# FEDERATION OF BOSNIA AND HERZEGOVINA ROAD SECTOR MODERNIZATION PROJECT

# DRAFT

Environmental and Social Managament Plan for the Project of Rehabilitation of the Bridge over the Breagva River on the Major Road M17



July 2016





# ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE PROJECT OF REHABILITATION OF THE BRIDGE OVER THE BREGAVA RIVER ON THE ROAD M 17 (SECTION MOSTAR-ČAPLJINA-BORDER WITH THE REPUBLIC CROATIA)

- DRAFT -

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#### LIST OF ABBREVIATIONS

BH	- Bosnia and Herzegovina
CFD	- Central Feedback Desk
CSOP	- Construction Site Organization Plan
EIB	- European Investment Bank
EMP	- Environmental Monitoring Program
ESMF	- Environmental Social Management Framework
ESMP	- Environmental and Social Management Plan
FBH	- Federation of Bosnia and Herzegovina
FMoET	- Federal Ministry of Environment and Tourism
HNC	- Herzegovina-Neretvian Canton
IFI	- International Financial Institutions
MP	- Main project
МРСА	- Management Plan in Case of Accidents
ОР	- Operational Policy of the World Bank
PAP	- Project Affected Person
PPE	- Personal Protective Equipment
PC Roads FBF	I - Public Company Roads of the Federation of Bosnia and Herzegovina
RAP	- Resettlement Action Plan
RPF	- Resettlement Policy Framework
TD	- Tendering Documentation
ТМР	- Traffic Management Plan
WB	- World Bank
WMP	- Waste Management Plan

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#### 1. INTRODUCTION

This Environmental and Social Management Plan (ESMP) was developed within the Environmental and Social Management Framework (ESMF) for the FBH Road Sector Modernization Project, as one of the three site-specific examples.

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 FBiH), a limited liability company wholly owned by the Government of FBiH, has initiated the FBiH 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. Reconstruction of roads, this component includes:
  - 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 Rehabilitation of the Bridge over the Bregava River (the Project) for which this ESMP is developed within the ESMF, is a one of the sub-projects included in the group of sub-projects co-financed by the WB and EIB.

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#### 2. METHODOLOGY AND OBJECTIVES OF ESMP

Rehabilitation of the Bridge Over the Bregava River, on the road M17, is characterized as a category B project according to the Operational Policies (OP) 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.

Environmental permits are subject to Federal and Cantonal legislation<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 an acceptable level.

ESMP is 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 implementation. Monitoring during project implementation provides information on the key environmental and social aspects of the project, particularly on the environmental and social aspects of the project measures.

#### 3. LOCATION DESCRIPTION

The bridge over the Bregava River is situated on the main traffic direction of Čapljina municipality, on the major road M-17.0–5 Mostar – Čapljina – Border with Croatia. The major road M17 that passes through crossroad is part of the south European route E73 that connects 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. This section connects two largest cities of Herzegovina region Mostar and Čapljina.

The bridge lies 2 kilometres south from Čapljina, 4 km south from the old town of Počitelj (one of the most important historical cities and touristic attractions in Herzegovina) and it lies on the very border of the Hutovo Blato Nature Park.

Immediately after the bridge, in the direction to border of Croatia on the right side there is a village cemetery; and on the left side to it there is a junction to the regional road R426 that enters the Hutovo Blato Nature Park and connects municipalities Čapljina, Neum and

<sup>&</sup>lt;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 FBiH No. 19/04). In Herzegovina-Neretvian 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 HNC, No. 10/12).

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Ravno. Only 150 meters south to the bridge are situated first residential houses in settlement Klepci. 250 meters upstream the Bregava river there is a national monument, 500 years old Ottoman bridge in Klepci. In addition, 500 meters downstream the Bregava river flows into Neretva river. The rest surrounding land around the bridge is mostly first class agricultural land.

*Figure 1* shows the location of the bridge in a wider surrounding area on a topographical map, and *Figure 2* shows the location in more detailed narrower area on ortho-photo map.



Figure 1: Lookup Map of Wider Area with the Project Location

Source: Ecoplan, 2015

Čapljina municipality adopted a Physical plan in 2012 for the period 2010-2020, and the Physical plan for Nature Park Hutovo Blato for the period 2013-2023 is currently in the adoption procedure. There are no other strategic development plans for the area. As stated above, the bridge is situated on the edge of the Hutovo Blato Nature Park, and at the junction of the regional road to the major road, and this is the main entrance to the Park. All plans see Hutovo Blato as a great touristic potential, and certain steps (e.g. Physical plan, Management plan) have already been made in order to exploit this potential. Hutovo Blato is very appealing to bird watchers, nature enthusiasts, and most recently cyclists, and the Physical plan includes improvement of the cycling infrastructure in the area of the Nature Park; whereas this bridge as its entrance point plays a significant role. Many cyclists coming from the direction of Mostar and Čapljina use this bridge to enter the Park. This bridge is

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also significant in terms of pedestrian access to the Park, coming from the direction of Čapljina and neighbouring villages.

This 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 direction to the border crossing to republic of Croatia, most significant country's port Ploče and the BH seaside Neum<sup>2</sup>.



Figure 2: Narrower project area

Source: Ecoplan, 2015

NATIONAL MONUMENT,

BRIDGE IN KLEPCI

nm

**REGIONAL ROAD R 426** 

<sup>&</sup>lt;sup>2</sup> This route is used by a majority of population to reach the south Adriatic sea (either Croatian or BH coastline) since the existing major road connecting inland with the seaside M17.3 doesn't meet the minimum of criteria for a major road. Reconstruction of this Neum-Stolac road is a part of the Project of Modernization of Major Roads in FBH. After the construction of this road and the motorway on Corridor Vc the traffic shall redirect to this new infrastructure.

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#### 3.1. TRAFFIC DATA

PC Roads FBH have installed automatic traffic counting devices along the main traffic network throughout FBH. Automatic traffic counting is done since the 2005 and, last report<sup>3</sup> was published in 2015 with data for the previous year. The nearest relevant traffic count device is in Dračevo, 5 km south from the bridge, and it shows that, in 2014, 4170 vehicles were passing daily (*Figure 3*).



Figure 3: AADT in 2014

Source: PC Roads FBH, 2015

By the request of PC Roads FBH, traffic prognosis for the traffic network was developed by IPSA Institute Sarajevo in 2014<sup>4</sup> for the period 2013 to 2040. Analyse of the traffic flow was made for every year by applying "equilibrium" procedure. 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 M1	7, section Čapljina - Metković
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Major road	Section name	AADT									
	20	2016	2018	2020	2022	2023	2025	2030	2035	2037	2040
M 17	Čapljina - border with R. Croatia (Metković)	2947	2631	4088	4344	4479	4771	5640	6473	6772	7263

Source: PC Roads FBH, 2014

There is no data on traffic accidents on this section.

<sup>&</sup>lt;sup>3</sup> "Traffic count on major roads in Federation of BiH in 2014", PC Roads Federation BiH, Sarajevo 2015

<sup>&</sup>lt;sup>4</sup> "Justification studstudy for modernization of major roads in FBiH programme",IPSA Institute Sarajevo, 2014

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#### 4. PROJECT DESCRIPTION

Main design of the *Rehabilitation of the Bridge over Bregava River* was prepared by the company Divel Ltd. Sarajevo in 2013, and the update of the main design was done in March 2017, also by the company Divel Ltd. Sarajevo, by the request of PC Roads FBH.

The bridge over the Bregava River was built in 1964. All constructive elements of the bridge were made of reinforced and pre-stressed concrete. During those 50 years of its existence, the load-bearing capacity of the bridge remained intact, but the overall equipment of the bridge (fence, drainage, paving) is in poor state and requires rehabilitation. Visible traces of percolation under the bridge cornice and through openings/drains for evacuation of water from the bridge exist, and although they did not have a destructive impact on the bridge, there remained surface trails in form of efflorescence. Furthermore, below pedestrian paths there is no hydro-isolation in place, so traces of water percolation are visible, and the fence is affected by surface corrosion.

