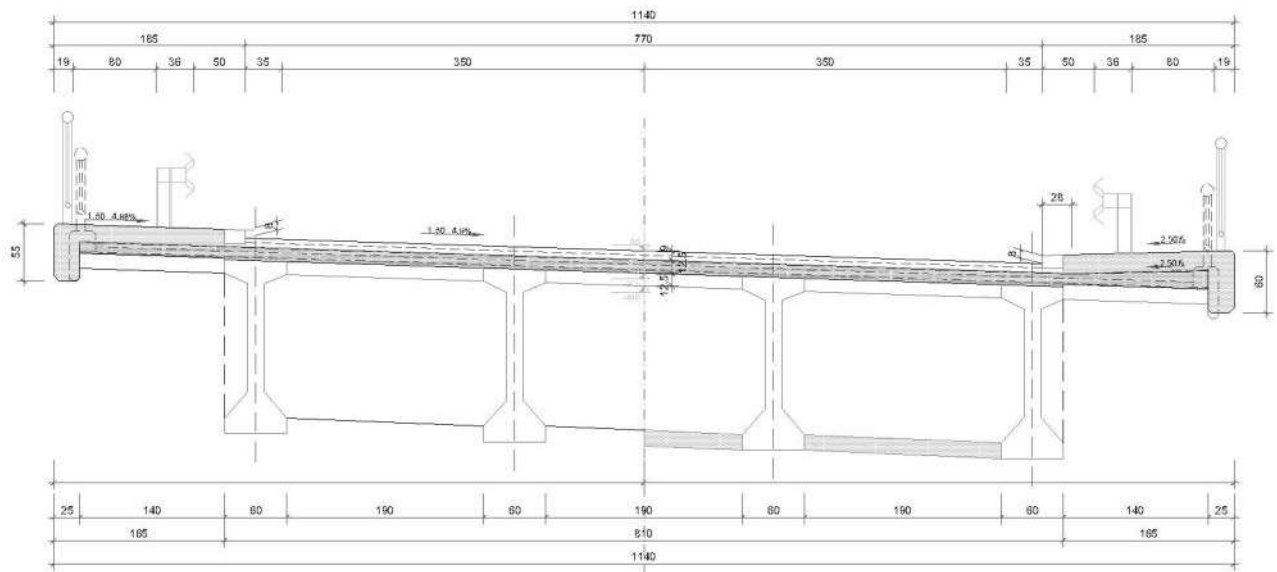
*Source: Main design; Divel Ltd; 2009.*

### 4.3. NEW DESIGN

Cross section of the reconstructed bridge is coordinated with the existing roadway width at the Main Road and with conditions prescribed by Guidelines for design. Roadway width at the bridge is:  $B_k = 0.35 + 3.50 + 3.50 + 0.35 = 7,7$  m. Total width of the bridge, including elastic buffer railing, footpath and guard rail is  $B = 11.40$  m.

Basic reconstruction of the bridge implies continuation of spanning structure i.e. transforming string of simple beams into continual support in order to form one continuous structure with four spans and other structure with independently rested RC slab (static system of the structure above local road shall remain unchanged) with expansion joint above middle pier No.5. continuation of spanning structure will be achieved by additional roadway slab placed at the upper surface of the existing spanning structure 12,5 cm thick, and by placing additional slab within the zone of middle pier at the level of lower flange 15 cm thick and by creating new crossmembers at middle piers. Prior to concreting this new part of roadway slab, it is necessary to remove protective concrete layer from upper surface of the slab and from prestressed supports. Negative bending moment above middle supports in roadway slab is neutralized by concrete steel RA 400/ 500-2. By continuing spanning structure RC joints at middle piers are cancelled, the same spots which represent weak points allowing water to penetrate and to disintegrate structure. By the same token, solidity of spanning structure is increased and deformations are minimised. Cast drains for drainage of surface and drainage water from hydro insulation are designed for the bridge.

*Figure 6: Normal cross section of the new design*



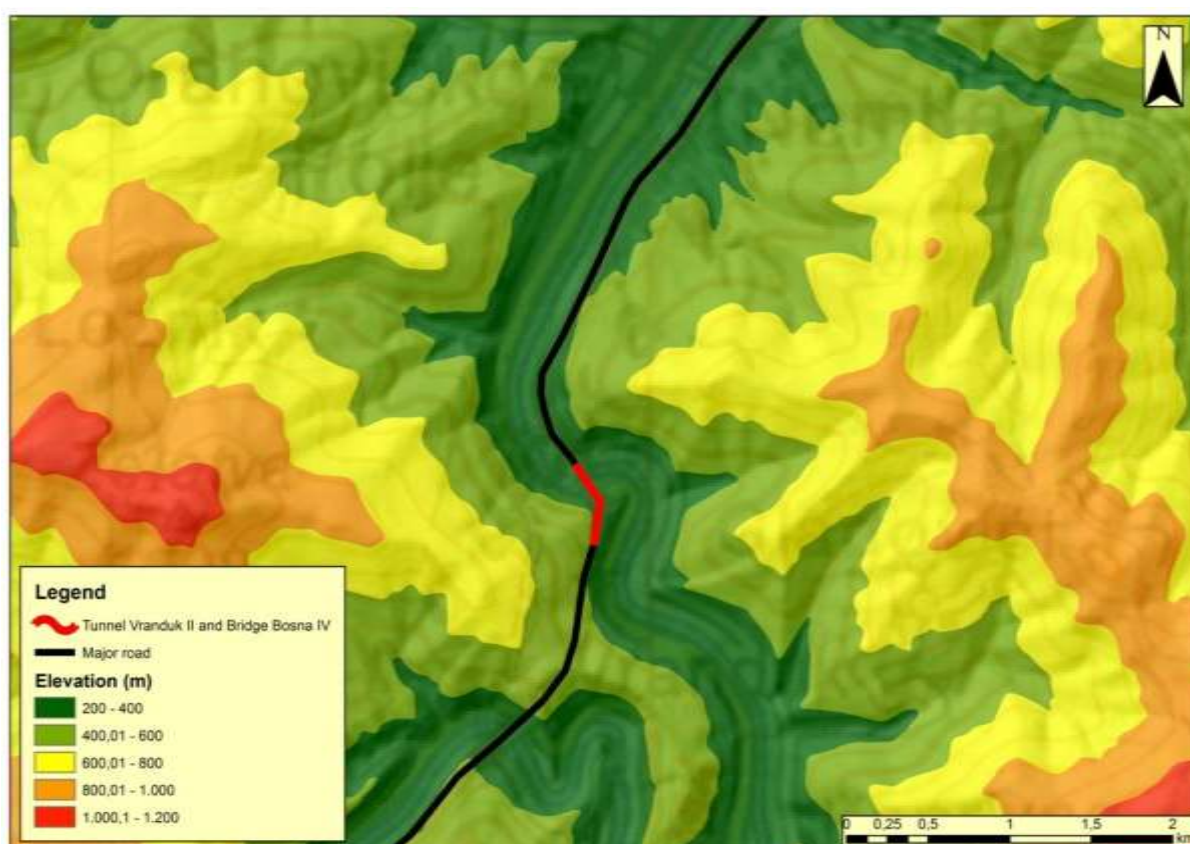
*Source: Main design; Divil Ltd; 2009.*

## 5. BASELINE OF PARTICULAR INTEREST

### 5.1. GEOGRAPHIC CONDITIONS

The terrain of the Project is mostly with an attitude in the range from 200 to 400 meters above sea level. In the wider area the altitude goes up to 1.200 meters above sea level, as indicated in the next Figure. From stratigraphic – petrographical point of view this area is composed from stable and water permeable rocks, and from structural geomorphological point of view this type of relief belongs to the fluvial – accumulation type of morphostructure

*Figure 7: Geographical Map of Wider Area with the Project Location*



*Source: Draft of Spatial plan of FBiH 2008.-2028.*

The geological structure of the area of reconstruction is characterized by Jurassic – cretaceous flysch. The Jurassic – cretaceous flysch is composed from marly limestones and marl.

*Figure 8: Geologic Map of the wider area of the Project*



*Source: Draft of Spatial plan of FBiH 2008.-2028.*

## 5.2. CLIMATE FEATURES

Climatic features of subject area are determined by the thermal and pluviometric regime, and therefore it is necessary to define its basic parameters, using climatological monitoring and a detailed analysis of the same. It can be said that this area is mostly under the influence of the humid continental climate, with smaller areas under the influence of the subalpine and alpine climate.

The average multi-annual temperature for Zenica is 10,6 °C, the warmest month is July, and with an average perennial air temperature of 20, 4°C and the coldest month is January when the average perennial temperature is 0, 2°C.

Table 2. Average temperature and precipitation for the multi-year period

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Avrg/ Sum
Temperature (°C)	0,2	2,3	6,5	11	15,8	19	20,4	19,9	15,2	10,9	5	0,9	10,6
Precipitation (mm)	54,9	53,8	48,2	60,5	73,2	82,7	71,2	66,6	89,7	67,2	69,4	61,9	803

Source: Federal Hydrometeorological Institute, Sarajevo

The average rainfall measured in Zenica, during multi-year period is 803 mm through the year. The rainiest month is September, when the average precipitation is 89,7 mm. The least precipitation occurs in March, only 48,2 mm on average. The area of Zenica is one of the drier areas in Bosnia and Herzegovina. The reason is the relief of the City, which prevents a stronger flow of humid air masses. Calms are present 59% of the total time and wind speeds are relative small.

### 5.3. AIR QUALITY

The monitoring of air quality in Zenica is been carried out by the City of Zenica and the Federal Hydrometeorological Institute. The nearest monitoring station is located in Tetovo in Zenica, about 7 kilometers south from the tunnel Vranduk II and bridge over Bosna. The following pollutants are measured at this monitoring station: sulfur dioxide (SO<sub>2</sub>), and total suspended particles (TSP).

Table 3: Numbers of daily exceedances of tolerant and limit values<sup>6</sup> of SO<sub>2</sub> and TSP at the monitoring station „Tetovo“ (2006. – 2015.)

		Numbers of daily exceedances of tolerant and limit values	
		SO <sub>2</sub>	TSP
2006.			
2007.		88	22
2008.		112	13
2009.		91	18
2010.		152	11
2011.		105	22
2012.		179	47
2013.		194	40
2014.		173	35
2015.		251	22
		177	39
Norm	µg/m <sup>3</sup>	125	250
	days	3	0

Source: Ecological Action Plan of Zenica – Dobo Canton 2017 - 2025

<sup>6</sup> Limits and tolerance values prescribed by the Rulebook on the Manner of Air Quality Monitoring and Defining the Types of Pollutants, Limit Values and Other Standards (Official Gazette of FBH, No. 01/12).

The following table presents the results of the measurement of the concentration of sulfur dioxide (SO<sub>2</sub>), total suspended particles (TSP), and the content of lead and cadmium in samples of suspended particles.

Table 4. Overview of average air pollution data for monitoring station "Tetovo" in the period of 2006. – 2015.

Pollutant	Unit of issue	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Norm <sup>7</sup>
Sulfur dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	86	112	115	132	109	150	152	144	175	155	50
TSP	µg/m <sup>3</sup>	84	75	94	96	106	141	145	131	106	131	90
Lead in TSP	µg/m <sup>3</sup>	0,46	0,51	0,24	0,18	0,095	0,143	0,26	0,24	0,12	0,09	2
Cadmium in TSP	ng/m <sup>3</sup>	12,6	16,3	15	11,2	2,275	5,87	6,54	10,06	8,82	11,43	40

Source: Ecological Action Plan of Zenica – Dobo Canton 2017 - 2025

The Contractor shall conduct a baseline measurement for air quality monitoring prior to the start of works.

