FEDERATION OF BOSNIA AND HERZEGOVINA ROAD SECTOR MODERNIZATION PROJECT

Environmental and Social Impact Assessment for the Section Neum-Stolac

JP CESTE FEDERACIJE BIH
Javno preduzece Ceste Federacije Bosne i Hercegovine

March 2016.

UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FOR SECTION NEUM – STOLAC

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PROJECT NO.: **367/15**

CONTRACT NO.: **I – 441 – 367/15**

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Mostar, March 2016

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A B B R E V I A T I O N S

AADT – annual average daily traffic
BH – Bosnia and Herzegovina
DNP – Defect notification period
CPI – Consumer Price Index
CSOP - Construction Site Organization Plan
DNP – defect notification period
EC7 – Eurocode 7 for geotechnical engineering
EIS – Environmental Impact Study
ESIA– Environmental and Social Impact Assessment
F BH – Federation of Bosnia and Herzegovina
FBHRSMP – Federation of BH Road Sector Modernization project
FMoET – Federal Ministry of Environment and Tourism
Ha – hectar
HR – Human resources
IDDEEA – Agency for identification documents, records and data exchange
IDP – Internally displaced person
PAP – Project affected persons
PC Roads FBH – Public Company Roads of Federation of Bosnia and Herzegovina
PEIS - Preliminary Environmental Impact Study
PPM Neum – Physical plan of the Municipality of Neum
PPM Stolac – Physical plan of the Municipality of Stolac
OHS – Occupational Health and Safety

RAP – Resettlement Action Plan
ROW – Right of Way
RPF – Resettlement Policy Framework
SEETO - South East Europe Transport Observatory
SME – Small and medium enterprises
WB – World Bank
WMP – Waste Management Plan

EXECUTIVE SUMMARY

Introduction

Public Company Roads of Federation of Bosnia and Herzegovina (PC Roads FBH) has launched the Modernisation of major roads in the FBH Programme in order to assure adequate road infrastructure by 2020. In the framework of the abovementioned umbrella Program, PC Roads FBH has initiated the FBH Road Sector Modernization Project and FBH applied for loans from the European Investment Bank (EIB) and from the World Bank (WB) for funding the Project (the Project). This assessment focuses on the Project's largest activity: proposed construction of the new road M17.3 Buna-Neum, section Neum-Stolac with a total length of 38,2 km, located in the Herzegovina-Neretva Canton. Given the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental and social impacts the project was classified as a Category A, according to the World Bank classification of impacts. This ESIA is being carried out in line with Tors cleared by the Bank to review and update the earlier Environmental Impact Study (EIS) carried in 2009 with the aim of including an evaluation of social impacts, and to reflect the environmental and social status on the ground relevant to the project investments as of 2015. The purpose of this ESIA study is to investigate the environmental and social consequences, identify the impacts of the proposed project, propose mitigation measures, and develop an Environmental and Social Management Plan (ESMP).

Project location

Section Neum-Stolac is a part of the major road M17.3 Buna-Neum, which is a branch of the major road M17 Sarajevo-Mostar-Čapljina-Metković (Republic of Croatia). The route M17 is part of the European Route E73 that connects the central part of the continent (Hungary) and the Adriatic Sea in the port of Ploče (Croatia) and passes through the centre of Bosnia and Herzegovina in total length of 433 km, as presented in the image no. 1.4-1. Position of road M17, as part of the European Route E73 and M17.3 as a branch of M17. The road M17.3 starts in the community Buna, 11 km south from the City of Mostar, which is the regional centre of Herzegovina-Neretva Canton; it continues to the South-East towards Stolac and it further goes from Stolac in the direction South – South-West in the hinterland of Neum towards the coast, respectively towards the City of Neum, as presented in Image no. 1.4-2. Position of road M17.3 in relation to Corridor Vc of this ESIA.

Project background and rational

Existing Neum-Stolac road has sub-standard technical conditions for a road of major category and importance in the regional transport network. Additionally, road suffered substantial damages during the past war (1992-1995) which adds to its low safety profile. Construction of this road is important not only for the local people, respectively their easier connection to the education, health and cultural as well as municipal centres, but is important for the Bosnia and Herzegovina (BH) as well. Firstly,

by the construction of this road BH would get new modern access to the Adriatic Sea that would fully go through BH area and would enable connection of the inner land with its only sea town and tourist centre Neum. In addition, by the construction of this new road the road route M17 would be relieved so that would decrease congestion and delays at the border crossing with Republic of Croatia and it would increase traffic safety in full.

Project description

The total length of section Neum-Stolac is 38,2 km. Main project for this road is already prepared and the first 5,3 km of the new road were constructed. Construction was financed by the FBH Government and PC Roads of FBH, and the construction works were performed by local companies. The non-constructed road section begins from the settlement Babin Do in the municipality of Neum and passes near the communities Broćanac, Hutovo and Cerovica and ends in the community Drenovac in the Municipality of Stolac. The entire non-constructed section is 32,9 km long, and it is divided into following sub-sections: Babin Do – Broćanac (6.4 km), Broćanac – Hutovo – Cerovica (11.2 km) and Cerovica – Drenovac (15.3 km). The road is projected as a 3rd class road (3000-7000 vehicles/h), with computational speed of 80 km/h, roadway width 2x3,25 m and 2 lanes. ***Section Babin Do-Broćanac*** begins in the settlement Babin Do, where the connection of the access road with the new road is established. On this part of the road, two bridges are planned: one in settlement Babin Do and another near village Dobrovo, each 10 m long. Tunnel Oštrovica of L=190 m length and 3 passages for animals are also planned in this section. From tunnel Oštrovac, the route continues furthermore to the settlement Broćanac, where the first subsection of the route finishes. At the beginning of the ***Section Broćanac-Hutovo-Cerovica*** the junction Broćanac is planned, in order to connect settlement Broćanac. Along the alignment, 3 more junctions are planned in order to connect settlements: Prapratnica, Hutovo and Cerovica (Shrine Hrasno). In addition, on this section 4 subway crossroads and one overhead railroad bridge is planned. Between settlements Prapratnica and Hutovo a tunnel Žaba through hill Osoje in total length of 975 m is planned. According to main project, masses of excavation materials are balanced, i.e. all excavated material for tunnels and cuts will be used for road bedding and embankments, so no other borrow pits will be used. Beside mentioned, six deviations of the existing roads on this section were planned. ***Section Cerovica-Drenovac*** begins after the junction in Cerovica. This section passes alongside many communities and villages and therefore most facilities that are projected at these sections are deviations and passages, i.e. 10 in total. On this section, 3 crossroads are planned: one for settlement Rabrani and gravitating villages, one for the settlements Udora, Ober and Doluša and another in the end of this section, i.e. for the settlement Drenovac. In the area of settlements Udora, Ober and Doluša is the steepest part of the route, therefore a lane for the slow vehicles on this section is planned. The planned road is presented in Traffic Map in the graphic part of the ESIA, and images 1.5.-1. Position of the road in relation to the concept and main project design and Image 3.-1. Area of influence of this ESIA.