Along with traces of water percolation, it is necessary to point out other technical damages to the bridge. Namely, dilatations are not functional, because they are covered with cracked asphalt. At the transition of the bridge to Hutovo Blato, cracks-dilatation were 'mended' in the way that asphalt mass was infilled into the cracks, but the mass disappeared very quickly, which suggests that the mass is 'swallowed' by the infill. It is an assumption that during construction of road junction, a part of coast pillar and bridge wing partially collapsed. In front of the first coast pillar asphalt is deformed and an indentation in asphalt is visible, and behind the third one, asphalt was mended and cracks were filled with asphalt.

Following conclusions apply to current condition of the bridge:

- The span construction in the first field is healthy, while partially damaged in the second field. Pendle bearing support is damaged at the pillar No 1 with leaked led, but with no damages to the construction.
- Bridge equipment (pedestrian paths, fence, hydro-insulation, dilatations)) is in bad shape;
- The transition area and turning point towards Hutovo Blato is not properly carried out (area between the third pillar and embankment).
- Pavement structure is damaged at whole surface and the transition slab was not carried out.

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a) Pillar No 1. – Dumped rocky material that can endanger the flow profile



c) Construction damages



b) Middle Pillar – without proper foundations



d) Crack in the console



e) Damaged pavement structure, turning point



f) Damaged fence

Source: Main Design of the Rehabilitation of the Bridge over Bregava River, Divel Ltd. Sarajevo, 2013

Rehabilitation of the bridge encompasses complete replacement of equipment on the bridge, partial rehabilitation of structures with demolition of old ones, demolition and construction of new pedestrian paths and complete replacement of pavement structure and hydro-insulation, and new dilatations.

A new cross-section of pavement structure was approved with improved geometry of the traffic road, and vertical alignment of the bridge was adapted to the existing one. Thickness of construction remains the same, apart from introducing a new layer of concrete below the part of bridge bracket below the pedestrian paths. On the part of the clamp of bracket, additional reinforcement of bracket will be inserted.

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Hydro-insulation on the bridge is placed on the whole width of bridge cross-section. The selected dilatation is a flexible dilatation on the base of elastic polymers. This kind of dilatation can be considered further improvement of asphalt dilatations.

Asphalt layer of the pavement structure consists of the following:

- Wearing course, 4 cm with eruptive aggregate; and
- Base course, thickness 4 cm with limestone aggregate.

Bridge level line is placed in vertical curve, so it was decided on system of filtering gulleys placed in existing openings in bridge slab. The water from gulleys is controlled with pipeline, and taken into the separator. Railing at the bridge is made of regular steel sections, and is 110 cm high. Curbs are made of stone, and are of following dimensions 22\*15 cm.

Rehabilitation works at the cross section will be done in two stages and will include following works:

#### Rehabilitation of the right side

- removal of roadway structure
- dismantling of curbs
- dismantling of railings
- demolition of footpath
- demolition of edge beam at console
- demolition of roadway slab above consoles in strips
- placement of additional reinforcement for consoles
- placement of gullies
- concreting of console reinforcements in stages
- rehabilitation of crack at RC slab support point of the second span, using polymeric cement mortar
- rehabilitation of upper concrete surface, 15% of total surface
- excavations in front of abutments No.1 and No.3
- demolition of parts of skewback and wingwalls
- construction of new skewback resting on connective platform
- construction of footpath consoles at wingwalls
- construction of connective platforms
- placement of hydro insulation and stone curbs
- placement of filtering gulleys in existing drainage pipes
- placement of reinforcement and concreting of new footpath
- new asphalt concrete 4 cm
- mounting of new railing
- finishing asphalt concrete course 4 cm
- placement of expansion joints

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#### Rehabilitation of the left side

Rehabilitation of the left side is following same stages as defined above for the right side, once traffic is redirected to the completed lane. Additionally, rehabilitation of the left side also includes:

- rehabilitation of damages sustained at spots where installation shelves structures are penetrated, rehabilitation done by grouting with epoxy resin
- removal of roadway structure at junction of bridge and road to Pribilovci
- placement of reinforced roadway structures at junction with the bridge
- construction of support wall along abutment No.3 in order to reinforce structure of road to Pibilovci

The rehabilitation will be performed in two phases; alternately right and left side of cross-section with organization of alternate traffic on the bridge. In parallel way, independently of the traffic, rehabilitation of damaged pillars and span construction is carried out.

Below the left bracket of pedestrian path there is the main distribution pipe for installation (local water supply, telecommunication installations). During the time of rehabilitation, water installation will not be relocated. The project prescribes setting openings in the pedestrian path if the need to introduce other installations arises.

Since the bridge consists of only on lane per direction the construction works need to be organized in a way to enable minimum of traffic flow. Therefore, a constituent part of the Main design is the elaboration of uninterrupted traffic during the construction works. The technology of construction of individual positions of works will be adapted by the selected Contractor to their possibilities and available mechanization, while bearing in mind project solutions and complying with quality requirements and safety of workers and public traffic.

*Figure 5* shows main elements of the Main design.

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# Figure 5 (a, b): Excerpt from the Main design

a) Cross section through the construction in the first field

b) Cross section through the construction in the second field



Source: Main Design of the Rehabilitation of the Bridge over Bregava River Divel Ltd. Sarajevo, 2013

What is important to mention for this Project is that a closed drainage system with placement of oil separator (light liquids) was planned in the updated Project from March 2017.

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#### 5. BASELINE OF PARTICULAR INTEREST

#### 5.1. CLIMATE FEATURES

Climatic features of subject area, which is a part of the Neretva River watershed, are determined by geographic position, relief, height above sea level and proximity to the Adriatic Sea i.e. the Mediterranean basin.

Since the largest impact on the climate, apart from the geographic position is the relation between mainland and the sea, as well as relief features such as height above sea level, this area with altitude of about 1,5 m to 6,0 m and average temperature of the warmest month higher than 22°C belongs to the climatic region of Csa (by Köppen). That is a type of Mediterranean climate characterized by dry and hot summers while winters are mild and rainy.

The whole area is under direct impact of sea air. Due to the vicinity of the Adriatic sea, which during winter radiates warmth accumulated during summer months, the average air temperatures in winter months are quite high. Autumns are warmer than springs.

At monitoring station "Čapljina" the average temperature of the warmest month, July is 23.7 °C, while the absolute highest measured temperature is 41.0 °C. Average annual air temperature is 14.1 °C. Average air temperature of the coldest month, January is 4.9 °C, whereas the lowest measured temperature is -14.2 °C in the same month.

#### 5.2. AIR QUALITY

No particular monitoring of air quality for this location was performed, neither for the area. Judging by the location of the bridge, it can be concluded that the highest and the only air pollution refers to traffic of the major road, while there are no other major air polluters near the bridge. As well in the wider area there are no significant air polluters. Air quality largely depends on distance from the source of pollution and airflow, as well as on terrain configuration. The configuration is connected with airflow and changes its direction and speed, but also affects the speed of air exchange. Due to strong northern winds during the whole year and wide valley it is difficult for pollutants to concentrate for a longer period.

The closest monitoring station for air quality is in Mostar, where monitoring has been performed since 1998, and the data are collected and published by the Federal Hydrometeorological Institute. There are no data on air quality on this particular location, but based on geographical features and the fact that there are no significant polluters, and the only polluter is the road traffic in the wider area it can be considered that the air quality is good.

#### 5.3. 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.

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#### 5.4. WATERCOURSES AND HYDROLOGICAL BASELINE

The bridge, as already mentioned, stretches over the Bregava River, one of the largest confluents to the much larger and international waterway, the Neretva River. Its source is Bitunja and it mouths into river Neretva after 35 km of flow. With its beauty, numerous waterfalls and variety of biological life it represents one of the most important rivers of this area. The water of Bregava river is classified as class  $I^5$  what means that this water in its natural state can be used (with eventual disinfection) as potable water and for cultivation of *salomonidae* fish ( $1^{st}$  class fish).