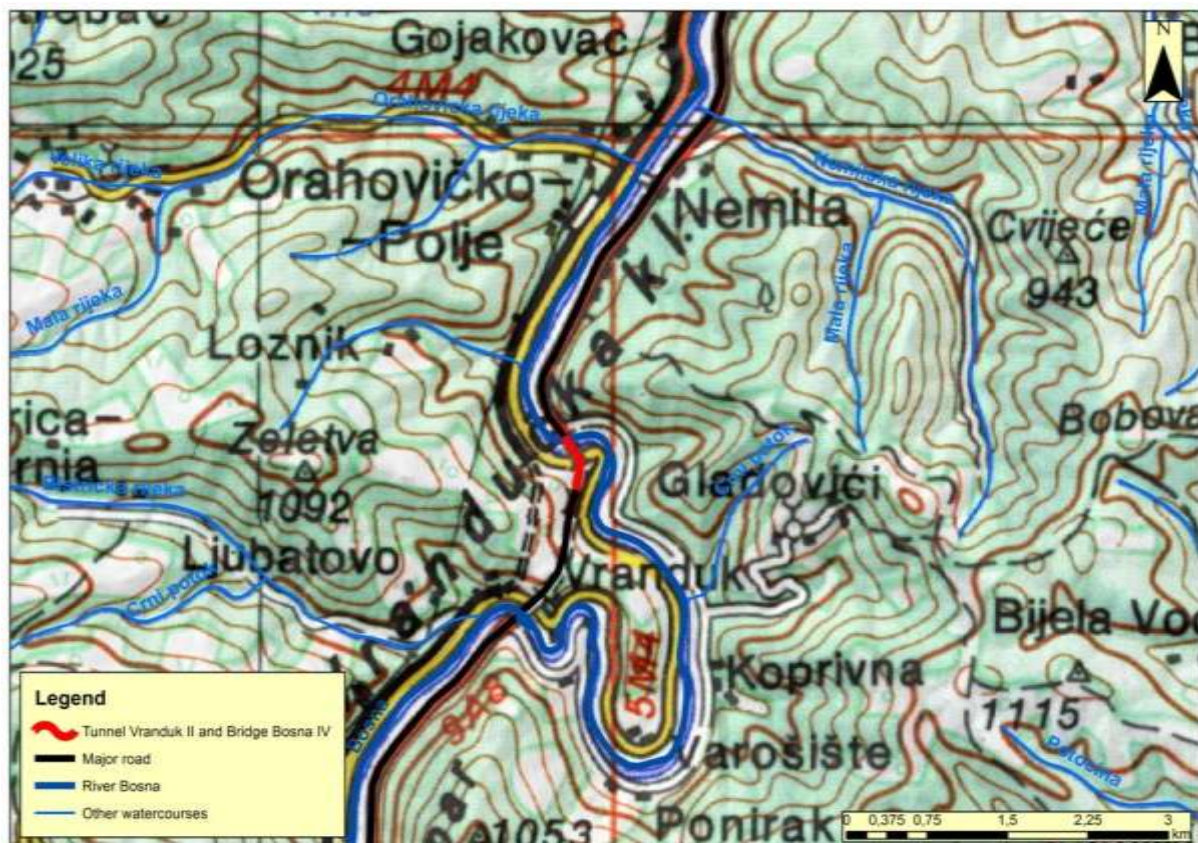
## 5.4. WATER AND WATER QUALITY

The bridge "Bosna IV" stretches over the Bosna River. The river Bosna is the third longest river in Bosnia and Herzegovina, and is considered one of the country's major internal rivers. The Bosna River also makes up the Bosna River Valley, the country's industrial center and home to close to a million people, as well as the location of several major cities. The river's major tributaries are the Željeznica, Miljacka, Fojnica, Lašva, Gostović, Krivaja, Usora and the Spreča River. Its source is at the spring "Vrelo Bosne" at the foothills of the Mount Igman, on the outskirts of Sarajevo. The river basin of Bosna has an area of 10.457 km<sup>2</sup>, the total length of Bosna is 273 km, while the average flow is  $Q_{avg}=174 \text{ m}^3/\text{s}$ .

Characteristic of this part of the flow of Bosna is that the river receives a high amount of wastewater; especially it refers to wastewater from the Zenica industrial plants.

<sup>7</sup> Limits and tolerance values prescribed by the Rulebook on the Manner of Air Quality Monitoring and Defining the Types of Pollutants, Limit Values and Other Standards (Official Gazette of FBH, No. 01/12).

Figure 9: Hydrographic Map of the wider area of the Project



Source: PC Roads Federation of BH

The Bosna River is also threatened by human activities such as transport, agriculture, non-sanitary waste disposal and discharging untreated wastewaters from the housing facilities in the vicinity. The Contractor shall conduct a baseline measurement for water quality monitoring prior to the start of works.

## 5.5. NOISE LEVELS

There was no monitoring of noise levels near the Project area; therefore there is no available baseline data of the impact of the noise on the environment. The largest source of noise, in general, is traffic.

In close proximity to the Project area, there are no facilities for residential purposes (houses) and business purposes (stores). According to the Law on Noise Protection, they fall under the sixth zone, where allowed noise levels are 70 dBA during day and 70 dBA at night. There are no sensitive receptors (hospitals, health resorts etc.) around the area that could be impacted by an increased noise level.

## 5.6. LAND AND LAND USE

The dominant purpose of the surrounding area is forest and agriculture, and in the immediate vicinity of the tunnel and bridge we cannot find residential or business facilities according to the CORINE methodology<sup>8</sup>.

Figure 10: Land use in the wider area of the project according to CORINE model



Source: Coordination of information of the Environment, European Environment Agency

## 5.7. FLORA AND FAUNA

There is no exact data on the flora and fauna for the particular location of the Project, but based on the fact that this is an existing tunnel and bridge, and that almost all activities will be carried out within the existing footprint, the risk to the flora and fauna is minimal. However, considering that the works will be done within the watercourse, the Contractor shall hire a biologist to conduct a review of the site for the baseline that needs to be prepared for monitoring prior to the start of works.

<sup>8</sup> Coordination of information of the Environment - European Environment Agency

## **5.8. PROTECTED AREAS**

The location of the Project is not located within a protected area according to Spatial plan of FBH and the Ecological Action Plan of Zenica – Dobož Canton. The nearest National monument is the Old Town Vranduk, located approximately 350 meters of air distance from the southern entrance into the tunnel. The Old town Vranduk is located on top of the hill above the actual works. The National monument will not be directly or indirectly impacted by the project due to the distance from the project site and due to the fact that works are limited within the existing footprint.

## **5.9. POPULATION AND SETTLEMENTS**

The city of Zenica has a population of 110.663 people who live in the area of 558,50 km<sup>2</sup>. The population density equals 198,1 people per km<sup>2</sup> which makes it one of the densest populated municipalities in FBH. Zenica as the cantonal center has 19 primary schools, 9 of which are branch village schools and 11 high schools. Furthermore, there is a university with 7 faculties.

The health care system in the city Zenica is based on primary, secondary and tertiary health care provided in 6 institutions with numerous outposts. Although the direct location of the project tunnel and bridge is not inhabited, it is located near the settlement Vranduk, Ponirak, Koprivna and Nemila, on the west edge of the Zenica-Dobož canton. All four of the nearest settlements are characterized by ground floor or one story residential houses.

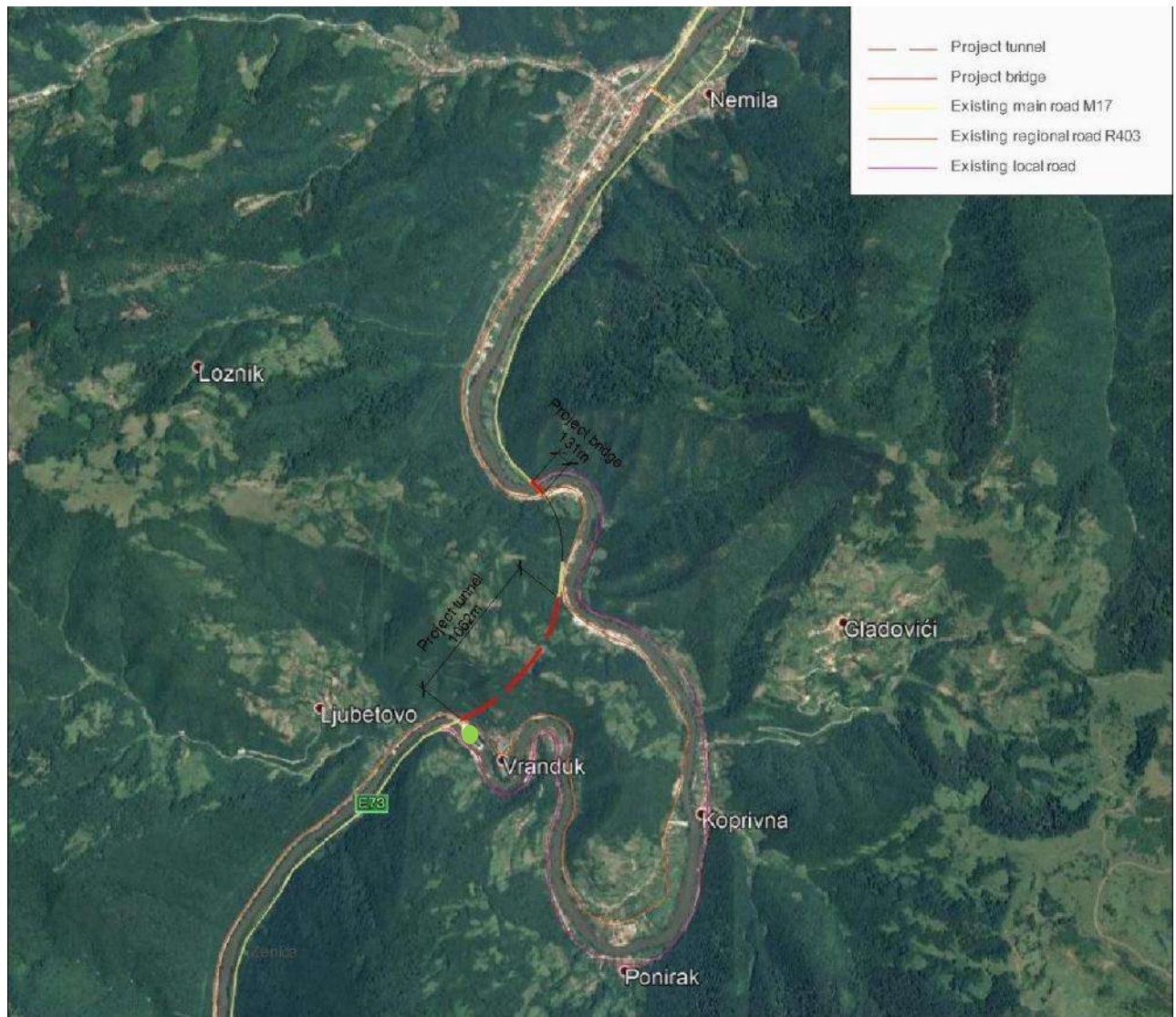
The settlement Nemila, although gravitating towards the municipality center is a settlement center with a primary school and a local ambulant. The settlement Vranduk is a tertiary settlement center with just a primary school but no ambulant. Children from Ponirak and Koprivna attend primary school in this settlement.

Nevertheless, inhabitants of all four of the above mentioned settlements gravitate completely toward Zenica and depend on the city's secondary and tertiary health care as well as high school and university education. Furthermore, the majority of local population works in Zenica. The location of the project tunnel is uninhabited in a radius of 300 m, while the location of the project bridge is not populated in a radius of 1km. The project is located on the western part of the Zenica-Dobož canton and presents the fastest and most convenient connection between Zenica and Dobož the two largest cities in the canton.

Based on the above said the importance of the project for local population is immense. Being situated on one of the most important main roads in FBH, the M17, the tunnel and the bridge are the fastest and most convenient way for inhabitants of the northern part of the

Canton (towns Žepče, Maglaj, Tešanj, Doboј) to reach the cantonal capital and administrative, educational and health center of the region as well as one of the biggest cities in FBH Zenica. The project has huge importance for transit traffic too, being the fastest and most adequate connection of the southern part of the country to the Bosnian-Croatian border on the river Sava.

*Figure 11: location of the project bridge and tunnel*



*Source: PC Roads Federation of BH*

In the direct vicinity of the entrance to the project tunnel (marked with a green dot on figure 11) works for the construction of the Hydropower plant Vranduk have started. It has been detected that the works are on standstill because of a dispute between the Investor (Elektroprivreda BH) and the Contractor.

## 6. DESCRIPTION OF POSSIBLE IMPACTS DURING PRE-CONSTRUCTION CONSTRUCTION, OPERATION AND MAINTENANCE

### 6.1. IMPACTS DURING PRE-CONSTRUCTION

#### Socio-economic impacts

**Land acquisition and resettlement:** No permanent land acquisition of private land or resettlement will occur in this project. The tunnel has a clearly defined existing footprint. Although a new evacuation tunnel is designed in order to align the project to existing regulations, no additional private land is required.

Instead parts of three public land plots, located on the entrance and exit of the tunnel will have to be expropriated (land plot nr. 349671, 3506/6, 3506/8)

*Figure 12: Location of land plot nr. 3506/6, 3506/8*



*Source: PC Roads Federation of BH*

*Figure 13: Location of land plot nr. 3496/1*



*Source: PC Roads Federation of BH*

## 6.2. IMPACTS DURING CONSTRUCTION

### Impact on Air Quality

**Exhaust gases** - The machinery which is used during the construction and delays, i.e. traffic standstills on the road due to works on reconstruction of tunnel and bridge will lead to an increased emission of such gasses as SO<sub>2</sub>, CO<sub>2</sub>, CO, NO<sub>x</sub> and Pb. Increased emissions of exhaust gases in tunnel especially because of the one lane traffic during reconstruction works. Increased emissions of exhaust gases in tunnel especially because of the traffic of construction machines during reconstruction works.

**Dust generation**- where the most important polluters are solid particles (PM10 and PM2,5). Possible sources of dust generation include demolition works (chiseling of the existing concrete at the tunnel base and milling of the roadway structure), site preparation

activities, handling of building materials such as substrate, gravel, sand, asphalt, cement and the construction itself.