Project alternatives and implementation agreements

Different variants of connections of the Neum with the interior of BH started being explored back in the 1970es. For the purpose of developing Physical Plan of the Socialist Republic of BH for the period 1981-2000, several possible alternatives of this

road were explored and the most favourable one, the corridor of 3 km width was established and was implemented as well into the Physical Plan of the Municipality of Neum (1985-2000) as the corridor for further research. Recently, for the purpose of creating the Physical Plan of the Federation of BH(development phase) and the Physical Plan of the Municipality of Neum (2010-2020) the established corridors were examined again, as well as several alternative routes within the corridors.

Five alternatives between Brocanac and Hutovo were analysed in 2013, of which one was from the preliminary design. Alternative without the tunnel Žaba was possible and had significantly lower costs, but at the insistence of Municipaliy of Neum alternative with the tunnel was selected in order to reflect the priorities of local community. Other adjustments imply by-passing olive groves along the section Babin Do-Broćanac, including intersection for the community Papratnica. In addition to that, in the area of the Queen of Peace Shrine, a request by the local community was accepted to place the route more to the north because of unique features of the terrain and access to the Shrine, which as accepted by the Investor and implemented into the final version.

Legal and institutional framework

Environmental legislative of the FBH has dozens of acts, rulebooks and ordinances regulating the field of environment, where the most important and fundamental act is the Environmental Protection Act (Official Gazette of the FBH no. 33/03 and 38/09). Federal Ministry of Environment and Tourism (FMoET) is the fundamental responsible for formulation and implementation of the environmental policy matters. In the FBH, the investments that require Environmental Impact Assessment (EIA) are identified in the Rulebook. The environmental permit (EP) in the FBH is also issued on canton level, as regulated by canton acts on environmental protection. For the proposed Project EP is issued in 2010, based on the EIA process carried out in 2009.

Depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts this Project is Category A in line with the Bank OP 4.01 environmental assessment policy It is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

Four of the WB safeguards policies are "triggered" for the Project based on the site visits and assessments undertaken during preparation of this ESIAs as follows: Operational Policy 4.01 Environmental Assessment and the Project falls into Category A, OP 4.12 Involuntary Resettlement, OP 4.04 Natural Habitats and OP 4.11 Physical Cultural Resources.

One of the major shortcomings of the EIS or EIA produced to meet the local legal requirements is the lack of a detailed social assessment and inclusion of social data and indicators in the EIA report itself. As such, this was one of the main reasons why the EIS prepared in 2009 needed to be revised in the form of this ESIA.

The key difference between the content and requirements of the ESIA as per the World Bank policies and the Environmental Impact Assessment for the environmental permit is reflected in the monitoring of different parameters, in particular the environmental baseline. Since the environmental permit is issued per laws of FBIH as

part of the process for issuing the construction permit, majority of baseline indicators and project impacts are determined to be monitored in the environmental permit, while the EIA proposes the parameters to be monitored. As such, a number of monitoring requirements, as set forth in this ESIA are also determined to be the responsibility of the contractor and to be carried out shortly prior to the start of works.

In order to fully meet the requirements of the World Bank's Operational Policies, as set forth for a Category A project, a detailed and site-specific Environmental and Social Management Plan (ESMP) will need to be prepared prior to the start of works, , so that the ESMP, with all of the obligations set forth are included. The site specific ESMP will build on the requirements of the environmental permit, recommendations of this ESIA and shall include monitoring results that would establish the environmental baseline for the project site, including detailed biological and archaeological surveys, and all other site specific information and details that are determined in this ESIA to be carried out prior to start of works. This is stipulated in the Loan Agreement for the project, and is one of the conditions that need to be met prior to the start of works.

Environmental baseline

The project area administratively belongs to the municipalities of Stolac and Neum. Both municipalities are part of Herzegovina-Neretva Canton, precisely its south and southeast part. The area is mostly rolling country-lowland and hilly-rolling country terrain. The route at most goes over hilly parts of terrain, but only the middle part (around Prapratnica and Hutovo) goes around mountain Žaba (small Žaba). Geological analysis determined that the entire road goes through typical karst terrain, which is characterised by high water permeability. At the area of the new road, there are no surface flows. Local vegetation is consisted of forests and underwoods of oriental hornbeam and oak, within them there are more communities, depending of the level of degradation. All grass communities are originally diverse, and classified into many associations. Among the species that can be found at the project area there are some rare and protected botanical species. One such plant is Dalmatian Laburnum (Petteria ramentacea), although its communities noted on these sites are very rare. Fauna is mostly consisted of small and medium game and big number of birds that seasonally reside in this area, but a sufficient number of species that are residing all year long. The project area is without industrial pollutants, so it can be considered that the air is relatively clean. The micro region is rich with cultural and historical heritage of different types, there are 35 national monuments, and big number registered heritage assets, different by its character; architectural and archaeological heritage (historical building and archaeological sites), and monumental ensemble (archaeological areas, building, natural buildings and historical ensembles), etc. The road passes through no protected natural heritage; concretely Nature Park Hutovo blato is out of range and direct influence. Apart from rare and protected species stated in chapter *Flora and vegetation* of this Environmental baseline, project area does not include elements of fauna, cultural resources and parts of nature that are formally protected on national (BH) level. The area of south and south – east Herzegovina is specific by its natural and social characteristics. In the last decades it has suffered significant demographic and economic changes but precisely because of the poor economic situation its landscape remained complete and intact. The most important feature of those landscapes is their

uniformity due to natural factors, anthropogenic influence and specific historical development. The road passes mostly through rural parts of Stolac and Neum municipalities, and in the projects area of influence there are facilities of communal and physical infrastructure: parts of the water supply network, local ways and roads, and facilities of electric and telecommunication infrastructure of the settlements along the planned road. Current road has poor connecting properties, thus making this space unattractive for doing business or business investments. This said, there are no local shops or any kind of businesses along side old road or new alignment. As there is no physical displacement, there is neither private gardens[1].