Based on the Law on Nature Protection FBH municipality Čapljina protected this river in its Physical plan. Partially in its upper flow the parts of the river (waterfalls, mills etc. mainly in area of Stolac) it is protected by different instruments, as well as its source. River Bregava holds special value, sensitivity and beauty of the landscape, which should be given special attention. All planned activities in this area shall be consistent with the protection measures in order to preserve the whole area and its significance to its municipalities.

Wider area of the bridge location is surrounded with karst massive hills and karst fields with typical geological forms characteristic of karst.

Hydrological monitoring and measuring at station VP Do - Bregava (source zone) for the period 1965 -  $1990^6$  show average annual flows of  $Q_{avrg}=17,5 \text{ m}^3/\text{s}$ ,  $Q_{min}=0,45 \text{ m}^3/\text{s}$  and  $Q_{max}=68,0 \text{ m}3/\text{s}$ . Starting from source zone, in the basin, from Stolac onwards certain amounts of water are lost, which later appear in the lakes and springs of Hutovo Blato.

There are no hydrogeological monitoring of Bregava waters at the section of Project area.

Downstream from Čapljina along the Neretva River on the left coast, a deep depression of Hutovo Blato (Protected Area) stretches and is sometimes flooded by high waters in rainy periods.

#### 5.5. SURFACE WATER AND GROUNDWATER QUALITY

Groundwater-aquifier quality in alluvial deposits of Neretva are provided on the basis on quantitative tesing results. Underground water in this acquifier by their basic minerological composition belong to medium hard water.

Groundwater temperature ranges within limits from 13.4  $^{\circ}$ C to 13.6  $^{\circ}$ C, and pH from 7.5 to 7.8, and it refers to underground water of good sanitary quality.

The Bregava River is a confluent of the Neretva River and therefore directly affects the state and quality of water in it. Water quality monitoring on Neretva are performed on several automatic measuring stations by the Adriatic Sea Watershed Agency.

The closest monitoring station is located a few kilometres downstream from the bridge, in Dračevo. In this monitoring station, regular monitoring of water quality on the Neretva

<sup>&</sup>lt;sup>5</sup> Statue on the Classification of water and water of the coastal sea of Yugoslavia within borders of Social Federal Republic of Yugoslavia (Official Gazette of SFRY no. 18/80)

<sup>&</sup>lt;sup>6</sup> Performed by Federal Hydrometeorological Institute Sarajevo

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River are performed by the Adriatic Sea Watershed Agency with official seat in Mostar<sup>7</sup>. According to the latest results at the measuring station Dračevo, water of Neretva river is classified as Class II, which according to the Ordinance<sup>8</sup> means that those are waters which in their natural state can be used for citizens' bathing and recreation, for water sports, fish farming, or which can be used for drinking water and in food industry, with ordinary methods of processing.

5.6. WIND

From the wind roses for the monitoring station Čapljina, domination of the winds from direction north (bora) and south (sirocco) was observable. Bora is the strong north wind blowing from the inlands. It blows in gusts, and brings cold and dry air that dries the soil and lowers the temperature. It appears suddenly, in the colder part of the year, even though it can appear during the whole year, as well.

Sirocco is the wind blowing from southeast and brings warm and rainy weather. It can blow at any time of the year, and is very common in the autumn, winter and spring periods. It usually blows several days and brings abundant precipitation with it.



Figure 6: Wind roses

Source: Physical plan of Čapljina municipality, Ecoplan, 2012

<sup>&</sup>lt;sup>7</sup>http://www.jadran.ba/

<sup>&</sup>lt;sup>8</sup> Ordinance on the Classification of water and water of the coastal sea of Yugoslavia within borders of Social Federal Republic of Yugoslavia (Official Gazette of SFRY no. 18/80)

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#### 5.7. GEOMORPHOLOGY AND GEOLOGY

The wider project area is a part of typical karst relief.

In the wider Project area following geomorphological units can be found:

- Solid Rocks: These rocks include limestone, occasional appearance of dolomitic limestone, rarely dolomites, and marly and sandy limestone is mostly connected with upper eocenic deposits, as inserts within the clastic series.
- Incoherent Soil: The category of incoherent soil includes alluvial gravel and sand with rare parts of small grain sand and weakly bound conglomerates. Their thickness is relatively small and does not exceed 15 m. These deposits are mostly built of sand, loam and red soil. They belong to the soil of low or medium loadbearing capacity which is prone to changing its physical-mechanical features at intense wetting. These are fertile soils for intense agriculture.

#### 5.8. LAND

According to the data on agricultural and forest areas in the Physical Plan of the Municipality of Čapljina, the bridge is located in the area which belongs to particularly valuable arable land. This land must be preserved for the needs of agricultural production and their use for these purposes is possible without or with minimum investment. Those are top quality river valley surface areas and flattened hummock areas, excluded from urbanization process.

#### 5.9. FLORA AND FAUNA

The area of Neretva River delta, with geographic features of the terrain and large variety of ecosystem (wetlands, hydrological, underground, karst etc.), is listed into world register of areas with the highest biodiversity (the second richest area in Europe). According to numerous researches, which were carried out for this area, namely Hutovo Blato nature park, it is considered that in the wider area there is over 600 species of vascular plants in this area, with about 28 rare ad endemic species. As for fauna, 163 bird species and 24 fish species were registered. There is no exact data on the flora and fauna for the particular location of the Project.

#### 5.10. PROTECTED AREAS

The bridge lies at the protective belt of Bregava river and it borders with Hutovo Blato nature park. Hutovo Blato is also recognized as a Ramsar site since 1992, as well it is a bird reserve enlisted in the list of BirdLife International's Important Bird Areas. It is the largest reserve of its kind in the region, in terms of both size and diversity. It is home to over 240 types of migratory birds and dozens that make their permanent home in the area.

The closest historical heritage – the bridge in Klepci, a national moment is distanced 250 m upstream of from the bridge.

Figure 7 shows all protected areas near the bridge.

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Figure 7: Protected Areas around the Bridge over the Bregava River

Source: Physical plan of Čapljina municipality, Ecoplan, 2012

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

#### 6.1. 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 crossroads will lead to an increased emission of such gasses as  $SO_2$ ,  $CO_2$ , CO,  $NO_X$ .

**Dust generation**- where the most important polluters are solid particles (PM10 and PM2,5). Possible sources of dust generation include demolition works, site preparation activities, especially excavation and levelling, handling of building materials such as excavated earth/ 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: ground preparation activities such as excavation and levelling, 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 Surface Water Quality

**Creation of additional water demand** - The workers and the construction works will create an increased demand for water in addition to the existing population demand in surrounding area. Water will be mostly used in the creation of aggregates for construction works and for wetting the surfaces, as well for daily water demand of workers.

**Possible contamination of water**– Possible sources of water pollution are: demolition works and malpractice including inappropriate extraction of resource material, 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, 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

- Work of heavy machinery during construction phase may lead to plants being covered with dust (e.g. blockage and damage to stomata, shading, abrasion of leaf surface or cuticle), which will affect feeding base for animals;
- Pollution of water and soil with hazardous substances (fuel and oils in case of spills) can harm fish, amphibians, as well as animals living in the surrounding area.
- If not carried out carefully earth works in the riverbed may alter the flow of the river.

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#### Impact on the Protected Areas

The bridge is located at the border of Nature Park Hutovo Blato and 250 m away from the national monument – Bridge in Klepci. A temporary negative impact to the Bridge in Klepci shall occur during the construction since the main access to it will be interrupted. Other possible impacts on protected areas i.e. Hutovo Blato Nature Park are encompassed through other listed impacts (water, fish habitat etc).

#### 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 - increased traffic load, leading to congestion and obstruction is likely to be experienced on regional road (R426) and on major road (M17). This is especially expected during delivery of construction material to site and collection of waste from site. During the reconstruction of the lanes, one of the traffic lane will be closed for traffic therefore there will be decrease in traffic flow and possible standstills on the bridge and wider.