#### Impact on Noise Level and Vibrations

Noise emission is likely to appear during site preparation. Possible sources of noise are: site preparation activities such as chiseling of the existing concrete at the tunnel base and milling of the roadway structure, use of tools and equipment, assembly of building materials on site; offloading of building materials such as gravel, sand, asphalt etc. and the work of construction machines in general.

#### Impact on Water Quality

**Possible contamination of water** – Possible sources of water pollution are: demolition works and malpractice, handling with hazardous substances (i.e. concrete, asphalt, chemicals and paint), inadequate waste handling, liquid and solid equipment damage which may lead to leakage of lubricants and fuel (increased blurring, input of fats and oils), painting of the fences, corrosion protection, paving of the bridge etc. Negative impacts may occur due to accidental or careless deposition of toxic substances from the asphalt or toxic paints into watercourses.

#### Impact on Biological and Natural Resources

- Pollution of Bosna River and soil with hazardous substances (fuel and oils in case of spills) can harm animals living in the surrounding area.

#### Impact on the Protected Areas

The observed project is not situated in any of the existing protected areas.

#### Impact on Fish Habitat and Water Quality

Negative impacts on fish habitat may occur during the execution of the following activities: demolition works, works in the immediate vicinity of watercourses or in them, dumping toxic concrete, asphalt or concrete and asphalt, paint and other chemicals leaching into watercourse, disposal of fine particles in watercourses.

Works on the foundations of the bridge may cause changes in the flow of the river if not planned and executed properly.

#### Impact on Landscape Values

Partial alternation of landscape and visual aspects can be expected with organization of construction sites, presence of personnel and machinery on site. These impacts are temporary and negligible.

#### Impact on Traffic Safety and Traffic Flow

Traffic congestion and obstructions on the bridge and tunnel - increased traffic load, leading to congestion and obstruction is likely to be experienced on local roads and on major road (M17). This is especially expected during delivery of construction material to site and collection of waste from site.

Complete traffic stoppage over the Project Bridge and Tunnel is planned during the entire time of construction works. Thus temporary bypasses on existing regional road R4013 and a nearby local road will be made available (location of temporary bypasses shown on figure 10)

This is also an important issue in the summer months where the volume of traffic on this road substantially increases for approximately 12%. This will be taken into consideration by the Federal Ministry of Traffic and Communication during the process of handing out the necessary Permit for Change of Traffic Regime during construction. The Federal Ministry has the mandate to decide whether to allow construction during summer months or not.

#### Worker health and safety impacts

Impacts on the health and safety of workers working in closed spaces with air emissions, risks of accidents and damages from the construction vehicles.

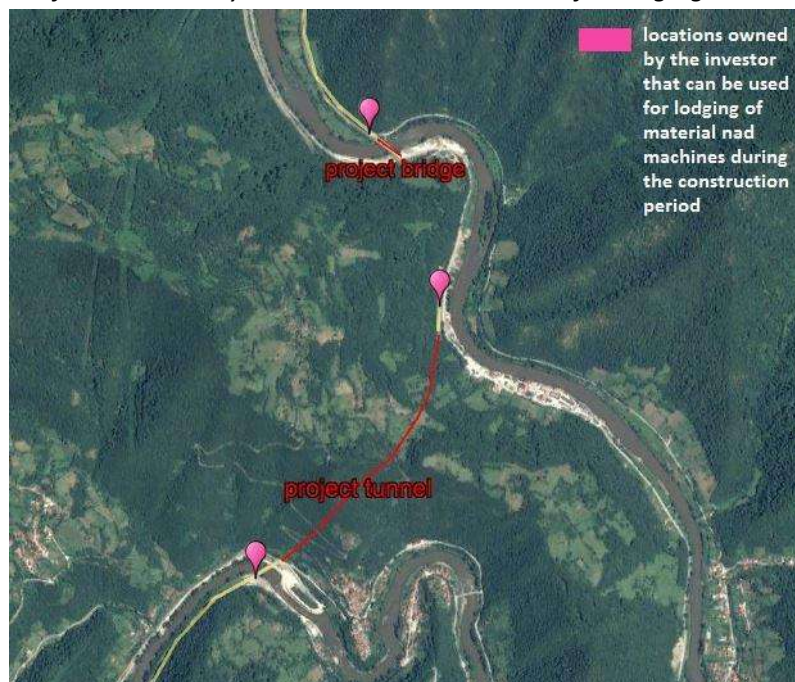
#### Population safety impacts

According to local practice, no working camps will be set up for the purpose of accommodation of workers. All workers will commute daily to the construction site. Thus the impact of worker's presence on local community is minor. Furthermore, the project area is uninhibited minimizing the impact local population safety.

#### Socio-Economic Impacts

**Temporary land acquisition and damage to private property:** It is not expected that it will be necessary to temporarily occupy any privately owned land plots for lodging machines and disposal of materials. Machines and materials will be disposed on land owned by the Investor depicted on figure 14. However, if additional temporary occupation of private land is needed during construction activities, this will be agreed upon with respective land owners and compensation will be paid in accordance with provisions determined in the RPF before the land is accessed.

Figure 14: Location of land owned by the invest that can be used for lodging machinery and materials



Source: PC Roads Federation of BH

In case alternative traffic routes which need civil interventions would be used during construction period, the civil work would not extend the existing footprint of the existing roads. All construction works would be done on land owned by the Investor.

In case the interventions on existing road would extend on to private land, weather temporarily or permanently, the impact on land would have to be reassessed and a separate ESMP would have to be developed by the contractor.

**New workplaces and impacts on local businesses (positive):** New business opportunities are expected to be created for local businesses such as transporters, suppliers and other service providers. The Project is expected to have positive impacts on the local employment opportunities with opening new workplaces during road construction. This impact is considered to be short-term and small.

#### **Impact on living conditions of local communities**

The area in the vicinity of the project construction site is not populated, thus, no impact on local communities is identified. Still, following adverse impacts during construction are possible:

- Noise increase,
- Construction waste disposal,
- Short-term disruptions to water and electricity supply, telephone and Internet connections, waste collection, regular public transport, delivery of mail.

- Local businesses can be affected in means of late delivery of goods and products.  
The impact is short termed and low due to the existence of an alternative route.

**Impacts on local traffic:** Local traffic will be increased (including heavy machinery and trucks) and diverted to Roads of lower rank (local and regional roads), due to full traffic stoppage during the construction period, causing delays and limited access.

**Land screening:** On 9<sup>th</sup> of November, 2017 social specials of the Project Implementation Team (PIT) conducted a walkover survey on the location of the Project Tunnel (Tunnel Vranduk II) and the Project Bridge (bridge over river Bosna, bridge IV). It has been noted that public land plots required for project activities, such as temporary storage of machines and material, are not being used in any way, neither formal nor informal, and do not require clearance.

*Figure 15 (a,b): Photographs made during the walkover survey on November 9<sup>th</sup>, 2017*



*a) public land at the exit of the project bridge*



*b) public land at entrance to the project bridge*

*Source: PC Roads of FBH*

### **6.3. IMPACTS DURING OPERATION AND MAINTENANCE**

Since this tunnel and bridge already exist, neither new negative environmental impacts, nor deterioration of existing negative impacts, during operation and maintenance are expected.

#### **Socio-Economic Impacts**

**Impacts on traffic:** Increase in speed of vehicles is expected due to the rehabilitation of the tunnel during which all technical problems, that were causing the lowering of speed of vehicles below allowed speed limit, will be resolved.

#### **6.4. POSITIVE IMPACTS**

Project implementation will contribute to better conditions and will have positive impacts on the quality of life of the local community. There are several opportunities which were detected in the project:

- Tunnel improvement in the sense of constructive stability;
- Bridge improvement in the sense of constructive stability;
- Improvement of the hydro insulation of the bridge and tunnel;;
- Safer traffic conditions for drivers by improving construction elements of the pavement structure
- Increased pedestrian safety by reconstructing the pedestrian pavement on both sides of the tunnel and bridge;
- Less damages to vehicles,
- Better traffic flow.

**6.5. Enhancement measures**

Table 5: Enhancement measures

Impact	Improvements to be achieved	Cost Assessment (US\$)		Institutional Responsibility	
		Operative	Implementation	Operative	Implementation
▪ Traffic	<ul style="list-style-type: none"> <li>▪ Improved road and travel safety by improving construction elements of the pavement structure</li> <li>▪ Better traffic flow;</li> <li>▪ Increase of pedestrian safety by reconstructing the pedestrian pavement on both sides of the tunnel and bridge</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH
▪ Socio-economic	<ul style="list-style-type: none"> <li>▪ New job and business opportunities for local construction workers and firms;</li> <li>▪ Improvement of connections of the municipality of Zenica with Doboj;</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH
▪ Visual aesthetic and landscape	<ul style="list-style-type: none"> <li>▪ Improving visual aspects of the tunnel and bridge and surrounding area.</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH

## 7. MITIGATION MEASURES

The purpose of this ESMP is to set forth mitigation measures associated with the environmental impacts identified for this given project activity. The mitigation measures are included in this section and summarized in *Table 6*. This chapter includes also the general provisions and mitigation measures that the contractor hired for reconstruction will need to obey and/or perform. The requirements that the Contractor needs to follow, beyond the provisions of the ESMP, will be outlined in a number of planning documents (plans) that will be developed by the contractor prior to any start of works. The development of such documents will allow for adjustments of the ESMP measures based on the potential new findings on the site, as a result of the public consultations or developing the project specific baseline.

As a part of Tendering Documents (TD) for the Contractor, PC Roads FBH will require that the Contractor submits a Construction Site Organization Plan (CSOP), which will highlight certain requirements both for completion of works and implementation of mitigation measures.

CSOP consists of following components<sup>9</sup>:

- (i) Description of the preparation works and description of location organization during and after the construction (design of access roads, internal roads, manipulative and parking spaces, layout of installations, design and organization of temporary construction site facilities, terrain rehabilitation upon completion of works). This part of CSOP needs to contain technical description, calculation and graphical appendices, and BoQ.
- (ii) Technological scheme (location and operation of the storage and disposal sites of the materials, location of the mechanization maintenance, disposal sites for special types of waste, storage of dangerous and harmful substances). This part of CSOP needs to contain technical description, calculation and graphical appendices, and BoQ.
- (iii) Elaborate on safety (Elaborate on safety on work and Elaborate on protection from fires and explosions), which shall include according to provision of this ESMP a Management Plan in Case of Accidents (MPCA); and
- (iv) Practical plan of the implementation of this ESMP and among other a detailed Waste Management Plan (WMP)].

---

<sup>9</sup> Ordinance on Construction Site Organization, Mandatory Documents on Site and Participants in Construction (Official Gazette of the FBH No. 48/09)

Additional request for the Contractor, as stipulated by ESMF and this ESMP, is to design and submit a detailed Traffic Management Plan (TMP) 30 days prior to commencement of works (in accordance with *Appendix 4. Road Safety Management* of the ESMF). The TMP shall also include management of traffic according to the season, notably trying to minimize impacts during the summer months where the traffic in this area is exceptionally high.

Within the framework of the project, PC Roads FBH prepared a Resettlement Policy Framework (RPF) which clarifies land acquisition/resettlement and compensation principles, organizational arrangements and procedures for planning land acquisition/resettlement. In this sub-project no land acquisition is expected.

## **7.1. MITIGATION MEASURES IN PRE-CONSTRUCTION PHASE**

### **7.1.1. Contractor Management**

PC Roads FBH will ensure that the construction activity is carried out without risk to the health and safety of all workers and local community through contract clauses. Therefore, the Contractor will plan, coordinate, control and monitor the undertaken activities to effectively minimize the risks presented during their work.

The ESMP is an integrated part of the TD and the Contract for Execution of Works. It is the Contractor's obligation to include the implementation of environmental and social mitigation measures into the overall cost.

The Contractor will be required to provide a short statement that confirms that:

- The ESMP conditions have been estimated and included into the bid price,
- The Contractor for Execution of Works has a qualified and experienced person on the Contractor's team who will be responsible for the environmental and social compliance requirements of the ESMP.
- The Contractor will comply with applicable BH and FBH laws, EU standards and WB requirements, including the relevant Operational Policies, this ESMP, framework ESMF and the Environment, Health and Safety guidelines, where applicable.

The following contractual conditions shall apply to the Contractors for Execution of Works employed by PC Roads FBH:

- The Contractor will be required to prepare site-specific CSOP in accordance with the requirements of this ESMP. All submitted CSOPs shall be formally reviewed by PC Roads FBH prior to agreement and signing.
- The Contractor will provide formal written reports to PC Roads FBH in accordance with requirements set-out in the ESMP which is part of this document;

- PC Roads FBH is responsible to introduce all contractors and sub-contractors and personnel working on the Project on the contents and provisions of this ESMP and any penalties arising from non –compliance therewith;
- The Contractor is responsible for notifying PC Roads FBH immediately upon receiving any complaints or grievances, as well as immediately upon identifying and implementing of any corrective actions. The Contractor shall inform the complainant of the Grievance redress mechanism. All grievances will be registered with the Central Feedback Desk (CFD) and logged in the Central Grievance Log. Contractor will fill out the grievance registration template provided in Appendix 2 of this ESMP on a regular basis and will make it a part of the monthly reports to the contractor.