Road M17.3 passes through the area where war took place in period 1992-1995, and mine contaminated areas in the Municipalities of Neum and Stolac correspond to the zones of war operations. This problem is considered as a temporary restriction in space but its resolving is aggravated largely, because it is about mine-fields of the unknown allocation with individual mines or groups of mines spread in a wide area. Some areas were mined and cleared of mines for several times during the war. According to the data obtained from BHMAC and used for creation of the physical plans Neum and Stolac, there is one surface with no risk determined at the section Cerovica-Drenovac in the area of the community Stolovi. Although the area along the road is proclaimed safe, special attention is needed during the earth moving works and blasting works, and in case of any doubt MAC BH will be contacted for further instructions.

Socioeconomic baseline

Area of influence expand from city of Stolac to coastal line of BH. This area encompasses two urban settlements, cities of Stolac and Neum and 23 villages with their hamlets. Territory described above is under direct influence, but indirect influence covers whole municipalities (i.e. Neum and Stolac).

During the last 30 years, this area has gone through demographic transition. The change in population is characterised emigration from rural to urban areas and aging trends. Today these municipalities together have 17.233 inhabitants, 49, 62 % in cities of Stolac and Neum and rest 50,38% in neighbouring villages. Although the female population is not dominant in both municipalities there are 1-2% more women than man. Even though these municipalities were under influence of the 1991 to 1995 war, today this area does not host internally displaced individuals or groups[2].

The construction of the Stolac-Neum component of the project requires land acquisition but no movement of physical structures is expected. A total area of 511.972 m^2 is to be acquired and is mostly forest (61.7%) and pasture land (18.6%) from 99

[1] Private garden - Small agricultural land beside houses where vegetables and flowers are grown.

[2] An internally displaced person (IDP) is someone who is forced to flee his or her home but who remains within his or her country's borders. They are often referred to as refugees, although they do not fall within the current legal definition of a refugee.

private owners and 257 users[3], affecting 281 land plots. Six land plots in the area of influence are already property of the government and shall be subject of administrative transfer. The prevailing type of land in Stolac and Neum is agricultural land and forests.

The Social component of the ESIA has focused on particular needs of vulnerable members of these communities by virtue of but not limited to age, economic status, gender, disability, etc. There are 231 beneficiaries of social welfare receiving support in both municipalities.

No ethnic minorities are present in the area.

There is a difference in number of children age 0-14 between these two municipalities. In Neum 898 children are living compared to 4.054 living in Stolac. Municipality wide access to education system for this cohort is considered moderately satisfactory. The school network comprise of 8 schools in both municipalities, of which one for musical education and two Secondary schools. There is no university in either of these municipalities.

The literacy rate among the population aged 15 years and over is very high on the national level, and assumptions are made that the same ratio mirrors the level in the project area. There is an equal 98 % amongst the men and women.

The share of labour force unemployed differs in these two municipalities. While Neum as the more developed of the two municipalities has an unemployment rate of 390 or 12,6% out of the working-age population of 3.088, Stolac has higher unemployment rate of 2.127 or 23,4% out of working-age population of 9.078.

There are no available data on the Number of people living below poverty line in these municipalities but based on the average level of income every household with one employed member only could find itself below this line.

The major sectors providing employment are tourism and trade in Neum and trade only in Stolac. There are no major factories and facilities employing a larger number of people. The current condition of the overall road network is partially responsible for difficulties in transport of agricultural goods to potential markets. In addition, tourism is more feasible in comparison to agriculture. This draws the population to engage in the tourism sector rather than agriculture. Therefore, the migration trend is towards the coast where people have more tangible resources and better returns on their investments. The additional factor influencing such low agricultural production is land fragmentation. A large number of small land parcels are mainly appropriate for household consumption.

Infrastructure utilities and public services are at satisfactory level except for water supply in villages Bjelojevići and Burmazi. These villages are still well dependant, and do not have telephone landlines. The rest of the area has fair coverage of utilities and public services.

[3] Persons who do not have formal rights to land/property at the time of the cut-off date, but have a claim to such land or assets provided that such claims are recognized under the laws of BH (i.e., mostly referring to family inheritance).

The quality of healthcare provided is satisfactory but the problem remains with remote villages with poor road infrastructure thus making healthcare less accessible. Both Neum and Stolac have a healthcare Centre covering the basic primary health needs all the time, while some specialists examinations are provided once a week. More complex interventions as well as diagnostics have to be attended to in the closest hospitals in Mostar and Sarajevo, approximately 85km and 213km from Neum and 37km and 165 km from Stolac respectively away.

The larger part of agricultural production in Stolac is not within the area of influence of the new road, but rather in the northern part of the municipality. The reason of poor development of agriculture in the southern part of the municipality is scarcity of water, which is essential for development of agriculture. Potato is the main crop cultivated in Stolac municipality.

The area of the Municipalities of Stolac and Neum has been inhabited since the Historic times, which is witnessed by numerous archaeological sites found in the area of these municipalities. The artefacts and sites from the Historic times found in this area act as the rich and clear display of the wider area development where the planned section of the major road M17.3 should go.

In order to complement the secondary data and allow for the full range of relevant baseline to be presented, public surveys, focus groups and key informant interviews were conducted to gather qualitative data. Additionally, several public consultations were held to disclose information about the alignment of the Project, tentative implementation arrangements were disseminated and comments and concerns and views on the planned activities collected.

Summary of environmental and socioeconomic impacts and mitigation/enhancement measures

The table below shows those negative (white cells) impacts whose impact intensity extents from moderate to significant with appropriate mitigation measures. The table also shows the most significant positive (green cells) impacts with adequate enhancement measures.