#### Socio-Economic Impacts

**Prohibition of land use and damage to private property:** It is expected that it will be necessary to temporarily occupy several privately owned land plots for the purpose of lodging machines and material. Construction activities may cause damage to land plots, fences and railings due to disposal of construction waste and heavy machinery parks.

**Impact on cultural-historical heritage:** temporarily restricted access to the Bridge in Klepci during construction can be expected.

**Impact on the protected natural areas:** temporarily restricted access to Nature Park Hutovo Blato during construction can be expected.

#### Impact on living conditions of local communities

Following adverse impacts during construction are expected:

- 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.

**Impacts on local traffic:** Local traffic will be increased (including heavy machinery and trucks) and only one lane will be in function, causing delays and restricted access.

#### 6.2. IMPACTS DURING OPERATION AND MAINTENANCE

Since this bridge is an already existing object no new negative environmental impacts, nor detoriation of existing negative impacts, during operation and maintenance are expected. On the contrary, an improvement of the environmental and social aspects is expected.

#### Socio-Economic Impacts

**Impacts on traffic:** According to the Traffic prognosis, an increase to the number of vehicles is expected during the operational phase. Furthermore, an increase in speed of vehicles is expected due to the rehabilitation of the bridge during which all technical problems that were cause to lower speed of vehicles will be resolved.

#### 6.3. POSITIVE IMPACTS

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

- Bridge improvement in the sense of constructive stability;
- Reduction of erosion (improvement of drainage);
- Reduced pollution of river Bregava and its environment due to drainage water treatment;
- Improved access for vehicles, pedestrian and cyclist to Nature Park Hutovo Blato and to national monument Bridge in Klepci;
- Safer traffic conditions for both, pedestrians and drivers;
- Lower number of traffic accidents on the bridge;
- Less damages to vehicles,
- Better traffic flow.

#### 6.4. ENHANCEMENT MEASURES

Impact	Enhancement Measures	Cost Asses (US\$	ssment ;)	Institutional Responsibility		
p.cot		Operative	Implementation	Operative	Implementation	
<ul> <li>Traffic</li> </ul>	<ul> <li>Improved road and travel safety by improving construction elements of the pavement structure and safety fence;</li> <li>Better traffic flow due to</li> <li>Increase od pedestrian safety by reconstructing the pedestrian pavement on both sides of the bridge</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH	
■ Socio-economic	<ul> <li>New job and business opportunities for local construction workers and firms;</li> <li>Improving connections between Mostar, Čapljina and RH;</li> <li>Better connection to tourist attraction Nature Park Hutovo Blato.</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roa ds FBH	
■ Water	<ul> <li>Improvement of the protection of the Bregava River with implementing a treatment of drainage water and regular maintenance of it;</li> <li>Improved and renewed hydro-isolation</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH	
<ul> <li>Visual aesthetic and landscape</li> </ul>	<ul> <li>Improving visual aspects of the bridge and surrounding area.</li> </ul>	Included in construction works	Included in supervision	Contractor	PC Roads FBH	

#### Table 2: Enhancement measures

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#### 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 this task 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.

As a part of Tendering Documents (TD) for the Contractor, PC Roads FBH will require that the Contractor subm its 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) Elaborate on environmental protection during construction [that shall include a practical plan of the implementation of this ESMP and among other a detailed Waste Management Plan (WMP)].

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).

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. The RPF also serves as a guide for preparation of site-specific Resettlement Action Plans (RAPs).

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

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#### 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. 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 calculate 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.

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 of any complaints or grievances received and of any corrective actions identified and implemented. The Contractor shall inform the complainant of the Grievance redress mechanism.

The Contractor shall provide regular 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 labour and health and safety standards.

The contractor shall:

- Ensure that all workers are required to comply with all national/federal legislation on labour and health and safety, as well as any other relevant standards;
- 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.

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.

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 form 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.

#### 7.2.1.1. Construction Site Organization

- The Contractor shall be responsible for ensuring that order, discipline and professional responsibility of all employees on the construction sites are maintained at all times. Work must be restricted exclusively to the construction site, and damage to private property, land and crops must be avoided.
- It is recommended that machines only operate in the period 07-20h.
- Timing of works needs to be organized so to avoid the tourist season and fish spawn season.
- The Contractor is responsible for establishing temporary disposal sites for construction materials, area for washing and cleaning machinery (on site or off-site) and vehicles in accordance with CSOP. Temporary disposal sites for excavation material (topsoil) are to be reduced to maximum 2 m height, in order to prevent compaction caused by weight of the soil, and storage time is to be reduced to minimum - applicable to construction of bypasses.
- The Contractor is responsible for ensuring that all construction equipment is licensed and approved in accordance with local regulations, and certified in compliance with EU standards. This includes use of modern machines and vehicles that fulfil environmental

standards in terms of emission of harmful gases (complete combustion) and those that have enclosed sources of noise (engines, exhaust system).

- The Contractor is responsible for ensuring that machines and vehicles parking places and worker's residence containers (if used during the course of the Project implementation) are not located inside any forested areas, that they do not impact watercourses and do not affect endangered flora and fauna.
- The Contractor is obliged to reinstate the construction areas in accordance with the planned land use and to restore species preserved in topsoil and supplement them by adequate material if needed.

#### 7.2.1.2. Management of Hazardous Materials and Substances

The materials, which are used for rehabilitation of the bridge, are potential source of pollution. Inappropriate storage and handling oils, lubricants, chemicals and hazardous substances on construction site and potential spills of those substances may harm the environment or health of employees working on road rehabilitation. In order to mitigate that, the Contractor is obliged to:

- Prepare the procedure of spills control and submit the plan to PC Roads FBH for approval.
- Train relevant construction works staff for handling fuels and procedure of spills control.
- Storage of hazardous substances in restricted areas in sealed plastic foil far from watercourses.
- Fuelling is allowed only inside restricted area.
- Ensure absorbing and retaining material (for example, absorbing covering), where the staff will be appropriately trained regarding safe handling practices, use and storage.
- Provide protective clothes, safety booths, helmets, masks, gloves, glasses, staff for promoting construction works, material appropriate for use.
- Check whether all containers, drums and cisterns used at storage are in good condition and with a designation of expiry date. Each container, tank or drum that is indented, cracked or rusty may cause leakage. Check leakage on a regular basis in order to identify potential problems in time.
- Put containers and drums in temporary storage in clearly designated areas where they will not be ran over by vehicles or heavy machinery. Storage must be on a tilt or with drainage for safe collection of fluids in case of spill.
- Take all precaution measures on handling and storing fuels and lubricants, while avoiding environmental pollution.
- Avoid the use of material with a higher possibility of pollution, by replacing them with more eco-friendly materials.
- Ensure special storage area for fuels/oils and/or other hazardous substances used during construction.

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- All storage areas should be equipped with an appropriate spill kit.
- The staff using the hazardous material should be appropriately trained regarding safe handling practices and emergency response procedure.
- Provide all workers with appropriate personal protective equipment from harmful effects of hazardous substances.
- Ensure that hazardous waste i.e. waste oils are managed and disposed by a specialized and licensed operator for hazardous waste management.
- Identify and register hazardous substances by marking in details place and amount of hazardous substances, including storage, use and disposal.
- Where absorbents, (e.g. sand, oil pads or booms) have been used to absorb a leak or contain a spill, the contaminated waste absorbent is to be disposed of as hazardous waste on a special area inside the construction site before the licensed operator takes over the waste and dispose it permanently.
- Train the staff and implement a safe work practice for minimizing the risk of spill.
- Establish the cause of pollution if it appears and control the area of pollution. The impact can be controlled by isolating the source of pollution or by implementing control of the affected area.
- Rehabilitate contaminated soil by using the most appropriate available method.

#### 7.2.1.3. Waste Management

Following measures shall be implemented:

- Waste generation, where practicable, will be minimized through the adoption of efficient designs, reduction of materials required, construction method selections and reuse and recycling where practicable.
- The Contractor is responsible for ensuring that all waste is disposed of by licensed operators for waste management at appropriate waste management facilities.