The Contractor shall provide monthly reports on its management and monitoring of the working conditions of direct and indirect employees on the work site and ensure that systems are in place to monitor compliance with labor and health and safety standards.

The contractor shall:

- Ensure that all workers are required to comply with all national/federal legislation on labor and health and safety, as well as any other relevant standards, , including the World Bank Group EHS guidelines and be held responsible if compliance is not met;
- Be responsible for all activities undertaken by his subcontractors;
- Maintain regular effective two-way communication with all workers, sharing information and assisting in dealing with any unforeseen problems promptly.
- Exchange information and request any plans from sub-contractors which deals with significant health and safety hazards and risks created by or associated with their work activities.

During the construction period full traffic stoppage will be unavoidable. Thus, a temporary bypass will be made available. In the event that any physical interventions are required for creating a bypass beyond the existing structures, or interventions to improve the conditions of an existing bypass, the Contractor shall prepare a separate ESMP and not start works until the ESMP is cleared by both PC Roads and World Bank. This ESMP should include worker safety analysis for the alternative with complete traffic stoppage which implies a bypass and the alternative with one-way traffic throughout the construction period. Furthermore, it should include analysis of emissions from cars, safety issues, potential damages to vehicles passing, and the scope of work for both alternatives.

The recommendations and proposed mitigation measures will be attached to the tendering documentation and subsequently the contract with the Contractor. The ESMP is a part of the work program and as such, it needs to be addressed to the Contractor and carried out as required.

Within the tendering documentation PC roads will provide a proposal of the Traffic Management Plan (TMP) which is to regulate traffic during the construction period. Within the TMP alternative routes will be laid out for the purpose of minimizing the impact on traffic during construction period.

The contractor shall is to analyze and optimize the TMP.

During the construction phase, Contractors will be required to allocate the responsibility of overseeing day-to-day compliance with the SS ESMP to a senior member of staff. Contractors will be responsible for the implementation of all measures included in the SS ESMP for all activities undertaken in terms of the construction contract (including work undertaken by subcontractors). Compliance of Contractors with these measures will be assessed by the Construction Supervisor appointed by the PC Roads FBH, in line with the Decree on Construction Site Organization, Mandatory Documentation on Construction Site and Construction Work Participants.

Furthermore, the contractor shall coordinate the construction site organization and the construction traffic with the Investor and Contractor for the project of the Hydropower Plant Vranduk in the close vicinity of the entrance to the project tunnel.

## **7.2. MITIGATION MEASURES IN CONSTRUCTION PHASE**

### **7.2.1. Environmental Management**

During the construction phase, the Contractor shall award the responsibility of supervising everyday compliance with ESMP to a senior engineer.

The Contractor will be responsible for the implementation of all measures included in the ESMP for all activities undertaken in terms of the construction contract (including work undertaken by sub-contractors).

Compliance of Contractors with provision of ESMP will be assessed by the Construction Supervisor appointed by PC Roads FBH, in accordance with the Ordinance on Construction Site Development, Obligatory Documents on Construction Site and Participants in Construction Work (Official Gazette of the FBH, No. 48/09, 75/09 and 93/12).

Compliance reviews will be submitted by Contractor to PC Roads FBH on a monthly basis. Non-conformances, incidents and deviations from the ESMP will be

communicated to PC Roads FBH, or the Supervisor, as soon as possible, within 24 hours from the time of occurrence, where PC Roads FBH shall react to the occurrence a.s.a.p. and impose corrective measures with a deadline for undertaking them.

All mitigation measures are specified in the Table 6. Environmental and Social Impacts Management Plan.

### **7.2.2. Health and Safety**

Works on the rehabilitation of the tunnel may pose health and safety risks for construction workers and visitors to the construction site. Road users and construction workers will be exposed to the risk of: biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, wastewater, vector transmitted diseases etc.), and (ii) road accidents from construction traffic of heavy machinery during the construction period.

Therefore, the Contractor is obliged to:

- Ensure that only properly trained/licensed people operate heavy machinery;
- Implement suitable safety standards for all workers and site visitors, which should not be less than those laid down in the international standards<sup>10</sup> in addition to complying with the national standards the FBH,
- Make sure basic safety features for visitors are in place, such as construction warning signs for protecting unsafe areas from being accessed or the obligation for every visitor to wear a helmet before entering the construction site
- Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular road rehabilitation activity and specific classes of hazards in the work areas,
- Provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty equipment and by replacing damaged equipment with new one.

---

<sup>10</sup> - *Occupational Safety and Health Convention, 1981 (No. 155)*

- *Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)*

- *The Safety and Health at Work Directive 89/391/EEC*

- *World Bank Occupational Health and Safety Guidelines (April 30, 2007.)*

- *and other Recommendations and EU directives*

- Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job.
- Appoint an environment, health and safety manager to look after the health and safety of the workers.

Furthermore, the contractor is required to develop a Study on Construction Site and Occupational Safety Measures During Construction in line with provisions of Labor protection Law (Official Gazette of SRBH 22/90) and Regulations on Occupational Safety in Construction (Official Gazette of SRBH 42/68).

#### **7.2.2.1. Safety Engagements**

The Contract should ensure that all possible risks in the course of work are eliminated or reduced to a minimum. In order to prevent the possibility of higher-scale accidents it is necessary to plan and develop the measures to help reduce the adverse impacts. The Contractor's duty is to create a Management Plan in Case of Accidents (MPCA).

The MPCA should include organizational structure, responsibilities, procedures, communication, training, resources and other measures needed to provide appropriate reaction of the Contractor in case of accidents which might occur during the project. The most important items of the MPCA are as follows:

- Identify potential hazards and large-scale accidents,
- General procedures for all emergencies and accidents that might occur during the project due to natural disasters, defects on equipment of human errors,
- Description of preventive measures against accidents,
- Workers training for their roles and responsibilities when accident occurs,
- Determining responsible person at the spot,
- Urgent communication procedures,
- Information and contacts of important local authorities and emergency services,
- Internal and external alarming,
- Response plans for specific types of hazards, for example medical assistance, fire etc.

The MPCA should include:

- Spill Response Plan,
- Emergency Preparedness,

- Response Plan to Accidents.

Specific measures for works in tunnels are provided in the Labor protection Law (Official Gazette of SRBH 22/90) and Regulations on Occupational Safety in Construction (Official Gazette of SRBH 42/68).

The Contractor is obliged to secure the construction site in accordance with the Regulations on Occupational Safety and to provide adequate equipment.

In case compliance is not met the contractor will be held responsible in accordance with Labor Protection Law.

The contractor is also obliged to:

- The contractor should provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities should be at least 6 m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment.
- Contractor should provide bottled drinking water facilities to the construction workers at all the construction sites.

**7.2.2.2. First Aid**

The Contractor shall:

- Ensure that facilities that provide health care and first aid are easily accessible. Appropriately equipped first aid stations are to be easily accessible in the whole work area;
- Documenting and reporting accidents, diseases and incidents on workplace;
- Prevent accidents, injuries and diseases originating from, in connection with or arising in the course of work, reducing as much as possible the possible cause of danger in the way which is in accordance with good international practice;
- Identify potential dangers for works, particularly those that might pose threat to life, and provide the necessary preventive and protective measures;
- Ensure that construction site drivers strictly comply with the rules of driving;
- Ensure appropriate lighting alongside roads.

### 7.2.3. Traffic and Road Safety

The Contractor shall develop the CSOP which includes preparation and organization of construction site during and after construction, including roads on the construction site i.e. Traffic Management Plan (TMP). Traffic on construction site is to be regulated the same way as public traffic roads.

The TMP should be developed based on the TMP proposed in the Tendering documentation. The proposed TMP will include possible alternative routes, suggested to minimize impact on traffic during the construction period.

**Route1:** (marked pink on figure 17) possible route if coming from the direction of Zenica and heading to Doboj.

On the entrance to the route the width of the local road it is placed on dictates one way traffic. The road widens after passing through the tunnel shown of figure 16. The road passes through the settlements Vranduk, Ponirak and Koprivna. In the settlement Vranduk in the vicinity of the road proposed as the temporary bypass route 1 a primary village school is located.

**Route 2:** (marked orange on figure 17) possible route if coming from the direction of Doboj and heading to Zenica.

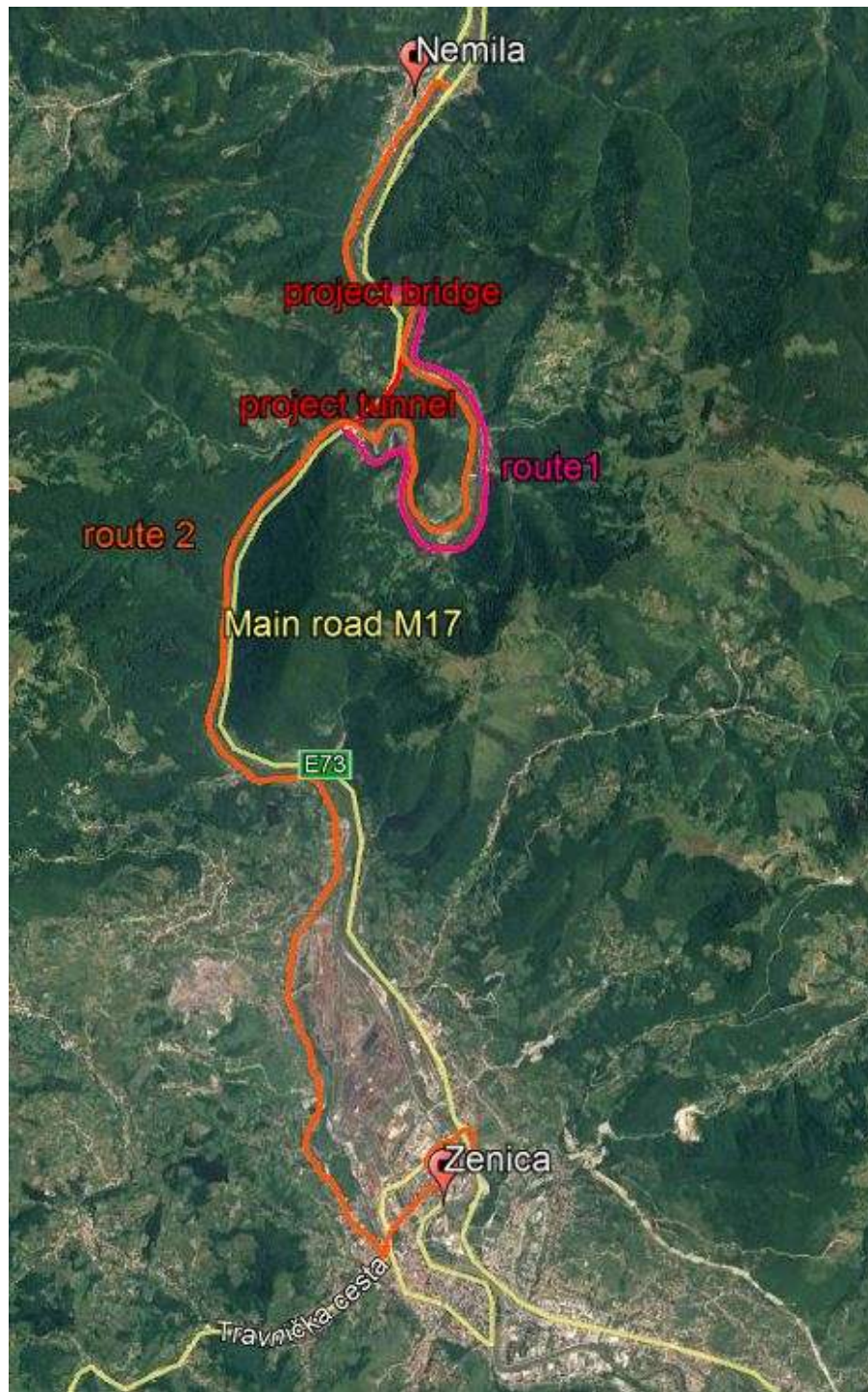
A part of this route is a macadam road in the length of cca 6 km. the road would need to be leveled and brought into drivable state.

*Figure 16: Tunnel on the alternative bypass route1*



*Source: PC Roads FBH, November 9<sup>th</sup>, 2017*

*Figure 17: Possible alternative routes*



*Source: PC Roads Federation of BH*

The Contractor is obliged to:

- Prepare and deliver the TMP to PC Roads FBH for its approval, no later than 30 days upon the beginning of works on any component of the project included in traffic redirection and management.

- For the purpose of uninterrupted traffic movement during the reconstruction of the crossroads, include in TMP the following parts: detailed drawings of traffic solutions by showing all bypasses, temporary roads, temporary turns, necessary barricades, signalization/lighting, traffic signs etc.
- Ensure signs in strategic parts of traffic roads.
- Install and maintain a sign on each important crossroads, on roads which will be used during reconstruction works, which will clearly indicate the following data in a local language:
  - Location: station label and settlement name,
  - Duration of construction,
  - Period of the proposed bypass/alternative road,
  - Map of the proposed bypass,
  - Name and contact address/telephone number of responsible personnel,
  - Name and contact address/telephone number of contractor,
  - Sincere apology for the caused inconvenience.