Table 1. Review of environmental negative and positive impacts[4]

Impact	Mitigation/enhancement measures
PRE-CONSTRUCTION	
Risks for all environmental components	▪ Considering the indirect impacts in the pre-construction phase, project documents need to be devised in accordance with legal regulations, environmental permit and prior water approval, geological, hydrogeological, agricultural, and woodland and other features of the area.
Negative impacts on landscape due to poor	▪ Include landscape architect into design and audit teams. ▪ Once more compare different design strategies in terms of

[4] For more details on cost assessment and responsibilities please see table 9.1.-1. in chapter 9. Mitigation measures.

Impact	Mitigation/enhancement measures
design decisions	landscape protection and reduction of permanent impacts. If the route is being laid by the edges of morphological units, respecting ground layers, negative effects could not only be mitigated but sometimes the road can add a completely new positive dimension to the landscape. ▪ Preserve agricultural area as one of the most important anthropogenic factors. ▪ Provide landscape protection through implementation of all mitigation measures described in Environmental Permit and Urban Consent. ▪ Ensure that relationship between traditional elements of life in karst areas remains intact, i.e. be careful not to intercept the path between fields/pastures and settlements.
Potential spontaneous construction along the road	▪ Through physical – planning documents provide the ban on building along the road and direct connection to it.
Disruption of harmony and integrity of the landscape	▪ Landscape Design Project, as included in the main design implies greening of all surfaces disrupted by the construction and setting up a buffer zone towards the settlements and the agricultural areas. Furthermore, the project should contain selection of the type and quantity of plants, substrates for planting, dynamics, as well as costs of planting and annual maintenance.
Enabling observation of the landscape, opening vistas	▪ Record all the best vistas and design viewpoints along the road.
Conflict of utilities with road alignment	▪ Considering the indirect impacts, separate documents which will forecast all conflicts of the road M17.3 with the existing infrastructural system: local roads, electric energy, water supply and telecommunication systems; as well as to resolve these conflicts, are to be included in frames of the main project design.
Compliance with national legislations regarding Construction site	▪ Obtaining all necessary certificates and equipment for execution of planned works. ▪ Preparation of Construction Site Organization Plan (CSOP), technological scheme, Management plan on Safety at Work and Management Plan on Fire Fighting and Explosion and Management Plan on Environmental Protection pursuant to the Decree on Construction Site Organization, Mandatory Documentation on Construction Site and Construction Work Participants, (Official Gazette of FBH, No. 48/09, 75/09 and 93/12) and Waste Management Plan in accordance with the Waste Management Act (Official Gazette of FBH No. 33/03 and 32/09).
CONSTRUCTION	
Groundwater and soil pollution due to uncontrolled discharge of wastewater from road, as well as uncontrolled/accidental	▪ Implementation of water protection measures as determined in ESIA and ESMP. ▪ Performing works in accordance with Main Project, WMP and CSOP. ▪ Ensure appropriate supervision of works. ▪ Ensure areas with impermeable base for siting, repair of

Impact	Mitigation/enhancement measures
leakage of oil and lubricants from means of transport or construction machines, fuelling on construction site	mechanization and prohibit repair of machinery and change of oil in the zone of inacceptable risk for groundwater. ▪ On the occasion of decanting and pouring oil special measures must be implemented to prevent incidental situations; If it comes to pollution by oil leakage or in some other way, that layer of soil should be removed and taken to landfill. ▪ Control waste storage and secondary raw materials storage. ▪ All waste from construction site must be disposed of in organized way by means of an authorized company. ▪ Change of vehicle and machinery batteries is to be performed in those parts of construction site which are ensured from possible leakage of hazardous substances into soil. ▪ Prevent leakage of polluted and uncontrolled discharge of wastewater from the area of construction site into soil; ▪ In stretches of road passing near sensitive zones of groundwater, blasting works need to be adopted to this special situation in order not to disrupt groundwater flows, i.e. apply the technique of millisecond activation of blasting charge with directed blasting action. ▪ All materials from excavation which will not be used immediately must be disposed of in planned location in accordance with CSOP (excess material depot), as well as outside of defined sensitive zones.
Impact on soil and land	▪ The land determined for use by the Project, including storage of building material, parking of the heavy machinery etc., can only be used for the construction activities and no other land is available for these activities in terms of preventing land disturbance. ▪ Proper waste disposal; separation of hazardous waste; engagement of authorized companies for final waste disposal. ▪ Oil and fuel collection systems to be fitted to prevent leakage. ▪ All excavated humus material shall be disposed of on planned sites, so it could be used later for the purpose of planting greenery. ▪ Set physical barriers and protective belts in zones of agricultural land areas to protect them from mechanical pollution and contamination.
Pollution of air and surrounding soil from emission of dust and soil particles due to work of construction machinery and means of transport	▪ Wetting the site to prevent dust occurrence during dry and warm weather conditions and particularly during high winds. ▪ When blasting the excavations in rock massif choosing the type of explosive which makes least harmful environmental impacts. ▪ For the use of blasting boreholes use boring-machines with dust collection in plastic bags. ▪ When transporting construction material and other small material cover it to prevent dissipation on the surrounding area. ▪ Regular maintenance of construction machinery: ensure maximum functionality of motor fuel combustions system; use and regular control of fuel with guaranteed quality standard.