Due to inappropriate waste management and construction waste pollution of soil and water is possible (the Neretva and Bregava River). Therefore, the Contractor is obliged to:

- Create a Waste Management Plan (WMP) prior to the beginning of road rehabilitation for various types of waste (for example, usable waste, flammable waste, construction waste, food waste etc.) and submit it to PC Roads FBH for approval.
- Organize waste disposal in eco-friendly manner, which was created during works on road rehabilitation. That will include consideration of nature and landfill, in order to reduce the environmental impact to the lowest level possible.
- Reduce creation of waste by the following approach: reduce, recycle, reuse.
- Wherever possible separate the entire waste and reuse or recycle it.
- Prohibit waste incineration.

- Collection and transport of non-hazardous waste in all approved landfills. Vehicles for transport of solid waste must be covered with tarpaulin or nets to prevent dissipation of waste on the road.
- Provide containers on construction site.
- Ensure that the sandblasting of the bridge construction is carried out with protective covers and the dripping of paint is caught in tarps.
- To request from supplies fewer packaging material, wherever possible.
- Maintain construction site clean, tidy and safe, and provide and maintain appropriate facilities as temporary storage of the entire waste prior to transport and final disposal.
- Collect chemical waste in 200 litre drums (or similar sealed container), appropriately labelled for safe transport to an approved chemical waste depot.
- Store, transport and handle all chemicals avoiding potential environmental pollution.
- Store all hazardous waste appropriately in restricted areas away from watercourses.
- Collect hydrocarbon waste, including lube oils, for safe transport off-site for reuse.
- Locate the garbage pit/waste disposals item in 500 m away from the residence so that people are not disturbed with the odour likely to be produced from anaerobic decomposition of waste at the waste dumping places. Enclose the waste dumping place by fencing and tree plantation to prevent children to enter and play.

# 7.2.1.4. Road Transport and Road Traffic Management

Dust generation on construction sites, stocks of materials and access roads poses disturbance for the surroundings and may be harmful to health. In order to prevent this adverse impact, the Contractor shall:

- Prevent dust emissions by transporting asphalt, gravel, stone, earth and other material in covered trucks. The speed of transport vehicles should not exceed 30 km/h and 20 km/h on unpaved sections.
- Define control measures for dust generated through handling of equipment and/or during rehabilitation works. The Contractor must submit the plan in which the above proposed paths for transport of material have been listed (Technological scheme and TMP), and is also required to provide statements about proposed method of dust control in places where transport through settlements may not be avoided.
- To water the stocks of material, access roads and bare soil in order to reduce the possibility of disturbing the surrounding due to dust. Increase frequency of irrigation during high-risk periods (for example, high winds). Stock materials such as gravel and sand must be covered and closed in order to prevent dissipation by wind.
- Decrease range and period of exposure of bare surfaces.
- Postpone the activities of earthworks or cleaning of vegetation if it is necessary for avoidance of the periods of high wind or if dust is seen outside the construction site.

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- Rehabilitate the disrupted area as soon as possible by planting greenery or grass.
- Establish appropriate areas for storage, mixing and load of construction material in the way that dispersion of dust is prevented due to such operations.

In order to ensure proper traffic management, the Contractor is obliged to do as follows:

- To create TMP as part of CSOP.
- Implement adequate traffic control measures, in accordance with national legislation and such measures must first be approved by the Supervision Engineer.
- Traffic safety management measures need to include temporary lighting and adequate signalization during excavation and rehabilitation/construction works.
- Appoint permanent staff that will be engaged on traffic safety issues, and would be responsible for implementation of traffic safety measures and implementation of traffic measures as prescribed by national legislation, which would include: (i) inspection of the condition and position of equipment for traffic control in use; (ii) design review part related to traffic control equipment necessary to provide safe and efficient traffic flow; (iii) correction of all traffic deficiencies where applicable; (iv) inspection of work areas, handling of equipment and storage, handling of material and storage related to traffic safety.

#### 7.2.1.5. Environmental Impacts Management

#### Air Quality, Noise Levels and Vibrations

The contractor shall:

- Ensure that high quality fossil fuels (with low percentage of sulphur and lead) are used for construction machinery and equipment;
- The Contractor needs to ensure that all construction machines are operated during normal working hours (07 20 h);
- Avoid unnecessary operation of construction machinery and vehicles;
- Maintain all vehicles in order to keep them in good working order in accordance with manufactures maintenance procedures
- Make sure all drivers comply with the traffic codes concerning maximum speed limit, driving hours, etc.
- Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site,
- Appropriately site all noise generating activities to avoid noise pollution to local residents,
- Use the quietest available plant and equipment,
- Modify equipment to reduce noise (for example, noise control kits),
- Install acoustic enclosures around generators to reduce noise levels.,

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- Fit high efficiency mufflers to appropriate construction equipment,
- Avoid the unnecessary use of alarms, horns and sirens,
- Notify adjacent landholders prior any typical noise events outside of daylight hours,
- Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions,
- Employ best available work practices on-site to minimize occupational noise levels,
- Install temporary noise control barriers where appropriate,
- Plan activities on site and deliveries to and from site to minimize impact,
- Monitor and analyze noise and vibration results and adjust road rehabilitation practices as required,
- Avoid undertaking the noisiest activities, where possible, when working at night near residential areas.

#### Surface Water Quality

- Works to be executed on the protected Bregava river need to be carried out with utmost compliance to this ESMP, any additional local provisions (protection plans of the river, etc) and with the highest measures of protection of the water quality and quantity. No changes in the flow patterns would be made during works and highest attention will be paid in order to avoid any spills or contamination of the river.
- Maintenance, fuelling and cleaning of machines must be carried out off the site and outside of the area with surface water.
- With an aim to reduce the impacts on the Rivers Neretva and Bregava, activities of construction near these water bodies are to be undertaken during low water regime. Lowest water regime is during the period from July to September, but this is also the period of tourism peak, that should be avoided. The works as well need to be organized outside the spawning fish season.
- Wastewater from workers toilets must not be discharged on land or in water resources.
- During bridge reconstruction, riverbed should be protected and should not be completely blocked during reconstruction in order to protect the existing water corridor. Natural renewal of the existing embankments should be ensured by planting appropriate vegetation.
- Driving machinery inside river or streams, or on their embankments should be avoided as possible.
- 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.

During the works on reconstruction of the bridge, quality of surface water might deteriorate due to activities on river, sewage on construction sites and work camps. Works

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on reconstruction of the bridge with change the earth cover layer and topography, by changing surface drainage of the area, including infiltration and disposal of rainwater. These changes to hydrological regime may lead to an increased rate of residue and polluted sediments into surface water and thus affect fish habitats and the rest of aquaculture. Therefore, the Contractor shall:

- Install temporary drainage works (channels and bunds) required for sediment and erosion control and around storage areas for road rehabilitation materials,
- Divert runoff from undisturbed areas around the construction site,
- Place stockpile materials away from drainage lines,
- Prevent all solid and liquid waste entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport them an approved waste disposal site or recycling depot.
- Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved restricted areas on site.
- Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each vehicle to ensure the local roads are kept clean.
- Sediment-laden run-off prior to the final disposal should be directed so as to leak into the deeper layer of soil or discharge it into lagoon.
- Restore and protect clean areas as soon as possible.
- Soil erosion and dust from storage materials will increase residue and contaminated deposits on surface water bodies. In order to reduce erosion the Contractor shall perform as follows:
  - Stabilize the cleared areas not used for road rehabilitation activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion.
  - Ensure that roads used by construction vehicles are swept regularly to remove sediment.
  - Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).

In order to mitigate spillage of hazardous and poisonous chemicals polluting the soil, the Contractor shall:

- Strictly implement the WMP;
- Construct appropriate contents for drainage of pollution for all areas of fuel storage;
- Establish and maintain hazardous substances by marking place and amount of harmful substances in detail, including storage, usage and disposal;
- Train the staff and implement a safe work practice to minimize the risk of spill;

- Determine the cause of pollution if it appears, and control the area of pollution. The impact can be controlled be isolating the resource or by implementing control of affected terrain.
- Rehabilitate contaminated soil by using the most appropriate available method.