According to the Law on Roads FBH, article 77. For every construction on public road, for works on regular maintenance or any other works under traffic, appropriate temporary signage has to be set up. Respectively traffic has to be regulated in a way that will guarantee safety of traffic and contractor with minimum traffic flow disruptions.

The appropriate signage will be determined based on the Regulations on Traffic Signs (Regulations on Traffic Signs and Signage on Roads, Ways of Marking Works and Obstacles on Roads and Signs that an Authorized Person Can Give to Participants in Traffic ("Official Gazette of BiH", No. 16/07)) and in line with the Guidelines for Design, Construction, Maintenance and Control on Roads (Sarajevo/Banja Luka 2005).

TMP should include details about the following:

- Construction plan by phases,
- Beginning and duration of works,
- Overview of the existing conditions near the construction site,
- Identification of affected areas,
- Mitigation measures

- Plan of public transport, for example, timetable, change of timetable, disturbance and the like;
- Circulation plans, including zones of entry and exit, routes for towing of material, turnaround points, parking areas, zones of interlocking with other traffic roads etc.,
- Routes for pedestrians and vehicles,
- Traffic controls for each expected intervention, including illustrations of barriers, paths, signalization plan, warning signs etc.,
- Requirements for special vehicles, for example, those of large dimensions,
- Construction works paths (access, ramps, loading, unloading),
- Connection roads for supply vehicles and storage of material,
- Expected interaction of pedestrians and vehicles,
- Roles and responsibilities of persons on construction site regarding traffic management,
- Instructions on the procedures regarding traffic control, including urgent situations.

TMP should also include appropriate communication with affected population about traffic and timely information of traffic changes/road blockage.

TMP should be monitored on a regular basis (responsibility of the supervision engineer) and audited to ensure effective implementation and to take into consideration any changes on construction site. All workers on construction site should get acquainted with the TMP. Road safety measures envisaged during construction include vertical and horizontal signage based on Regulations on Traffic Signs (Regulations on Traffic Signs and Signage on Roads, Ways of Marking Works and Obstacles on Roads and Signs that an Authorized Person Can Give to Participants in Traffic ("Official Gazette of BiH", No. 16/07)) as shown in figure 14.

In addition, the contractor shall provide, in the joint names of the employer and the Contractor insurance cover from the Start Date to the end of the Defects Liability Period I the amounts and deductibles stated in the Particular Conditions of Contract (PCC) for the following events, amongst others, which are due to the Contractor's risks:

- a) Loss of or damage to property in connection with the contract
- b) Personal injury or death

Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such

insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

#### **7.2.4. Construction Site Safety**

The Contractor shall secure the construction site. The construction site should be accompanied with a board with information on works and participants in construction (investor's name, contractor's name, project designer's name, name and type of construction being built, beginning and end of works). These measures are necessary so the Contractor could ensure safety of construction site and prohibit entry ensure of unauthorized persons.

The *Elaborate on safety on work* and *Elaborate on protection from fires and explosions* should include detailed measures of safety on construction site in order to ensure safety of location and remove possible risks and adverse impacts on employees and unauthorized persons.

### **7.3. MITIGATION MEASURES IN OPERATIONAL PHASE**

It is required from PC Roads FBH to undertake the instructions given in the Table 6. Environmental and Social Impacts Management Plan in operational phase.

**7.4. SUMMARY OF MITIGATION MEASURES**

Table 6: Environmental and Social Impacts Management Plan

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
PRE-CONSTRUCTION PHASE						
▪ Impacts on living conditions	<ul style="list-style-type: none"><li>▪ Informing the local communities on the extent of works and duration prior to the commencement of construction works. via local newspapers, the municipality’s notice board and website and via PC Roads’ website as soon as the contract is signed</li><li>▪ informing road users via the construction site information board, and an information leaflet at the construction site</li></ul>	Internal resources	Internal resources	PC Roads FBH	PC Roads FBH	<ul style="list-style-type: none"><li>▪ Impacts on living conditions</li><li>▪ Road users are orderly informed about construction works on roads via radio news and auto-moto club’s press releases.</li></ul>
▪ Compliance with national legislation	▪ Obtaining all necessary permits for Project implementation.	Internal resources	Internal resources	PC Roads FBH + Project designer	Pc Roads FBH	<ul style="list-style-type: none"><li>▪ Compliance with national legislation</li></ul>

PC Roads of FBH

November 2017

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
<ul style="list-style-type: none"> <li>Restrictions on land use and damages on private property</li> </ul>	<ul style="list-style-type: none"> <li>Avoid private properties where possible;</li> <li>The Contractor will organize the construction site in collaboration and agreement with Zenica municipality;</li> <li>In case occasional land occupation cannot be avoided, compensation will be provided to affected owners/users (application of RPF), as well as compensation for loss of the possibility to continue to use land as intended.</li> </ul>	Internal resources	Internal resources	Contractor + PC Roads FBH	PC Roads FBH	If occasional land use cannot be avoided, it will be agreed upon with respective owner and compensation will be paid before the land is accessed
<ul style="list-style-type: none"> <li>Job creation and impacts on local business</li> </ul>	<ul style="list-style-type: none"> <li>Informing the public in advance about the construction works, in order to enable businesses and workforce in the area to prepare for the demand on the market via local newspapers, the municipality's notice board and website and via PC Roads' website as soon as the contract is signed</li> <li>Informing business owners in advance about the construction works, in order to be able to plan the necessary road use accordingly (via local newspapers, the municipality's notice board and website and via PC Roads' website as soon as the contract is signed)</li> </ul>	Internal resources	Internal resources	Contractor + PC Roads FBH	Contractor + PC Roads FBH	
CONSTRUCTION PHASE						

PC Roads of FBH

November 2017

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
▪ Access restriction	<ul style="list-style-type: none"> <li>▪ Implementation of the provisions on providing timely information to citizens through the media about upcoming construction works, expected duration of the works, alternative routes, etc. via an information leaflet on the construction site, local newspapers, the municipality's notice board and website and via PC Roads' website as soon as the contract is signed</li> <li>▪ Implementation of TMP.</li> <li>▪ Clear signs posted. Notifications made through media or other road safety clubs on road closure.</li> <li>▪ Area where materials and equipment are stored are clearly marked and closed off to unauthorized access.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
▪ Impacts on living conditions of local community	<ul style="list-style-type: none"> <li>▪ Providing timely information to the citizens on any type of disruption and inconvenience; via an information leaflet on the construction site, local newspapers, the municipality's notice board and website and via PC Roads' website, as soon as the type and duration of the disruption and inconvenience is known.</li> <li>▪ Implementation of TMP;</li> <li>▪ Implementation of CSOP;</li> <li>▪ Implementation of ESMP provisions.</li> </ul>	Included in construction works	Included in supervision	PC Roads FBH (providing information s to the citizens) + Contractor(following the provisions of the TMP, CSOP, ESMP	Supervisory body*	
▪ Temporary occupation of	▪ Avoidance of temporary occupation of privately owned plots;	Internal	Internal	PC Roads FBH+	PC Roads FBH*	

\* Supervisor shall be a Consultant appointed by PC Road FBH according to Federal Legislation.

\* Supervisory body shall be a Consultant appointed by PC Roads FBH according to Federal legislative

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
publicly or privately owned land plots in case of unforeseen circumstances	<ul style="list-style-type: none"> <li>In case avoidance is not possible, minimise size of the area used and impacts on the vegetation and implementation of RPF on temporary occupation.</li> </ul>	resources	resources	Contractor		
<ul style="list-style-type: none"> <li>Impacts on local traffic (increase of local traffic, including heavy machinery and trucks), use of only one lane causing traffic delays and limited access</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of TMP;</li> <li>Introduction of appropriate signalization and warning signs;</li> <li>Timely information to public on traffic disruptions.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	In collaboration with the Cantonal Ministry of the Interior Relations and BHAMK
<ul style="list-style-type: none"> <li>Impact on the Bosna River</li> </ul>	<ul style="list-style-type: none"> <li>Infill must be controlled in order not to endanger the flow profile of the Bosna River control</li> <li>Ensure that the sandblasting of the bridge construction and demolition works are carried out with protective covers, so waste cannot reach the river; and that the dripping of paint is caught in tarps.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>Impact on fish habitat and water quality</li> </ul>	<ul style="list-style-type: none"> <li>In order to avoid negative impacts the following mitigation measures can be used: <ul style="list-style-type: none"> <li>Ensure that concrete works are isolated from watercourses;</li> <li>Ensure that dirty water from machines, during the rehabilitation works, is collected and disposed properly</li> <li>Ensure that equipment is not washed near the watercourse.</li> <li>Ensure that the sandblasting of the bridge construction and demolition works are carried out with protective</li> </ul> </li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
	covers, so waste cannot reach the river; and that the dripping of paint is caught in tarps. - Ensure no changes to the flow of the river are caused by diversions during works on foundations ▪ Respect all protection provisions in line with the local regulations that call for protection of the Bosna river and riverbanks					
▪ Air emissions: - exhaust gasses; - dust generation - Increased emissions of exhaust gases in the tunnel	▪ High quality fossil fuels (with low percentage of sulphur and lead) need to be used for construction machinery and equipment; ▪ All machines and vehicles to be used in reconstruction activities must have use permit; ▪ Vehicles need to be regularly maintained; ▪ Equipment with installed filters to reduce soot emission needs to be used; ▪ When not in use the equipment and machinery need to be shut down; ▪ Maximum speed of the vehicle on unpaved roads should be restricted to 20 km/h; ▪ Sand and gravel materials need to be transported in covered trucks. ▪ In case of complaints by workers, the traffic of construction machinery inside the tunnel needs to be minimized	Included in construction works	Included in supervision	Contractor	Supervisory body*	
▪ Increased level of noise and vibration: - noise emission and	▪ In the case of noise complaints by local residents, simultaneous use of machines that generate noise over 70 dB needs to be limited;	Included in construction	Included in supervision	Contractor	Supervisory body*	

\* Supervisor shall be a Consultant appointed by PC Road FBH according to Federal Legislation.

PC Roads of FBH

November 2017

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
noise disturbance; - vibration	<ul style="list-style-type: none"> <li>▪ In the case of noise complaints by local residents, number of trucks per day visiting the site needs to be reduced;</li> <li>▪ All machines and vehicles to be used in reconstruction activities must have use permit;</li> <li>▪ When not in use the equipment and machinery need to be shut down;</li> <li>▪ Maximum speed of the vehicle on unpaved roads should be restricted to 20 km/h.</li> </ul>	works				
<ul style="list-style-type: none"> <li>▪ Emissions into water:</li> <li>- possible contamination of surface water</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure there is an emergency plan to contain all leaks and spills that result from an accident.</li> <li>▪ Prevent any repairs, handling of machinery, fuels or lubricants in areas that are not designated for such use.</li> <li>▪ Proper waste disposal and separation of hazardous waste is required, as well as the engagement of authorized companies for final waste disposal;</li> <li>▪ Oil and fuel collection systems to be fitted to prevent leakage;</li> <li>▪ Vehicles and machines need to be regularly maintained to prevent leakage.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>▪ Soil degradation and emissions to soil:</li> <li>- soil contamination by oils, fuels and other hazardous substances</li> </ul>	<ul style="list-style-type: none"> <li>▪ Proper waste disposal; separation of hazardous waste; engagement of authorized companies for final waste disposal; track of the final disposal sites especially for removed asphalt; note/record of the waste amounts;</li> <li>▪ Oil and fuel collection systems to be fitted to prevent leakage</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>▪ Degradation of biological and</li> </ul>	<ul style="list-style-type: none"> <li>▪ Prevent and control oil, fuel, and chemical spillages that can find their way to the soil, watercourses;</li> </ul>	Included in construction	Included in	Contractor	Supervisory	

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
ecological resources by oil, fuel and chemical spillages	<ul style="list-style-type: none"> <li>Works in the riverbed must be minimized and restricted;</li> </ul>	works	supervision		body*	
<ul style="list-style-type: none"> <li>Inadequate waste handling</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of WMP that shall ensure environmentally sound collection of waste, its storage, transport and final disposal, and primarily reuse / recycling.</li> <li>No clandestine waste disposal will be allowed on site, including open burning of wastes.</li> <li>The waste should be stored for a short period of time and should be removed as soon as possible.</li> <li>The waste should be primarily recycled or reused where possible and then finally disposed</li> <li>No open burning of wastes is allowed on site</li> <li>Waste that cannot be reused should be handed over to a licensed company or agent (amounts are to be recorded as well as types of handling actions).</li> <li>Disposal sites of construction material are determined by the municipality and should be handled in the most appropriate environmental manner.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>Inadequate workers safety</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of work safety measures:                             <ul style="list-style-type: none"> <li>Provide workers with a safe and healthy work environment, as defined in the Occupational Health and Safety Management Plan (OHSMP) ,developed as a part of the Construction Site Organization Plan (CSOP) that will be developed for the Project</li> <li>Provide personal protective equipment,</li> <li>Respect safety procedures,</li> </ul> </li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
	<ul style="list-style-type: none"> <li>- Provide portable toilets,</li> <li>- Provide drinking water</li> <li>- Implementation of provisions determined in the Study of Applied Measures for Insurance of Occupational Safety in the Main Project</li> </ul>					
<ul style="list-style-type: none"> <li>▪ Accidental situations i.e. spills, leakage of oils, fats, fuels and similar hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implementation of Environmental Management Plan which includes:               <ul style="list-style-type: none"> <li>- Spill Response Plan,</li> <li>- Emergency Preparedness and Response Plan.</li> </ul> </li> <li>▪ Implementation of Management Plan of Fire and Explosion</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>▪ Materials supply and transport</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implementation of CSOP to ensure materials are transported in covered vehicles to reduce impacts on environment</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>▪ Paving of the bridges and painting fences on bridges</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure that the asphalt is not deposited on purpose or accidentally into watercourses;</li> <li>▪ Ensure that the sandblasting of the bridge construction is carried out with protective covers and the dripping of paint is caught in tarps.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul style="list-style-type: none"> <li>▪ Impact to the flow profile of river Bosna</li> </ul>	<ul style="list-style-type: none"> <li>▪ Works should be carried out in the period of low water;</li> <li>▪ Strictly control work of excavation around foundations;</li> <li>▪ Restrict the movement of vehicles in the river bed;</li> <li>▪ Excavated material cannot be disposed in the riverbed or on riverbanks.</li> <li>▪ No waste disposal in river.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	

\* Supervisor shall be a Consultant appointed by PC Road FBH according to Federal Legislation.