Impact	**Mitigation/enhancement measures**
Pollution of surrounding soil due to work of construction machines , improper use of solid and liquid waste or due to dissipation of hazardous material waste	▪ Perform all manipulations with petroleum and petroleum products with maximum protection measures to prevent spill. ▪ Collect and storage lubricants and worn-out parts, as well as packaging for oils and other products in organized way. ▪ Use only technically functional vehicles, engines with catalytic converters, unleaded fuel. ▪ Park the machinery only in places intended for machinery park, and take measures of protection from soil pollution by oil, petroleum and petroleum products. If it comes to pollution by oil leakage or in some other way, that layer of soil should be removed and taken to landfill. ▪ All surfaces damaged by construction works should be reinstated or landscaped after completion of works. ▪ Perform regular repair and washing of mechanization in areas planned for that purpose.
Loss of vegetation and potential habitats due to performance of construction works	▪ During organization and siting of construction site disrupt vegetation to the least possible extent, i.e. preserve vegetation cover to the highest possible extent. ▪ Fence the construction site to limit the area of adverse impact. ▪ Limit movement of heavy machinery in order to preserve vegetation to the highest extent possible. Parking areas for mechanization must be planned and repair of vehicles in this area must be prohibited. ▪ Take account of waste storage, particularly waste from the category of hazardous waste (lubricants, fuel) in order to minimize damages to surfaces. Waste disposal to be performed in legal landfills. ▪ Prior the commencement of the construction works, Contractor is obliged to perform a review and record any rare and endangered species, such as Dalmatian Laburnum (*Petteria ramentacea*) and provide precautionary measures to preserve them in line with expert guidance, if any are registered. ▪ Excess construction material should not be flattened into soil because large areas with autochthonous vegetation are destructed this way. ▪ Protect surfaces sensitive to erosion with stabilization means and plants that prevent erosion. ▪ CSOP is to plan temporary protection measures from erosion by water (constructing peripheral canals, covering artificial slopes with water impermeable foils etc.).
Disturbing landscape features	▪ Reinstate landscape after completion of works, where possible; in parts of road where that is not possible, re-cultivate the environment in the way defined in Landscape design project.
Damages to the present Infrastructure and facilities (local roads, water supply, electric energy	▪ Minimize interruptions of local infrastructure as much as possible; where it is unavoidable, these works shall be organized in collaboration with municipalities and responsible institutions. ▪ Implementation of the provisions on providing timely information

Impact	Mitigation/enhancement measures
and telecommunication network)	to citizens about upcoming interruptions. ▪ If there are damages done to the local infrastructure the Contractor shall restore the object to the original or better state.
Loss of wild game and prevention of natural migration routes	▪ Construct passages for animals; underpasses and culvers in line with the design documents. ▪ In collaboration with hunting associations, remove the existing hunting facilities and dislocate (feeding and watering points, observation points) to other locations or replace them with new ones, at a safe distance from the road.
Increased noise and vibrations due to work of construction machinery and work processes including blasting/excavation	▪ Implementing all measures from CSOP in order to reduce noise. ▪ Place noisy equipment further from sensitive recipients. ▪ Plan construction activities so as to avoid parallel activities of several devices close to receptor. ▪ Maintain mechanization (construction machinery and vehicles) in proper condition and use them when necessary. Equipment which is not used at the moment should be switched off. ▪ Using engineering techniques of noise control where practical (using mufflers, silencers etc.). ▪ Limit the activities that potentially produce much noise (for example, Pile driving drills, blasting and other activities,) only to working hours during day (from 7.00 to 19.00, Monday-Friday and from 7.00 to 13.00 Saturday) and avoid Sundays; exceptions can be applied for individual facilities such as tunnels. ▪ In case of blasting of excavations in rock massif choose the type of explosive which makes least harmful environmental impacts; apply the technique of millisecond activation of blasting charge with directed blasting action, to reduce the impact of superposition of dynamic impacts (vibration), noise and dust emission. Alternatively, use the technique of excavation by applying hydraulic hammer or mechanical switching by milling machines, "moles" and similar. ▪ The drilling and blasting works shall be minimized as far as possible. ▪ Drilling in cracks shall be avoided. ▪ The drill-hole grid has to be adapted to the individual geotechnical situation. ▪ In case of exceeding the permitted values, ensure protective equipment during work to workers and apply regulation on protection at work.
Danger from mines	▪ Performing works with additional attention and safety measures in case of accident. ▪ Although the area near the road is proclaimed safe, a special attention is needed during the earth moving works and blasting works. In case of any doubt, works must be stopped and MAC BH has to be notified and contacted for consultations and further instructions.
OPERATION	

Impact	Mitigation/enhancement measures
Wind impact on participants in traffic	▪ Setting wind-barriers at places of potential gusts of wind, pursuant to received complaints.
Pollution of groundwater and the surrounding land	▪ In the zone of sanitary protection of water source Blace stormwater from the road shall be collected in a controlled manner (drainage canals and pipes), and treated in appropriate water treatment system (oil-water separators). ▪ If monitoring of water show an increased level of pollution additional measures of protection are to be implemented. ▪ Regular maintenance of the system and facilities of wastewater from the road shall be implemented.
Pollution of agricultural and forest land due to waste created on the road and at resting places along the road	▪ Take care of communal waste which can be created on bus stops or in resting places; and dispose it in proper manner (provide impermeable containers for waste so that wild animals would not come for feeding) and take it away on a regular basis.
Animals injured in the attempt to cross the traffic road; Cutting migration routes of wild game	▪ Implementing periodic monitoring at points of conflict. ▪ Take record of animals getting injured with an aim of taking additional measures of protection, such as marking the places where wild game crosses the road, by means of appropriate signs. ▪ Take care of communal waste which might be left behind at bus stops or resting places, and dispose of it in the prescribed manner i.e. provide impermeable containers for waste so that animals would not come for feeding.
Disrupting landscape features of the area along the road by constructing facilities	▪ Ensure continuous implementation of prohibition of construction along the road and on direct connection to the road; all possible attempts of construction must be penalized in timely manner.
Pollution of agricultural and forest land by disposing exhaust gasses from vehicles	▪ Maintenance of green protective belts and physical barriers in zones of agricultural and forest land.
Increased danger from fire and destruction of forest land and vegetation along the road	▪ Warning signs must be placed next to the road, regarding prohibition of throwing cigarette buds and glass packaging, which is the most common cause of fire in summer months. ▪ Setting up a good and active fire protection system.
Nature park Hutovo Blato	▪ Better transport connections and accessibility to this nature park and other cultural and historical assets and locations.
Incidental soil and water pollution due to collision, leakage of hazardous liquids into soil	▪ Traffic road is to be equipped with appropriate horizontal and vertical signalization, which includes necessary prohibitions and notifications in zones of possible water pollution. ▪ Traffic signals to be used to affect traffic participants, who transport hazardous substances in a way to reduce travel speed, increase the

Impact	Mitigation/enhancement measures
	level of attention, prohibit stopping vehicles on the road and similar. ▪ Establish good cooperation with all public services. ▪ In case of pollution, urgent rehabilitation shall be implemented in line with Regulation on procedures and measures in cases of accidents on water and coastal water terrain, Official Gazette of FBH no. 71/09. ▪ In case of leakage of hazardous substances they must be diluted, neutralized and absorbed. Cleaning must be performed by an expert using all necessary prescribed protection resources.