#### Land use

- The Contractor shall ensure that construction-related activities are performed strictly and in construction area;
- The Contractor shall ensure that the natural conditions of the surroundings of the construction site are reinstated after completion of works.

#### **Biological and Ecological Sources**

- Night work will not be carried out in order to prevent the possibility of disturbing wild game and other wildlife.
- The Contractor shall ensure that removal of vegetation is minimally limited to the marked construction area.
- All accidental leaks, spills or events that are opposite the provisions of this ESMP shall be immediately reported and intervention measures shall be applied due to the proximity of protected areas, and working on the protected area of Bregava river.

#### 7.2.2. Health and Safety

Works on the rehabilitation of the bridge may pose health and safety risks for construction workers and visitors to the construction site, which may cause severe injuries or death. Population near the construction site and construction workers will be exposed to a large number 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.

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,
- 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,

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

<sup>-</sup> Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)

<sup>-</sup> The Safety and Health at Work Directive 89/391/EEC

<sup>-</sup> and other Recommendations and EU directives

- 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.
- 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.
- 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.

#### 7.2.2.1. 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,

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- Emergency Preparedness,
- Response Plan to Accidents.

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 of industry;
- 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 ie. Traffic Management Plan (TMP). Traffic on construction site is to be regulated the same way as public traffic roads.

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,

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- 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 .

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.

#### 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

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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 following measures:

- Regular inspection of road integrity and constant maintenance of roads, including such road infrastructure as fences in accordance with the Regulation on Maintenance of Public Roads (Official Gazette of the FBH no. 48/03)
- Regular maintenance of vegetation along the bridge, ensuring appropriate visibility and passability of the bridge;
- Cleaning of bridge (removal of waste, debris caused by erosion, snow, etc.) and road signalization and lighting equipment;
- Ensuring all absorption substances used for absorption of spills on the bridge are treated as hazardous waste and handed over to authorized operators of hazardous waste.
- Regular maintenance and cleaning of the facilities for drainage water treatment.
- Regular maintenance of road safety equipment and signage

PC Roads FBH will hire a Contractor for maintenance works.

# 7.4. SUMMARY OF MITIGATION MEASURES

lucino et (Due ble un		Cost Assess	ment (US\$)	Institutiona	Commonto	
impacty Froblem witigation measures		Operative	Implementation	Operative Implementation		comments
	PRE-CONSTR	UCTION PHASE				
<ul> <li>Impacts on living conditions</li> </ul>	<ul> <li>Informing the local communities on the extent of works and duration prior to the commencement of construction works.</li> </ul>	Internal resources	Internal resources	PC Roads FBH	PC Roads FBH	<ul> <li>Impacts on living conditions</li> </ul>
<ul> <li>Compliance with national legislation</li> </ul>	<ul> <li>Obtaining all necessary permits for Project implementation.</li> </ul>	Internal resources	Internal resources	PC Roads FBH + Project designer	Competent body for issuing the permit	<ul> <li>Complianc</li> <li>e with</li> <li>national</li> <li>legislation</li> </ul>
<ul> <li>Restrictions on land use and damages on private property</li> </ul>	<ul> <li>Avoid private properties where possible;</li> <li>The Contractor will organization the construction site in collaboration and agreement with Čapljina municipality;</li> <li>In case occasional land use cannot be avoided, compensation will be provided to affected owners/users (application of RPF and RAP), 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	
<ul> <li>Job creation and impacts on local business</li> </ul>	<ul> <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.</li> </ul>	Internal resources	Internal resources	Contractor + PC Roads FBH	Contractor + PC Roads FBH	Applicable if the Contractor needs new workforce.

# Table 3: Environmental and Social Impacts Management Plan

luces at /Ducklour		Cost Assess	sment (US\$)	Institutiona	Commente	
Impact/Problem	Mitigation Measures	Operative	Implementation	Operative	Implementation	Comments
	CONSTRU	CTION PHASE				
<ul> <li>Access restriction</li> </ul>	<ul> <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.</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*	
<ul> <li>Impact on the Bregava River</li> </ul>	<ul> <li>Infill must be controlled in order not to endanger the flow profile of the Bregava 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> <li>Impact on fish habitat and water quality</li> </ul>	<ul> <li>In order to avoid negative impacts the following mitigation measures can be used:</li> <li>Limit the execution of works outside the spawning fish season;</li> <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> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	

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

	Nitigation Managemen	Cost Assess	ment (US\$)	Institutiona	l Responsibility	Commonto
Impact/Problem	witigation weasures	Operative	Implementation	Operative	Implementation	Comments
	<ul> <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> <li>Ensure no changes to the flow of the river are caused by diversions during works on foundations</li> <li>Respect all protection provisions in line with the local regulations that call for protection of the Bregava river and riverbanks</li> </ul>					
<ul> <li>Impacts on local traffic (increase of local traffic, including heavy machinery and trucks), operation of roads with only one lane causing traffic delays and limited access</li> </ul>	<ul> <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 collaboratio n with the local Ministry of the Interior Relations and BHAMK
<ul> <li>Temporary occupation of privately owned land plots for the purpose of placement of staff, machines and material</li> </ul>	<ul> <li>Avoidance of the use of private lands;</li> <li>Implementation of RPF and RAPs.</li> </ul>	Internal resources	Internal resources	PC Roads FBH	PC Roads FBH	
• Air emissions:	<ul> <li>High quality fossil fuels (with low percentage of sulphur and lead) need to be used for construction machinery</li> </ul>	Included in construction	Included in supervision	Contractor	Supervisory body <sup>*</sup>	

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

Impact/Broblem	Mitigation Massures	Cost Assess	sment (US\$)	Institutiona	l Responsibility	Commonte
Impact/Problem		Operative	Implementation	Operative	Implementation	comments
<ul> <li>exhaust gasses;</li> </ul>	and equipment;	works				
- dust generation	<ul> <li>All machines and vehicles to be used in construction/ reconstruction/ rehabilitation activities must have use permit;</li> </ul>					
	<ul> <li>Vehicles need to be regularly maintained ;</li> </ul>					
	<ul> <li>Equipment with installed filters to reduce soot emission needs to be used;</li> </ul>					
	<ul> <li>When not in use the equipment and machinery need to be shut down;</li> </ul>					
<ul> <li>Maximum speed of the vehicle on unpaved roads should be restricted to 20 km/h;</li> </ul>						
	<ul> <li>Moistening/ wetting the site to prevent dust occurrence (in areas with dry soils or where activities generate dust);</li> </ul>					
	<ul> <li>Sand and gravel materials need to be transported in covered trucks.</li> </ul>					
	<ul> <li>Restriction of works to period of day only (period of day: 06:00 to 22:00, period of night: 22:00-06:00; or agreed with the local community)</li> </ul>					
<ul> <li>Increased level of noise and vibration;</li> </ul>	<ul> <li>In the case of noise complaints by local residents, simultaneous use of machines that generate noise over 70 dB needs to be limited;</li> </ul>					
<ul> <li>noise and vibration.</li> <li>noise emission and noise disturbance;</li> </ul>	<ul> <li>In the case of noise complaints by local residents, number of trucks per day visiting the site needs to be reduced;</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
- vibration	<ul> <li>All machines and vehicles to be used in construction/ reconstruction/ rehabilitation activities must have use permit;</li> </ul>					
	<ul> <li>When not in use the equipment and machinery need to be shut down;</li> </ul>					