Impact/Problem	Mitigation Measures	Cost Assessment (US\$)		Institutional Responsibility		Comments
		Operative	Implementation	Operative	Implementation	
	<ul style="list-style-type: none"> <li>No cutting off of flow of the river in entirety</li> <li>Maintain high standard of protection of the riverbanks and river profile during works.</li> </ul>					
CHANCE-FIND PROCEDURES DURING CONSTRUCTION PHASE						
<ul style="list-style-type: none"> <li>Impacts on cultural heritage</li> </ul>	<ul style="list-style-type: none"> <li>If archaeological findings or other chance finds appear on or near construction site immediate work suspension and local authorities notification is required;</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	In case of finding cultural heritage, supervision is implemented by the competent institution
OPERATION PHASE						
<ul style="list-style-type: none"> <li>Problems due to lack of maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Regular road/tunnel /bridge maintenance works</li> </ul>	Included in maintenance works	Internal resources	Contractor for maintenance works	PC Roads FBH	
<ul style="list-style-type: none"> <li>Decrease in road safety due to the increase of traffic and speed</li> </ul>	<ul style="list-style-type: none"> <li>Regular maintenance of road safety equipment and signage</li> </ul>	Incl. in maintenance works	Internal resources	Contractor for maintenance works	PC Roads FBH	

## **8. ENVIRONMENTAL MONITORING PROGRAM**

The table below presents monitoring plan necessary for construction site – developed in connection of mitigation measures to avoid or reduce negative impact.

Prior to commencement of works, in accordance with requirements of the ESMP, and a minimum of monitoring requirements, described in table below, without limitation to these requirements, the Contractor shall prepare detailed list of mitigation measures and parameters to be monitored and prepare the site-specific baseline data as foreseen in the monitoring program below.

The monitoring plan on construction site will be used by Supervision Engineers of PC Roads FBH. These signed lists will be forwarded to PC Roads FBH, who will be responsible for monitoring and reporting about the compliance.

PC Roads FBH will maintain a registry of grievances, which will contain all information on grievances or complaints received by the community or other interested parties. That will include: type of grievance, time and actions for their resolution and outcome.

Table 7: Environmental and Social Monitoring Program

Potential impact	Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost assessment (US\$)		Responsibility	
					Implementa tion	Operative	Implementa tion	Operative
PRE-CONSTRUCTION PHASE								
▪ Job creation and impacts on local businesses	▪ Number of employed persons from local communities ▪ Timely informing the local communities	Wider area of construction	Inspection	Prior to construction	Included in performance	Included in performance	Contractor	Contractor
CONSTRUCTION PHASE								
▪ Access restrictions	▪ TMP in place	Construction site	Visual inspection	Random checks at least once a week during the construction	Included in supervision	Included in supervision	Supervisory body + PC Roads FBH	Supervisory body + PC Roads FBH
▪ Restrictions on land use and damage to the private property (agricultural plots, horizontal infrastructure, fences and railings) due to disposal of construction waste, work camps and parks of heavy machinery	▪ CSOP in place, ▪ Implementation of RPF provisions on compensation procedures in case occasional land use cannot be avoided, compensation will be provided to affected owners/users	Construction site	Visual inspection + Central Grievance Log	Prior to construction and random checks at least once a week during the construction	Included in supervision	Included in supervision	Supervisory body + PC Roads FBH	Supervisory body + PC Roads FBH
▪ Impacts on local traffic (increase of local traffic, including heavy machinery and trucks, operation of	▪ TMP in place ▪ Traffic patterns, ▪ Timely information to the	On construction site and nearby	Visual inspection and inspection	Random checks during the week	Included in supervision	Included in supervision	Supervisory body	Supervisory body

Potential impact	Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost assessment (US\$)		Responsibility	
					Implementa tion	Operative	Implementa tion	Operative
roads with only one lane causing traffic delays and limited access)	citizens							
<ul style="list-style-type: none"> <li>▪ Air emissions:               <ul style="list-style-type: none"> <li>- exhaust gasses;</li> <li>- dust generation</li> <li>- Increased emissions of exhaust gases in the tunnel</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Level of dust (amount of particles of sediment and floating particles)</li> <li>▪ Emissions of exhaust gases from vehicles and equipment</li> <li>▪ (SO<sub>2</sub>, NO<sub>2</sub>, dim and PM<sub>10</sub>)</li> </ul>	Construction site	Measuring devices	As a baseline and during construction when needed and upon complaints by the citizens and workers	-	500 USD/measuring	Contractor + Supervision	Authorized laboratory
<ul style="list-style-type: none"> <li>▪ Increased level of noise and vibration:               <ul style="list-style-type: none"> <li>- noise levels</li> <li>- vibration</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Level of noise</li> </ul>	In populated places near the construction site	Measuring devices	Upon order by supervisory organ or upon complaints by the citizens	-	500 USD /measuring	Contractor + Supervision	Authorized laboratory
<ul style="list-style-type: none"> <li>▪ Emissions into water:               <ul style="list-style-type: none"> <li>- possible contamination of Bosna river</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Analysis of parameters of surface water quality:               <ul style="list-style-type: none"> <li>- Chemical analysis (PH, turbidity, conductivity, temperature, suspended particles, COD, BOD, ingredients with nitrogen)</li> <li>- Standard bacteriological analyses</li> </ul> </li> </ul>	In watercourses near construction downstream	Standard laboratory equipment and methods of water quality monitoring	As a baseline and upon order by supervisory organ or upon complaints by the citizens	-	1000 USD /measuring	Contractor + Supervision	Authorized laboratory
<ul style="list-style-type: none"> <li>▪ Pollution of surface watercourses</li> </ul>	<ul style="list-style-type: none"> <li>▪ Presence of oil film in surface watercourses</li> </ul>	In watercourses near construction	Visual inspection + Standard	Upon order by supervisory organ or upon complaints by the	-	500 USD /measuring	Contractor + Supervision	Authorized laboratory

Potential impact	Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost assessment (US\$)		Responsibility	
					Implementa tion	Operative	Implementa tion	Operative
		site downstream	laboratory equipment and methods of water quality monitoring	citizens				
Soil pollution	<ul style="list-style-type: none"> <li>Soil quality, including, PH, heavy metals, phosphorus, nitrogen, Na, Ca, salts, PAHs hydrocarbons</li> </ul>	On representative plots of land near construction sites	Taking samples and standard laboratory analyses	As a baseline and upon order by supervisory organ or upon complaints by the citizens	-	500 USD /measuring	Contractor + Supervision	Authorized laboratory
<ul style="list-style-type: none"> <li>Emissions into water and soil due to improper waste handling</li> </ul>	<ul style="list-style-type: none"> <li>CSOP in place,</li> <li>WMP in place</li> <li>Placing protective covers during demolition works and sandblasting works</li> </ul>	Construction site	Visual inspection, disposal records or receipts from landfills	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
<ul style="list-style-type: none"> <li>Degradation of biological and ecological resources</li> </ul>	<ul style="list-style-type: none"> <li>Survey of the site for any endemic or endangered species</li> </ul>	In the zone of corridors of direct and indirect impacts	Field recordings and incorporation of the findings in the ESMP	As a baseline	-	-	Contractor	Authorized institution

Potential impact	Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost assessment (US\$)		Responsibility	
					Implementa tion	Operative	Implementa tion	Operative
▪ Waste management	▪ Implementation of WMP	Construction site	Visual inspection, disposal records or receipts from landfills	Regularly during construction, as appropriate. Amount and disposal records internal reports will be made daily and monthly	Included in performance	Included in performance	Contractor + Supervision	Contractor
▪ Accidental situations i.e. spills, leakage	▪ Implementation of EMP which includes: - Spill Response Plan, - Emergency Preparedness and - Response Plan	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
▪ Materials supply	▪ Implementation of CSOP (the origin of material, material approvals etc.)	Construction site	Reports	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
▪ Material transport	▪ Implementation of CSOP (the origin of material, licenses etc.)	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
▪ Workers safety	▪ Implementation of work safety measures (protection equipment, toilets, drinkable water etc.) ▪ Implementation of World Bank Occupational Health and Safety	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor

Potential impact	Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost assessment (US\$)		Responsibility	
					Implementation	Operative	Implementation	Operative
	Guidelines							
▪ River bed and river flow	<ul style="list-style-type: none"> <li>▪ Changes in the river flow, including flooding, water retention or complete cutting off of river flow during works.</li> <li>▪ Changes to the river banks</li> <li>▪ Disposal of wastes or materials on river banks or in river</li> <li>▪ Unauthorized activities being conducted within the river bed</li> </ul>	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor

*Note: All mitigation measures and parameters to be monitored should be included in total price of works performance. The table includes additionally provided prices of sampling and laboratory testing, solely as information for assessment of overall costs of construction.*

## **9. IMPLEMENTATION AND REPORTING**

### **9.1. PROJECT IMPLEMENTATION**

PC Roads FBH is the implementer of the project and will be responsible for the implementation and compliance of the project in line with ESMP.

The public has the right to participate directly or indirectly, with a possibility to state their interests and opinion in decision-making process during all project activities.

The application of all identified environmental and social mitigation measures and the environmental monitoring program will be ensured. The Contractor will be responsible for the implementation of the environmental mitigation measures during construction. The supervisor will employ environmental experts to supervise the implementation of Contractor's responsibilities, and will be in communication with the investor. PC Roads FBH will constitute a Grievances Committee which will receive all grievances during Project implementation in accordance with grievance mechanisms as prescribed in the Environmental Management Plan and Environmental and Social Management Framework for the Program of Modernization of Major roads of the FBH (ESMF). Furthermore, the Project Implementation Unit of PC Roads FBH includes an environmental and a social expert. During project implementation, the Investor will supervise compliance of the Contractor with provisions and ESMP.

Upon project completion, PC Roads FBH will be in charge of facilities management and maintenance. Regular and timely payment will be carried out in accordance with monitoring plan.

### **9.2. REPORTING PROCESS**

#### **9.2.1. Contractor to PC Roads FBH**

The Contractor shall prepare a Report on compliance with ESMP in form of a monthly progress report and submit it to PC Roads FBH in a local language (C/S/B and in English, in analogue and digital form.

In case of any accidental situations or jeopardizing the environment and society the reporting process must be immediate. The Contractor is obliged to inform the PC Roads FBH and local community immediately after any accidental situations that happened over the phone +387 33 250 370 or via email form at the PC Roads FBH website: <http://jpcfbih.ba/index.php/bs/kontakt>.

The Contractor's reports to PC Roads FBH are to include a list and description of the performed activities, as well as recommendations and planned future activities and protection measures.

#### **9.2.2. Supervision Engineer to PC Roads FBH**

The Supervision Engineer shall prepare a Report on compliance with ESMP in form of a monthly progress report and submit it to PC Roads FBH in a local language (C/S/B and in English, in analogue and digital form.

#### **9.2.3. PC Roads FBH to WB**

PC Roads FBH shall prepare Annual Environmental Health and Safety Reports (AEHS), including monitoring indicators and reports on the implementation of their requirements set in ESPM and submit them to the World Bank for review.

In case of higher-scale accidents or deaths on construction site, PC Roads FBH shall promptly notify the World Bank thereof.