LEGEND:	
	Negative impact
	Positive impact

'. Review of social negative and positive impacts[5]

Impact	Mitigation/enhancement measures
PRE-CONSTRUCTION	
Local overview and community support	▪ In order to consult the communities and enhance stakeholder support, due consideration should be taken when choosing the concept of the public consultations and presentation of the project. The presentation should contain the design, the financing method, the land acquisition phase and similar details which shall account to the readiness of government and PC Roads to complete this infrastructure project.
Access to water and sanitation electricity and telecommunications	▪ Considering the indirect impacts in the pre-construction phase, it is necessary to create separate documents which will forecast all conflicts of the road M17.3 with the existing infrastructural system: electric energy, water supply and telecommunication systems; as well as to resolve these conflicts. The documents are to be created in frames of the main project design. ▪ Use adequate and up to date utility mapping standards including but not limited to Existing records Surface features Electromagnetic/Radio Frequency Locators Ground Penetrating Radar Vacuum Excavations. ▪ Develop a Utility Conflict Matrix to provide management tool to deal with conflicts, organize relevant information on conflicts and alternatives and allow tracking of conflict resolution progress.
Dominant sectors	▪ During pre-Bid meetings, details on the bill of quantity and specific items of works shall be briefly discussed with PC Road of FBH and potential bidders to highlight type of works and related equipment

[5] For more details on cost assessment and responsibilities please see table 9.2.-1. in chapter 9. Mitigation measures

Impact	Mitigation/enhancement measures
	and machinery likely to be engaged in these activities. This will continue to boost economy in construction sector. ▪ Inform potential investors about opportunities and potential of this area regarding road construction and its impact on tourism.
Land acquisition / involuntary resettlement	▪ Development and implementation of resettlement action plan (RAP) as resettlement instrument guiding the resettlement and compensation process in compliance with national Law and OP 4.12.RAPs must be consistent with the Project level RPF. ▪ Compensation at replacement cost of damage/loss according to the RAP. ▪ Timely compensation. ▪ Under this Project PC Roads FBH shall establish Grievance mechanisms prior to commencement of works and expropriation. The grievance mechanism shall serve as a forum to address complaints of PAPs and all other persons affected or impacted by the Project.
Cultural Heritage	▪ Implementation of detailed archaeological research and conservatory inspection of recorded sites along the route; recording the present state of objects and sites (stone walls, tombstones etc.).
CONSTRUCTION	
Temporary worker in-migration and population change	▪ The contractor is obliged to arrange suitable worker accommodation for non-local workers. Provide that the road will be built between two urban settlements (one of which is a tourist town with high lodging availability), it is envisioned that the contractor will lease worker accommodation from the local, private market. In advance of the civil works, the affected ▪ Municipalities should communicate to the local community the upcoming demand for worker lodging and encourage private owners to early advertise lodging vacancies thus promoting leasing arrangements for vacancies that can accommodate construction workers. ▪ In addition any contractor shall ask for advice and recommendations of specific area of his interest most likely from Municipalities as forums most informed and involved in community activities. ▪ Managing Public Expectations by regular dissemination of information about temporary worker in-migration.
Gender	▪ Contractor shall prepare a staff engagement plan to allow where and when possible engagement of man and women equally depending on the specific position. The contractor will whenever possible employ women, depending on available trained and skilled labour.
Education and skills	▪ Workers included in construction works, especially those gone through vocational training will gain experience in this kind of construction works. ▪ Contractors to be encouraged to increase skill improvements at

Impact	Mitigation/enhancement measures
	local level.
Employment	▪ Hiring guidelines for recruitment will be in place to promote transparency of the recruitment process. ▪ Equal opportunities and non-discrimination will be guaranteed in the recruiting process. ▪ There will be no distinction, exclusion or preference in the recruitment made on the basis of "race, colour, gender, religion, political opinion, marital status, national extraction or social origin, disability, age, sexual orientation, and/or HIV status." ▪ Selection criteria will include minimum age and skills requirements. ▪ All job vacancies will be listed clearly with skills and experience required to fill the position, as well as the duration of the employment contract. ▪ Clear information on the recruiting process and the selection criteria will be publically available and easy to access to promote transparency of the process. ▪ All contractors will be required to implement the hiring guidelines.
Access to water and sanitation electricity and telecommunications[6]	▪ During construction comply with major road designs with special care to unchartered utilities. ▪ Emergency and prompt reaction in case of disruption. ▪ Use adequate and up to date utility mapping standards including but not limited to Existing records Surface features Electromagnetic/Radio Frequency Locators Ground Penetrating Radar Vacuum Excavations. ▪ Develop a Utility Conflict Matrix to provide management tool to deal with conflicts, organize relevant information on conflicts and alternatives and allow tracking of conflict resolution progress.
Construction site health and safety risk	▪ Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc. ▪ Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration. ▪ Regarding the blasting works/works with explosives, the contractor must have certificates that prove the competence or qualifications for these activities, according to the Mining Act of the Federation of Bosnia and Herzegovina (Official Gazette of the FBH 27/10). Specific measures are: ▪ The Contractor is obliged to deliver drilling and blasting parameters with a blasting field sketch at minimum one week prior to the implementation of these works. ▪ Blasting field and the distance to the endangered objects and

[6] *Also see table 8.1. Environmental mitigation table section Infrastructure and facilities*

Impact	Mitigation/enhancement measures
	mechanization needs to be presented in a blasting field sketch. ▪ During the blasting ignition it is not permitted for anyone to be present in the area of the stone scattering zone. ▪ Before the blasting works a security needs to be placed at all possible access points to contain people and vehicles outside of the endangered zone. ▪ The beginning and the end of the blasting works needs to be announced with audio signals. ▪ In case of any losses of cleaning air by drilling no further drilling or blasting works shall be carried out at that point. ▪ Drilling and blasting works need to be coordinated with seismical measurements in nearby settlements according to the law. ▪ The blasting works need to be announced in advance to: Ministry of Internal Affairs of the HNC, police stations in Neum and/or Stolac, and local population (one day in advance and at the day of the blasting works via local media, especially local radio stations). ▪ The contractor is obliged to carry out all the necessary safety measures in line with the legislative for its part of the work; in case of non-performance thereof it is liable to the investor and competent inspection authorities. ▪ Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE. ▪ Evaluate contractor performance on worker welfare and implement penalties for non-compliance. ▪ OHS Training. ▪ Maintenance all mitigation measures proposed during the DNP. ▪ The Contractor shall at all times maintain the health and safety of the Contractor's Personnel in collaboration with local health authorities. ▪ The Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. ▪ The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. ▪ The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider, and shall undertake such other measures to reduce the risk of the transfer of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals. ▪ The Contractor shall throughout the contract (including the Defects Notification Period): (i) conduct Information, Education and Communication (IEC) campaigns on the workers' code of conduct vis-a-vis the local community, at least every other month, addressed to all the Site