Impact (Broblem	Mitigation Massures	Cost Assess	sment (US\$)	Institutiona	l Responsibility	Commonte
impact/Problem		Operative	Implementation	Operative	Implementation	comments
	<ul> <li>Maximum speed of the vehicle on unpaved roads should be restricted to 20 km/h.</li> </ul>					
<ul> <li>Water consumption and emissions into water:</li> <li>creation of additional water demand,</li> <li>possible contamination of surface water and groundwater</li> </ul>	<ul> <li>Monitoring water consumption;</li> <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> <li>Installation of oil separators in accordance with EN ISO 858-1 and 858-2</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul> <li>Soil degradation and emissions to soil:</li> <li>soil erosion;</li> <li>borrow pit excavation;</li> <li>soil contamination by oils, fuels and other hazardous substances</li> </ul>	<ul> <li>Topsoil from borrow pit areas should be saved and reused in re-vegetating the pits;</li> <li>Borrow pit areas will be graded to ensure drainage and visual uniformity;</li> <li>Installation of drainage structures for proper drainage of water from construction site is required;</li> <li>Proper waste disposal; separation of hazardous waste; engagement of authorized companies for final waste disposal;</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> <li>Degradation of biological and</li> </ul>	<ul> <li>Prevent and control oil, fuel, and chemical spillages that can find their way to the streams;</li> </ul>	Included in construction	Included in supervision	Contractor	Supervisory body*	

Impact/Drahlom	Mitigation Massures	Cost Assess	ment (US\$)	Institutiona	l Responsibility	Commonte
Impact/Problem		Operative	Implementation	Operative	Implementation	comments
ecological resources: - destruction of aquatic habitat due to changes in water flow and quality in terms of sediment load • removal of	<ul> <li>Works in the riverbed must be minimized and restricted;</li> <li>Topsoil must be must be returned and re-vegetation must be performed after construction/ reconstruction/ rehabilitation activities are done;</li> <li>The land determined for use by the Project can only be used for the construction activities and no other land is available for i.e. storage of building material, parking of the heavy machinery etc. in terms of soil disruption.</li> </ul>	works				
<ul> <li>Inadequate waste handling</li> </ul>	<ul> <li>Implementation of WMP that shall ensure environmentally sound collection of waste, its storage, transport and final disposal, or reuse / recycling.</li> <li>No clandestine waste disposal will be allowed on site, including open burning of wastes.</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	+ local waste managemen t operator
<ul> <li>Inadequate workers safety</li> </ul>	<ul> <li>Implementation of work safety measures:</li> <li>Provide workers with a safe and healthy work environment,</li> <li>Provide personal protective equipment,</li> <li>Respect safety procedures,</li> <li>Provide portable toilets,</li> <li>Provide drinking water</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
<ul> <li>Accidental situations i.e. spills, leakage of oils, fats, fuels and similar hazardous materials</li> </ul>	<ul> <li>Implementation of Environmental Management Plan which includes:</li> <li>Spill Response Plan,</li> <li>Emergency Preparedness and Response Plan.</li> <li>Implementation of Management Plan of Fire and Explosion</li> </ul>	Included in construction works	Included in supervision	Contractor	Supervisory body*	

		Cost Assess	ment (US\$)	Institutiona	l Responsibility	
Impact/Problem	Mitigation Measures	Operative	Implementation	Operative	Implementation	Comments
<ul> <li>Materials supply and transport</li> </ul>	<ul> <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* <sup>*</sup>	
<ul> <li>Paving of the bridges and painting fences on bridges</li> </ul>	<ul> <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> <li>Impact to the flow profile of river Bregava</li> </ul>	<ul> <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> <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>	Included in construction works	Included in supervision	Contractor	Supervisory body*	
	CHANCE-FIND PROCEDURES	DURING CONSTRUC	CTION PHASE			
<ul> <li>Impacts on cultural heritage</li> </ul>	<ul> <li>If archaeological findings 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 implemente d by the

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

		Cost Assess	ment (US\$)	Institutiona	Comments	
Impact/Problem	Mitigation Measures	Operative	Implementation	Operative	Implementation	Comments
						competent institution
OPERATION PHASE						
<ul> <li>Problems due to lack of maintenance</li> </ul>	<ul> <li>Regular road/bridge maintenance works</li> </ul>	Included in maintenance works	Internal resources	Contractor for maintenance works	PC Roads FBH	
<ul> <li>Contamination of river Bregava</li> </ul>	<ul> <li>Regular maintenance of the water treatment system</li> </ul>	Included in maintenance works	Internal resources	Contractor for maintenance works	PC Roads FBH	
<ul> <li>Decrease in road safety due to the increase of traffic and speed</li> </ul>	<ul> <li>Regular maintenance of road safety equipment and signage</li> </ul>	Incl. in maintenance works	Internal resources	Contractor for maintenanc e works	PC Roads FBH	

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#### 8. ENVIRONMENTAL MONITORING PROGRAM

The table below presents summary of potential impacts in connection with the project, along with monitoring measures necessary as information for construction site – development of a certain plan during project implementation and connection of mitigation measures to avoid or reduce their impact.

The main components of the Monitoring Plan are as follows:

- Parameters to be monitored,
- Location of monitoring parameters,
- The way how monitoring will be performed,
- When monitoring will be performed,
- Costs of monitoring activities,
- Responsibility for monitoring activities.

The Contractor shall create an Environmental Monitoring Program (EMP), prior to commencement of works, in accordance with requirements of this ESMP, which will include a minimum of monitoring requirements, described in table below, without limitation to these requirements. PC Roads FBH will be responsible for reviewing the EMP prepared by the Contractor and for ensuring that these monitoring programs are in accordance with this document.

The list for monitoring in the field will be prepared based on this ESMP. The list for monitoring in the field 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.

				-				
		Where will	How will		Cost assess	ment (US\$)	Respon	sibility
Potential impact	Which parameter is to be monitored?	monitoring monitoring be be performed?		When will the monitoring be performed?	Implementa tion	Operative	Implementa tion	Operative
		PRE-CO	NSTRUCTION	PHASE				
<ul> <li>Job creation and impacts on local businesses</li> </ul>	<ul> <li>Number of employed persons from local communities</li> <li>Timely informing the local communities</li> </ul>	Wider area of construction	Inspection	Prior to construction	Included in performance	Included in performance	Contractor	Contractor
<ul> <li>Temporary occupation of privately owned land plots for the purpose of construction of access roads and placement of Staff, machines and material</li> </ul>	<ul> <li>Implementation of RPF provisions</li> </ul>	Construction site	Visual inspection and inspection	Prior to construction and during construction when necessary	Included in supervision	Included in supervision	Supervisory body + PC Roads FBH	Supervisory body + PC Roads FBH
		CONS	STRUCTION PH	HASE				
<ul> <li>Access restrictions</li> </ul>	<ul> <li>Provided alternative access,</li> <li>TMP in place,</li> <li>Implementation of RPF, provisions on compensation procedures for businesses affected by access restrictions and livelihood restoration.</li> </ul>	Construction site	Visual inspection	Random checks at least once a week during the construction	Included in supervision + Included in RPF (RAP)	Included in supervision + Included in RPF (RAP)	Supervisory body + PC Roads FBH	Supervisory body + PC Roads FBH
<ul> <li>Restrictions on land use and damage to the private property</li> </ul>	<ul> <li>CSOP in place,</li> <li>Disposal of construction and maintenance materials,</li> </ul>	Construction site	Visual inspection	Prior to construction and random checks at	Included in supervision +	Included in supervision +	Supervisory body +	Supervisory body +