## **10. PUBLIC DISCUSSION AND INFORMATION DISCLOSURE**

### **10.1. PUBLIC CONSULTATION**

Public consultation of the subject ESMP was organized in Zenica (MZ Vranduk) after the WB approved the draft of the ESMP.

The document was published and available to the public in a local language on the website of PC Roads FBH on 09.04.2018. and on the website of Zenica City on 06.04.2018. Public consultations were announced on the website PC Roads FBH on 09.04.2018. and on the website of Zenica City on 06.04.2018. and on 11.04.2018. in local newspapers (Dnevni Avaz). The public consultations were held on 26.04.2018. in Vranduk, and the Minutes of the Public Discussion on ESMP is an Appendix 3 of this document. Public consultations were attended by 28 interested parties.

The record on public discussion, that is, grievances presented at the public discussion shall be recorded in the Grievance Register, and opinions and suggestions of the public shall be integrated into the final ESMP.

After public discussion the documents is disclosed again on the website of PC Roads of FBH.

### **10.2. INFORMATION DISCLOSURE**

ESMP draft was available on the website of PC Roads of the ([www.jpcfbih.ba](http://www.jpcfbih.ba)) in a local language and on the website of the World Bank in English. During the process of public consultation the interested public got all information regarding the project, including social and environmental issues.

During construction works the Contractors will submit monthly information to PC Roads FBH regarding process of work, which will be published on the websites of PC Roads FBH and BHAMK (Car Association of BH) regarding temporary traffic regulation.

Schedule of works and potential changes to the schedule will also be announced two weeks prior to the beginning of works on the website of PC Roads FBH and in local newspapers, radio and television stations for disclosure. The schedules will provide information on the beginning and end of works, which can impact the affected groups (such as changes to traffic/water/regime of electric energy supply and access, noise and dust due to construction works).

#### **10.2.1. Grievance Mechanisms**

Besides the institutionally available ordinary and extraordinary legal remedy, and existing institutional channels, PC Roads FBH will ensure and form a special Grievance Redress

Mechanism in collaboration and direct involvement of those municipalities under whose administrative authority the project is carried out, in this case with the Zenica municipality.

Grievance Redress Mechanism designed for this project is the **Central Feedback Desk (CFD)** at the level of the implementing agency PC Roads FBH which shall serve as both Project level information center and grievance mechanism, available to those affected by implementation of all project sub-components. The CFD shall serve the persons affected directly or indirectly by construction works.

The Grievance Registration Sheet (Appendix 1) as print out shall be available at municipal administration, at the construction site and in the offices of PC Roads FBH and shall be available for download on the website of JP Roads FBH ([www.jpconfbih.ba](http://www.jpconfbih.ba)) and the municipality's website.

The grievance can be logged in writing with the Contractor, at the construction site as well as in the contractor's offices. The contractor is obliged to hand out the Grievance Registration Sheet, explain the grievance mechanism to the concerned citizen and forward the filled in Grievance Form to the central Feedback Desk in PC Roads FBH. The grievance can also be filled in within PC Roads FBH, by phone, by fax, and by e-mailing it to the designated e-mail address [zalbena@jpconfbih.ba](mailto:zalbena@jpconfbih.ba), or by mail to the address Terezija 54, 71000 Sarajevo.

An information leaflet concerning the grievance mechanism will be available at the construction site at all times, weather the construction site is closed or open. The information leaflet will be plasticized and hung on the construction site information board to be available to road users at all times

All grievances will be archived in the register and assigned a number, and acknowledged within 3 working days.

The CFD will make all reasonable efforts to address the complaint upon the acknowledgement of grievance. If the CFD is not able to address the issues raised by immediate corrective action, a long-term corrective action will be identified. The complainant will be informed about the proposed corrective action and follow-up of corrective action within 14 working days upon the acknowledgement of grievance.

If the particular issue raised through the grievance mechanism cannot be addressed or if action is not required, a detailed explanation/ justification will be provided to the complainant on why the issue was not addressed. The response will also contain an explanation on how the person/ organization that raised the complaint can proceed with the grievance in case the outcome is not satisfactory.

At all times, complainants may seek other legal remedies in accordance with the legal framework of FBiH.

## **11.Requirements for start of works**

The Contractor shall establish all required baseline data before the commencement of works. The Baseline – Monitoring data shall include air quality data, surface water quality data, soil quality data, survey of the site for any endangered and endemic species and other environmental issues in zone of corridors of direct and indirect impacts. The Contractor is also obliged to ensure these measurements during and after completion of the construction works. The Contractor will ensure that the measurements are conducted by authorized agencies and that they are based on the findings and recommendations of a qualified expert.

The Contractor shall develop:

A Construction Site Organization Plan (CSOP) that is made up of:

- a. Implementation Plan of this ESMP,
- b. a detailed Waste Management Plan (WMP)]
- c. Study on Safety (includes Elaborate on Safety at Work and Elaborate on Protection From Fire and Explosions),
- d. Traffic Management Plan (TMP) must be developed, which will be created by the Contractor prior to the beginning of construction works.

These studies are to be developed in accordance with federal acts<sup>11</sup>, before starting the execution of works, while the Contractor's legal obligations defined in the Bidding Documents and Contract shall be based on the a provisions of this ESMP . The Contractor shall submit these studies to the PC Roads FBH supervisory engineer, Environmental and Social Specialists, before beginning of works, and the Company has to accept and approve them prior to start of works.

Due to the time constraints related to the issuance of the bidding documents, the public consultations are to be held prior to the start of works but once the bidding documents have been issued; therefore the ESMP included in the bidding documents may need to be subsequently updated after the consultations. The contractor will be obliged to follow the updated ESMP.

---

<sup>11</sup> Provision on arrangements of construction site, mandatory documentation at the construction site and participants in construction, Official Gazette of FBH 48/09, 75/09 and 63/12

## **APPENDICES**

## APPENDIX 1. GRIEVANCE FORM

	REFERENCE NUMBER (Filled by the office)	
CATEGORY OF COMPLAINTS	A) Affected by expropriation	
	b) All others	
PARTICIPANT INFORMATION OF GRIEVANCE		
FULL NAME		
YEAR OF BIRTH		
GENDER	M	F
ADDRESS		
TELEPHONE/MOBILE NUMBER		
E-MAIL		
Description of Incident for Grievance (What happened? Where did it happen? Whom did it happen to? What is the result of the problem?)		
Date of the Incident?		
<ul style="list-style-type: none"> <li>One-time incident/grievance – Date: _____</li> <li>Happened more than once (How many times?) _____</li> <li>On-going (currently experiencing problem)</li> </ul>		
What would you like to see happen?		
DATE:	SIGNATURE:	
<p>RETURN THIS FORM TO:</p> <p style="text-align: center;">CENTRAL FEEDBACK DESK</p> <p style="text-align: center;">PC ROADS OF THE FBH</p> <p style="text-align: center;">Terezija 54,</p> <p style="text-align: center;">71000 Sarajevo</p> <p style="text-align: center;">Note: All copies are returned to PIU</p>		

**APPENDIX 2. GRIEVANCE REGISTRATION TEMPLATE TABLE**

No.	Date of receipt	Type of grievance	Description of grievance	Complainant		Date of acknowledgment of receipt	Description of actions undertaken	Date of solvation of grievance
				Status	Sex			

## APPENDIX 3. REPORT ON PUBLIC DISCUSSION



JP Ceste Federacije BiH d.o.o. Sarajevo poziva sve zainteresirane subjekte, nevladine organizacije i stanovnike grada Zenica i naselja koja gravitiraju području namjeravane rehabilitacije tunela „Vranduk II“ i mosta preko rijeke Bosne „Bosna IV“, da uzmu učešće u

### JAVNOJ RASPRAVI

o nacrtu Plana upravljanja okolišem i društvenim aspektima za projekat rehabilitacije tunela „Vranduk II“ i mosta preko rijeke Bosne „Bosna IV“

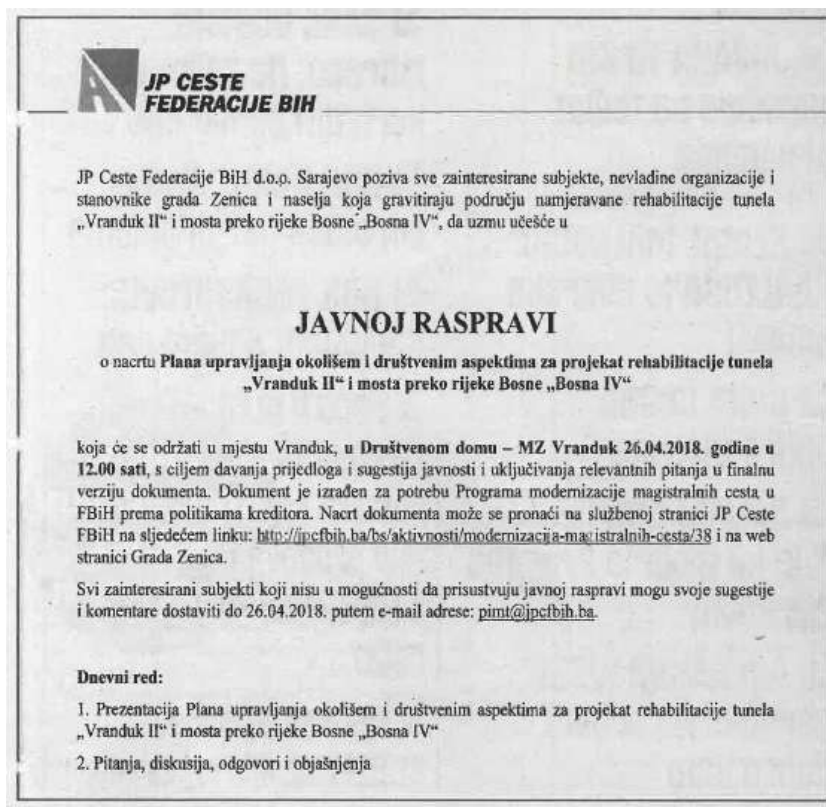
koja će se održati u mjestu Vranduk, u Društvenom domu – MZ Vranduk 26.04.2018. godine u 12.00 sati, s ciljem davanja prijedloga i sugestija javnosti i uključivanja relevantnih pitanja u finalnu verziju dokumenta. Dokument je izrađen za potrebu Programa modernizacije magistralnih cesta u FBiH prema politikama kreditora. Nacrt dokumenta može se pronaći na službenoj stranici JP Ceste FBiH na sljedećem linku: <http://jpcfbih.ba/bs/aktivnosti/modernizacija-magistralnih-cesta/38> i na web stranici Grada Zenica.

Svi zainteresirani subjekti koji nisu u mogućnosti da prisustvuju javnoj raspravi mogu svoje sugestije i komentare dostaviti do 26.04.2018. putem e-mail adrese: [pimt@jpcfbih.ba](mailto:pimt@jpcfbih.ba).

#### Dnevni red:

1. Prezentacija Plana upravljanja okolišem i društvenim aspektima za projekat rehabilitacije tunela „Vranduk II“ i mosta preko rijeke Bosne „Bosna IV“
2. Pitanja, diskusija, odgovori i objašnjenja

[illegible]



Web addresses containing the document and the Announcement of Public discussion with screenshots of the websites:

**1. PC Roads of FBH website (published on April 9, 2018)**

<https://jpcfbih.ba/bs/novosti/javna-rasprava-o-nacrtu-plana-upravljanja-okolisem-i-drustvenim-aspektima-za-projekat-rehabilitacije-tunela-vranduk-ii-i-mosta-preko-rijeke-bosne-bosna-iv/43> - Announcement of the Public discussion (B/H/S language)

<http://jpcfbih.ba/bs/aktivnosti/modernizacija-magistralnih-cesta/38> - Document (B/H/S language)

<https://jpcfbih.ba/en/news/public-consultations-on-draft-environmental-and-social-management-plan-for-the-project-of-the-improvements-of-the-tunnel-vranduk-ii-and-bridge-over-bosna/43> - Announcement of the Public discussion (English language)

<http://jpcfbih.ba/en/activities/modernization-of-main-roads/38> - Document (English language)



## 2. City of Zenica website (published on April 6, 2018)

[http://www.zenica.ba/aktuelnosti/javne-rasprave/news/javna-rasprava-o-nacrtu-plana-upravljanja-okolisem-i-drustvenim-aspektima-za-projekat-rehabilitacije-tunela-vranduk-ii-i-mosta-preko-rijeke-bosne-bosna-iv/?tx\\_news\\_pi1\[controller\]=News&tx\\_news\\_pi1\[action\]=detail&cHash=1e8c908378425cf0810323a178a4dcca](http://www.zenica.ba/aktuelnosti/javne-rasprave/news/javna-rasprava-o-nacrtu-plana-upravljanja-okolisem-i-drustvenim-aspektima-za-projekat-rehabilitacije-tunela-vranduk-ii-i-mosta-preko-rijeke-bosne-bosna-iv/?tx_news_pi1[controller]=News&tx_news_pi1[action]=detail&cHash=1e8c908378425cf0810323a178a4dcca)

[http://www.zenica.ba/fileadmin/user\\_upload/PDF/2018/Plan upravljanja okolisem i dr. a spektima.pdf](http://www.zenica.ba/fileadmin/user_upload/PDF/2018/Plan_upravljanja_okolisem_i_dr._a_spektima.pdf)

# ESMP FOR THE PROJECT OF THE IMPROVEMENTS OF THE TUNNEL VRANDUK II AND BRIDGE OVER BOSNA RIVER "BOSNA IV" IN ZENICA

PC Roads of FBH

November 2017



## MINUTES

### **of Public Consultation Meeting on the draft Environmental and Social Management Plan for the Project of the Improvements of Tunnel Vranduk II and Bridge over r. Bosna "Bosna IV"**

Public consultation meeting on the draft Environmental and Social Management Plan for the Project of the Improvements of Tunnel Vranduk II and Bridge over r. Bosna "Bosna IV" was held on April 26, 2018 at 12 am in business premises of Community Centre – MZ Vranduk.