Impact	Mitigation/enhancement measures
	staff and labour (including all the Contractor's employees, all Subcontractors and any other Contractor's or Employer's personnel, and all truck drivers and crew making deliveries to Site for construction activities) (ii) provide male or female condoms for all Site staff and labour as appropriate; and (iii) provide education/awareness raising activities in form of online presentation and brochure for STI and HIV/AIDS on screening, diagnosis, counselling and referral to a dedicated national STI and HIV/AIDS programme, (unless otherwise agreed) of all Site staff and labour.
Community health and safety risk	▪ Public dissemination of day-to-day traffic disruption ▪ Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions. ▪ Prepare an emergency response plan in case of emergency transportation to allow transport without delay to the intended destination. ▪ Maintenance all mitigation measures proposed during the DNP. ▪ The Contractor shall inform the local communities concerning the risks, dangers and impact, and appropriate avoidance behaviour with respect to, of Sexually Transmitted Diseases (STD) - or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular
Local transport system	▪ Develop the traffic safety management plan.
Schools	▪ The transportation of construction material will be aligned to the school timeline. ▪ Timely information of work sequencing. ▪ Develop Traffic Management Plan in conjunction with road authorities to manage all temporary accesses, delivery of material and machinery. ▪ Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions.
Facilities for staff and labour / working conditions	▪ According to MDBH condition of contract except as otherwise stated, the contractor shall ensure all necessary accommodation and welfare facilities for contractor personnel. ▪ Promote compliance with national labour and employment laws and the fundamental principles and key regulatory standards embodied in the ILO conventions. ▪ Contractor shall comply with all relevant labour laws applicable, including costs related to their welfare, accommodation, daily fees, etc.

Impact	Mitigation/enhancement measures
Income level	▪ Contractors should be encouraged to source local crops, meat and fish locally produced to feed themselves and their staff, use local services such as food preparation, cleaning facilities and laundry... ▪ The contractor should liaison with local suppliers to identify and quantify their potential and increase of capacity balanced with his demands. Activities required from contractor include, but not limited to publishing types of goods and services (food, beverage, cleaning services, repair shop services, etc) which contractor will procure in local media.
Poverty	▪ Advertise job opportunities related to the construction works well in advance. ▪ Contractors should be encouraged to procure locally equipment and vehicles, goods services and etc. that will be required during construction phase.
Agriculture and Farming[7]	▪ Farmers and cattlemen should be allowed to pass with their mechanization and livestock to their farming lands twice a day, when going and returning back to home. ▪ Cattleman to be encouraged to go to pasture away from construction site as far as possible. ▪ To sprinkle water on construction site to limit dust expansion on agriculture land.
Tourism	▪ Tourist agencies that offer arrangements to Neum should be noticed about traffic disruptions in order to avoid their customers inconveniences during their vacations.
Land acquisition[8]/ Involuntary resettlement	▪ The condition precedent to commencement of any construction works is that compensation must be paid at replacement cost according to RPF and RAP. ▪ Continuation of raising awareness about Grievance mechanisms.
Cultural heritage	▪ Mandatory suspension of all works and informing the competent heritage protection service in case of discovery of cultural / archaeological findings. ▪ The Contractor is obligated to inform the Supervisory body for cultural heritage in case that construction works might have influence on any of 13 tumuli that are recorded to be in direct area of influence. ▪ Periodic monitoring of objects in the indirect area of influence is required in order to determine possible physical damage to the structures. This monitoring will be in the line to the work dynamic.
OPERATION	
Migration and population change	▪ Municipality to promote all positive aspects of the newly constructed road by presentation of improved access to public services and the coast for the revitalization of this area on an

[7] *See table 8.1. Environmental impacts; better access to arable land.*
[8] *See table 8.1. Environmental Impacts; Impact on agricultural land*

Impact	Mitigation/enhancement measures
	ongoing base.
Age	▪ The municipalities should develop different policies for positive demographic change. This measures should include improving and promoting transport accessibility, supporting entrepreneurship (especially SMEs), stronger local job creation, gender equality improvement, poverty reduction, immigration encouragement, youth, adult and elderly skills development, etc.
Employment	▪ Hiring guidelines for recruitment of construction site personnel will be in place to promote transparency in the recruitment process. ▪ Equal opportunities and non-discrimination will be guaranteed in the recruiting process. ▪ There will be no distinction, exclusion or preference in the recruitment made on the basis of "race, colour, gender, religion, political opinion, marital status, national extraction or social origin, disability, age, sexual orientation, and/or HIV status." ▪ Selection criteria will include minimum age and skills requirements. ▪ All contractors will be required to implement the hiring guidelines. ▪ All job vacancies will be listed clearly with skills and experience required to fill the position, as well as the duration of the employment contract. ▪ Clear information on the recruiting process and the selection criteria will be publically available and easy to access to promote transparency of the process. ▪ Prior to civil works, the PC Roads FBH shall release an announcement to indicate commencement of the Project indicating what vocations and skills shall most likely be required during construction and backstopping activities and encourage vocational training.
Health services	▪ Publicly announce completion of construction and reduced time for travel. This would promote a constitution of habit to use easily accessible now medical centres in BH especially those in Mostar and Sarajevo.
Schools	▪ Publicly announce completion of construction and reduced time for travel. This would promote the option of choosing the most accessible school to attend.
Dominant sectors	▪ To encourage municipalities to implement physical plans in respect of rest areas along the road and related services.