# Table 4: Environmental Monitoring Program

		Where will	How will		Cost assess	ment (US\$)	Responsibility	
Potential impact	Which parameter is to be monitored?	the the monitoring monitoring be be performed? performed?		When will the monitoring be performed?	Implementa tion	Operative	Implementa tion	Operative
(agricultural plots, horizontal infrastructure, fences and railings) due to disposal of construction waste, work camps and parks of heavy machinery	<ul> <li>Position of work camps and heavy machinery parks,</li> <li>Implementation of RPF provisions on compensation procedures in case occasional land use cannot be avoided, compensation will be provided to affected owners/users and livelihood restoration assistance</li> </ul>			during the construction	Included in RPF (RAP)	included RPF (RAP)	PC Roads FBH	PC Roads FBH
<ul> <li>Impacts on local traffic (increase of local traffic, including heavy machinery and trucks, operation of roads with only one lane causing traffic delays and limited access)</li> </ul>	<ul> <li>TMP in place</li> <li>Traffic patterns,</li> <li>Timely information to the citizens</li> </ul>	On construction site and nearby	Visual inspection and inspection	random checks during the week	Included in supervision	Included in supervision	Supervisory body	Supervisory body
<ul> <li>Air emissions:</li> <li>exhaust gasses;</li> <li>dust generation</li> </ul>	<ul> <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	During construction when needed and upon complaints by the citizens	-	500 USD/measur ing	Contractor + Supervision	Authorized laboratory
<ul> <li>Increased level of noise and vibration:</li> <li>noise emission</li> <li>vibration</li> </ul>	• Level of noise	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

		Where will	How will		Cost assess	ment (US\$)	Respon	sibility
Potential impact	Which parameter is to be monitored?	the monitoring be performed?	the monitoring be performed?	When will the monitoring be performed?	Implementa tion	Operative	Implementa tion	Operative
<ul> <li>Emissions into water:</li> <li>possible contamination of surface water</li> </ul>	<ul> <li>Analysis of parameters of surface water quality:</li> <li>Chemical analysis (PH, turbidity, conductivity, temperature, suspended particles, KPK, BPK<sub>5</sub>, ingredients with nitrogen)</li> <li>Standard bacteriological analyses</li> </ul>	In watercourse near construction site (Bregava River) downstream	Standard laboratory equipment and methods of water quality monitoring	Upon order by supervisory organ or upon complaints by the citizens	-	1000 USD /measuring	Contractor + Supervision	Authorized laboratory
<ul> <li>Pollution of surface watercourses</li> </ul>	<ul> <li>Presence of oil film in surface watercourses</li> </ul>	In watercourse near construction site (Bregava) downstream	Visual inspection + Standard laboratory equipment and methods of water quality monitoring	Upon order by supervisory organ or upon complaints by the citizens	-	500 USD /measuring	Contractor + Supervision	Authorized laboratory
Soil pollution	<ul> <li>Soil quality, including, PH, heavy metals, phosphorus, nitrogen, Na, Ca, salts and pesticides K</li> </ul>	On representati ve plots of land near construction sites	Taking samples and standard laboratory analyses	Upon order by supervisory organ or upon complaints by the citizens	-	500 USD /measuring	Contractor + Supervision	Authorized laboratory
<ul> <li>Increased water consumption</li> </ul>	<ul> <li>Amount of affected water</li> </ul>	Construction site	Water meter, record-	Daily	Included in performance	Included in performance	Contractor +	Contractor

		Where will How will			Cost assessment (US\$)		Responsibility	
Potential impact	Which parameter is to be monitored?	the monitoring be performed?	the monitoring be performed?	When will the monitoring be performed?	Implementa tion	Operative	Implementa tion	Operative
			taking				Supervision	
<ul> <li>Emissions into water and soil due to improper waste handling</li> </ul>	<ul> <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> <li>Degradation of biological and ecological resources</li> </ul>	<ul> <li>All trenches up to 0,5 m of depth must be tilted or have ramps in case of necessity for animals' exit. All trenches shall be checked whether there any animals in the prior to covering them with soil.</li> </ul>	Construction site	Visual inspection	Regularly during construction, as appropriate.	Included in performance	Included in performance	Contractor + Supervision	Contractor
• 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

		Where will	How will		Cost assessment (US\$)		Responsibility	
Potential impact	Which parameter is to be monitored?	the monitoring be performed?	the monitoring be performed?	When will the monitoring be performed?	Implementa tion	Operative	Implementa tion	Operative
<ul> <li>Accidental situations i.e. spills, leakage</li> </ul>	<ul> <li>Implementation of EMP which includes:</li> <li>Spill Response Plan,</li> <li>Emergency Preparedness and</li> <li>Response Plan</li> </ul>	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
<ul> <li>Materials supply</li> </ul>	<ul> <li>Implementation of CSOP (the origin of material, material approvals etc.)</li> </ul>	Construction site	Reports	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
<ul> <li>Material transport</li> </ul>	<ul> <li>Implementation of CSOP (the origin of material, licenses etc.)</li> </ul>	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
<ul> <li>Workers safety</li> </ul>	<ul> <li>Implementation of work safety measures (protection equipment, toilets, drinkable water etc.)</li> </ul>	Construction site	Visual inspection	Daily	Included in performance	Included in performance	Contractor + Supervision	Contractor
<ul> <li>River bed and river flow</li> </ul>	<ul> <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

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			
OPERATION PHASE											
• Water emissions	<ul> <li>Analysis of the water quality parameters:</li> <li>Chemical analysis (PH, turbidity, conductivity, temperature, suspended particles, KPK, BPK<sub>5</sub>, ingredients with nitrogen, total fats and oils, mineral oils);</li> </ul>	At the treated water outlet	Sampling	Once a year	Internal resources	1000 USD/sample	PC Roads FBH	Licensed laboratory			

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.

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#### 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.

Application of all identified social and environmental mitigation measures and the State of the ESMP will be provided. The Contractor will be responsible for the implementation of the environmental mitigation measures during construction, will employ environmental experts to supervise the implementation of Contractor's responsibilities, and will be in communication with the investor and with the FMoET. PC Roads FBH will constitute a Grievances Commitee 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). 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.

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

#### 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.

If there shall be 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: <u>http://www.jpcfbih.ba/ba/kontakti/kontakti.shtml</u>.

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.

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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 FMoET and WB

PC Roads FBH shall prepare Annual Environmental Health and Safety Reports (AEHS)<sup>11</sup>, including monitoring indicators and reports on the implementation of their requirements set in ESPM and submit them to the World Bank for review.

PC Roads FBH shall prepare monthly progress reports to World Bank.

PC Roads FBH has the responsibility of preparing and submitting to the FMoET the reports which will include:

- status of implementation of mitigation measures,
- needs for possible additional mitigation measures,
- description of cases of non-compliance with environmental requirements,
- received grievances by local population and other participants, and the way how the grievances were resolved.

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

<sup>&</sup>lt;sup>11</sup> Annual Environmental Health and Safety

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# 10. PUBLIC DISCUSSION AND INFORMATION DISCLOSURE

10.1. PUBLIC CONSULTATION

Public consultation of the subject ESMP will be organized after the WB and PC Roads FBH approve the draft of the ESMP in Čapljina.

Minimum 10 day before the public consultation the document shall be published and made accessible to the public.

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 shall be disclosed again.

# 10.2. INFORMATION DISCLOSURE

ESMP draft will be available on the website of PC Roads of the (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 will obtain 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 reported 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 Čapljina 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.

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The Grievance Registration Sheet (Appendix 1) as print out shall be available at city administration and shall be available for download on the website of JP Roads FBH (www.jpcfbih.ba).

The grievance can be logged in writing within PC Roads FBH, with the Contractor, by phone, by fax, and by e-mailing it to the designated e-mail address <u>zalbena@jpcfbih.ba</u>, or by mail to the address Terezija 54, 71000 Sarajevo.

Further information on Grievances can be found in the ESMF and RPF for the FBH Road Sector Modernization Project.

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# APPENDICES

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# APPENDIX 1. GRIEVANCE FORM

	REFERENC	CE NUMI	3ER					
	(Filled by	the offic	e)					
	A) Affecte	ed by exp	propriation					
	b) All others							
PARTICIPANT INFORMATION OF GRIEVANCE								
FULL NAME								
YEAR OF BIRTH								
GENDER	М	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?         • One-time incident/grievance – Date:         • Happened more than once (How many times?)								
What would you like to see happen?								
DATE:	SIGNATUI	RE:						
RETURN THIS FORM TO:       CENTRAL FEEDBACK DESK         PC ROADS OF THE FBH         Terezija 54,         71000 Sarajevo         Note: All copies are returned to PIU								

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APPENDIX 2. REPORT ON PUBLIC DISCUSSION