On behalf of the PC Roads of the Federation of Bosnia and Herzegovina, public consultation meeting was attended by:

- **Nijaz Hadžikadunić** – Project Manager,
- **Selma Ljubijankić** – PIT Member in charge of social aspects of the Roads Modernization Program,
- **Haris Zejnić** – PIT member, assistant for EIA Monitoring under the Roads Modernization Program.

A list of all attendees is enclosed to these minutes.

**Selma Ljubijankić** welcomed the attendees, presented the representatives of the PC Roads of the FBiH and provided an overview of the Roads Modernization Program and the above document. She introduced the attendees to the draft Environmental and Social Management Plan for the Project of the Improvements of Tunnel Vranduk II and Bridge over r. Bosna "Bosna IV", including goals of its provision, mitigation measures of all potential identified environmental and social impacts, monitoring plan, information disclosure, grievance mechanism, requirements regarding work commencement and other relevant information.

It was pointed out that this is a draft document and that all relevant comments from this public consultation meeting will be incorporated into its final version. It was further clarified that the document was revised by the World Bank's team, and upon its approval, it will become a binding document for the contracting parties in the project implementation itself.

**Nijaz Hadžikadunić** presented an overview of the Project of the Improvements of Tunnel Vranduk II and Bridge over r. Bosna "Bosna IV", describing the scope, implementation and project objectives. He described the existing condition of the tunnel and bridges, and the stages during improvements of tunnels and bridges. The project foresees improvements to tunnel portals, including the provision of standard waterproofing and secondary lining over 150 m of the entry and the exit part of the tunnel. It was stated that a complete traffic suspension was planned for a period of 4 months, and the alternate traffic through the tunnel for the remainder of the 14 months, including the construction of an evacuation tunnel. All necessary tunnel equipment will be installed in order to modernize the tunnel structure. Furthermore, it is planned to remove decks and fences from the bridge over r.

Bosnia "Bosna IV" and to provide reinforcement, pedestrian paths, guardrails, elastic fences, drainage, waterproofing, asphalt works etc. Dilatations, fences, waterproofing and asphalt works are planned to be executed on the bridge Bosna V. The dimensions of the above structures will not be changed but modernized.

The alternative routes through the regional and local roads were taken into consideration as well. In cooperation with the representatives of municipalities, cantons and construction supervision entities it is envisaged to provide baseline survey of the carriageway before its use. The contractor is obliged to provide cost estimates of bringing these carriageways to the condition suitable for use. With support of the representatives of municipalities, cantons and construction supervision entities, after the forks completion these carriageways must be brought to their original condition prior to works commencement.

**Besim Begić**, President of the Local Community Vranduk states that it has not been pointed out that the traffic will take place during the works, since freight traffic is being prohibited along the road at the foot of the Vranduk fortress. The commencement of works at the hydroelectric power plant Vranduk near the tunnel is also presented as an issue. In connection therewith, it was inquired about the traffic management during the works.

**Nijaz Hadžikadunić** confirmed that they are aware of the prohibition of freight traffic along this alignment. The attendees were presented the possible variants for both passenger and freight traffic. As for the adopted version, it is foreseen to make it suitable for a particular type of traffic before the works themselves.

**Besim Begić** discussed the bridge that would have to receive traffic under one of the bypass variants, seeing it unsuitable for freight traffic, and referenced to a passage through a nearby village being hard even for passenger vehicles, and the proximity of a school.

**Alija Gazić** stated that only passenger vehicles are allowed passing by the school, unlike the big and freight vehicles.

**Ermin Dervišević**, a local resident of Koprivna mentioned that is necessary to immediately identify the alternative for freight traffic. He discussed the condition of road near the Koprivna settlement explaining that neither that one is suitable for freight traffic due to the fact the water supply is following the road alignment, the road width is inadequate for freight vehicles requiring the extensions. He emphasized the school closeness as an issue.

**Nijaz Hadžikadunić** replied that it has been envisaged to bring the selected alternative route to be an adequate state before the start of use.

**Hasib Šehić** proposed making the inventory of road and road structures before works in the road vicinity.

**Emin Deliћ**, MZ Koprivna, emphasized that carriageways had impact to all local communities nearby. He believes that it would have been necessary to adjust all project conditions with

the citizens prior to works commencement. He expressed doubts as to whether the freight vehicles will be able to circulate through the nearby local communities.

**Selma Ljubijankić** emphasizes the goal of the project and the fact that the baseline survey will be conducted in order to determine road condition and condition of road structures before the commencement of works.

**Enes Sinanović**, MZ Vranduk, emphasizes the goal of the local citizens that is to do everything before the construction of the bridge and the tunnel, to provide the baseline survey and to take care of all alternative routes.

**Nijaz Hadžikadunić** explained that the discussions were made with representatives of the local community, local citizens, contractors for routine maintenance, and confirmed that no damage will be allowed to roads, road structures etc. Prior to works commencement, new alternative routes and necessary works on them will be identified with representatives of the local community, municipalities, cantons and other representatives in order to be used as such.

**Miralem Šarić** expressed doubt as to whether the trucks will be able to pass through the settlements. He proposed one-way traffic during works execution to allow the circulation of passenger but not of the freight vehicles.

**Nijaz Hadžikadunić** explained that since tunnel parts do not meet standards, secondary tunnel linings must be removed, and therefore the traffic must be suspended until this part is completed. If the tunnel had met the conditions, one-way traffic could have been established during the works execution. In accordance with the plan, the works are planned to start by the end of August, or in early September, and a part of the gravel road is foreseen to be asphalted in a length of 6 km.

**Abdulah Ibrahimović** suggested extending the local road through Vranduk for at least 2 meters to the Austro-Hungarian tunnel and preferably further to Koprivna.

**Nijaz Hadžikadunić** explained that the above will be done if the local road is chosen as an alternative.

**Jahija Valentić** inquired about the speed limit on the local road and how will it receive 12 thousand vehicles per day going through the village.

**Emir Deliće**, president of the Local Community Koprivna, stated that passing over the blue bridge is risky as the one can't accommodate the freight traffic or the one could be redirected through settlements. The closeness of the school has been discussed too.

**Nijaz Hadžikadunić** replied that the bridge bearing capacity will have to be checked if decided to use it as an alternative route.

**Ervin Dervišević** required the assessment of the bearing capacity of all supporting walls and other installations and facilities along the roads to be used as a bypass. Dates of this meeting

and the official invitation to participate have also been discussed, as the gentleman had just found about it.

**Selma Ljubijankić** replied that a request may be addressed to BIHAMK in order to urge other alternative for freight traffic. The invitation was published in daily newspapers 15 days before the public consultation meeting.

**Haris Zejnić** further clarified that this invitation has been published both in the local media and on the web site of the City of Zenica and the website of the PC Roads of the FBiH 15 days before the public consultation meeting.

**Nijaz Hadžikadunić** explained that as the works weren't contracted yet, the Contractor will have to take into consideration the conditions stated herein.

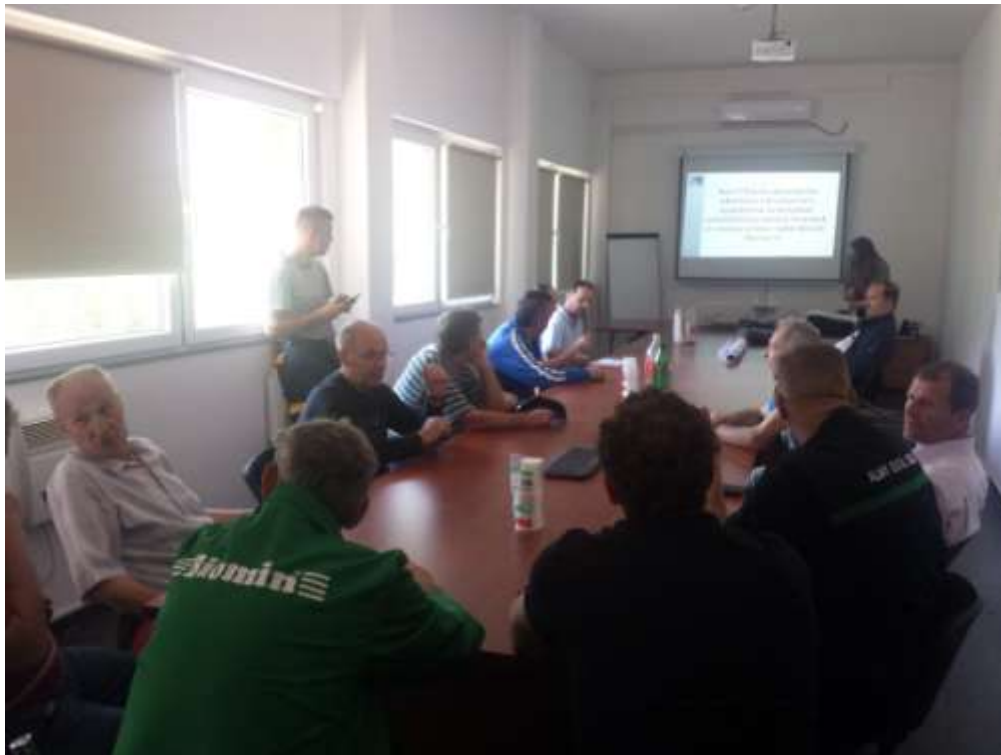
**Besim Begić** discussed that the above requests should be finalized and agreed with the presidents of local communities, including the drafting of requirements and their harmonizing with local communities.

**Nijaz Hadžikadunić** emphasized that there is still time for requests to be sent in writing through the web site, so that the PC Roads could finalize them and return to local communities in order to comply with all the conditions.

The public consultation meeting ended at 1 pm.

Photographs of participants in the Public Consultations in Vranduk (business premises of  
Community Centre – MZ Vranduk)





List of Participants in the Public Consultations



Javna rasprava o Planu upravljanja okolišem i društvenim aspektima za projekat rehabilitacije tunela „Vranduk II“ i mosta preko rijeke Bosne „Bosna IV“, Vranduk, 26. april 2018.g.

LISTA SUDIONIKA / LIST OF PARTICIPANTS

R.b. No.	Ime i prezime / Name and surname	Institucija/Institution	Tel.	E-mail	Potpis/Signature
1.	Ermin Dervisević		061/642-820		
2.	Halima Valić		062-619-659		
3.	Sindrić Enes	penzioner	061-613-667		
4.	Magazinović Armin	—	062-258-835		
5.	Šebić Hasan	—	061-061-667		
6.	Atlić Ibrahim	PENZIONER	061-013-500		
7.	Jarić Miralem	RADNIK	062-96-022		
8.	Čičak Mirko	Penz.	032-676226		
9.	Atlić	PEN.			
10.	Šehović Mustafa	PEN.			
11.	Yazici Alija	PENZIONER			
12.	Dejčić Bogdan	RADNIK	061/396-556		

**JP CESTE  
FEDERACIJE BIH**

13	Munir Huseinović	RAVNJE	0604196531		
14	Dečić Emir	ZENICA	062295069		
15	Kozlić SEJLA	RAVNJE	06010916529		t. Sejla
16	Imamović Bera	QDGOVIK	061039322		Imam
17	Šehić AM	RAVNJE	061576213		Šehić
18	NEŠIĆ BEGIĆ	RAVNJE	062189325		NEŠIĆ
19	ŠEHIĆ HASAN	RAVNJE	062273282		Š. HASAN
20	Šehić Bećir	PERZIORCE	060331459		Šehić B.
21	Čajlović Dorin	RAVNJE			Čajlović
22	Kurć JES	RAVNJE	061672356		Kurć
23	LEJLA BEGIĆ	GRAD ZENICA	061312229		Lejla
24	AJIPA KADUŠIĆ	GRAD ZENICA	061750670		Ajipa
25	BEGIĆ BEGIĆ	URAMOVIL	061432904		BEGIĆ
26	Dečić Emir	KOPRIVICA	062705292		Dečić
27	Mijaz Hadžeković	JP CESTE FBH			Mijaz
28	HARIS BEGIĆ	— II —	033120382		Haris
29					