LEGEND:	
	Negative impact
	Positive impact

Monitoring the environmental and socioeconomic indicators[9]

The objective of monitoring indicators is to measure the success of the project. Based on their measurement, it will be possible to check whether the negative impacts were avoided, and positive enhanced. Furthermore, active monitoring will indicate possible impacts that were over or underestimated so taking proper corrective actions will be possible.

Following aspects of environmental and social indicators are presented in tables below:

Table 3. Environmental Impacts Monitoring Plan

Which parameter is to be monitored?	Where will the monitoring be performed?
INITIAL STATE	
Groundwater quality: - Chemical analysis (PH, temperature, suspended particles, KPK, BPK5, ingredients with nitrogen) and standard bacteriological analyses	Water source Blace
Air quality: SO_2, smoke, NO_2, PM 10, according to legal regulations	Along road route near settlements and agricultural land
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to instruction and collaboration with specialized institutions for monitoring soil quality, define organization of monitoring and a network of monitoring points
Forest and forest land: frequency and type of forest systems, character of forest communities and their commercial categories, zones of sensitivity to harmful impacts from mechanical damage and damage caused by contamination, soil analysis for agricultural land	In zones of corridors of direct and indirect impacts, according to instruction and collaboration with specialized institutions for monitoring soil quality, define organization of monitoring and a network of monitoring points
Physical distribution of Dalmatian Laburnum (*Petteria ramentacea*); Population size of other rare, endangered and endemic species	In zone of corridors of direct and indirect impacts
Migration routes of large and small wild game	In zone of corridors of direct and indirect impacts

[9] For more details on cost assessment and responsibilities please see tables 10.-1. and 11.-1. in chapters 10. and 11. of this ESIA

Which parameter is to be monitored?	Where will the monitoring be performed?
CONSTRUCTION PHASE	
Air quality: SO_2, smoke, NO_2, PM 10, according to legal regulations	On construction site, in accordance with air quality monitoring program
Level of noise	Construction site
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to the defined network of measuring places and dynamics of performance of works
Forests and forest land	According to the defined network of measuring places and dynamics of performance of works
Cultural-historical heritage	In zone of corridors of direct and indirect impacts
Fauna	In zone of corridors of direct and indirect impacts
Landscape	In zone of corridors of direct and indirect impacts
OPERATIONAL PHASE	
Groundwater quality: - Chemical analysis (PH, temperature, suspended particles, KPK, BPK5, ingredients with nitrogen) and standard bacteriological analyses	Collect data on quality of groundwater at water source Blace
Air quality: SO_2, smoke, NO_2, PM 10, according to legal regulations	In inhabited places along the road
Level of noise	For inhabited places and groups of houses along the road
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to the defined network of measuring places
Forest and forest land	According to the defined network of measuring places
Landscape	Implementing prohibition of construction along the road and direct connection to the road

Table 4. Social Impacts monitoring Plan

Which parameter is to be monitored?	Where will the monitoring be performed?
CONSTRUCTION PHASE	
# of Grievance received and % of Grievance and comments addressed within the announce time-frame	Central Feedback Desk
Number of jobs created for men and women during project planning and construction Number of men-months	Contractor employment report and Municipality Economics Department
MAINTENANCE AND OPERATION PHASE	
Number of traffic accidents per AADT The number of killed in accidents per AADT The number of severely injured per AADT The number of slightly injured per AADT	At PC Roads FBH offices
The price of fuel at gas stations in Neum and comparable gas stations in the region	At Neum gas stations

Stakeholders

Stakeholder must be informed and consulted about the project activities during the entire project cycle. Vulnerable categories must be kept up to date and consulted in appropriate ways, and engagement activities adjusted to their needs. They include persons or groups which are:

- Directly and/or indirectly affected by the project activities;
- Have certain "interest" connected with the Project or its activities;
- Have the ability to influence the Project itself or its final outcome.

Public consultations and disclosure

First public consultation was held in Hutovo on November 11, 2015. During the presentation of the project participants were informed about previous and future project activities and detailed road plans, maps, placement of tunnels, road intersections, etc. were presented to the rest of the participants that were not familiar with road alignment.

Second Public consultations on the ESIA draft was organized after the World Bank and PC Roads of the FBH approved draft documents. The documents were published and available to the public in a local language on the website of PC Roads FBH on February 18th 2016, and public had 14 days to submit their comments in order to identify issues of concern and possible solutions. The public consultations were held on March 2nd 2016 in Hutovo, and the Minutes of the Second Public Discussion on ESIA is in Annex C of this ESIA.

Conclusions

Analysing the impacts of the planned road construction and operation, all negative environmental impacts of the Neum – Stolac road will be removed or minimized to the extent possible, provided strict compliance with proposed protective measures and ensuring monitoring the state of the environment, so in this sense it can be said that the planned project will not have significant negative impact on the environment in the project area.

From the study findings, it has been concluded that the social impacts of the proposed project are moderate-minor and easily mitigated. In fact, overall attitude of the communities in the affected area are positive towards the Project. Any disruption shall be temporary and offset by economic benefits. Within the scope of the engagement activities, stakeholders will be informed about the Project and their suggestions and opinions will also be recorded and taken into account in the decision making process. In addition, a grievance mechanism will be in place. The ESIA revealed that the majority of negative impacts are associated with the construction phase and that most of them can be mitigated through the implementation of good construction practice and the proposed mitigation measures, the implementation will be monitored and measures taken to reinforce, adapt or change if needed. There are no residual negative social impacts and their rating is assessed as not significant for negative and medium and minor for positive impacts. It is generally anticipated that the construction will bring short and long term benefits.

Due to the lack of existing data, a site specific Environmental and Social Management Plan (ESMP) will be prepared prior to the start ofworks. The ESMP shall include a detailed environmental baseline, and findings of relevant surveys to reflect the specific conditions of the project site and development. The ESMP shall build on the provisions of the environmental permit, this ESIA, the EIS from 2009 but will be developed based on the principles and requirements of the World Bank policies for such documents.

1. INTRODUCTION

1.1. STUDY BACKGROUND AND OBJECTIVE

Public Company Roads of the Federation of Bosnia and Herzegovina (PC Roads FBH) has launched the *Modernisation of major roads in the FBH* Programme for modernisation of major roads in the Federation of BH in order to assure adequate road infrastructure by 2020. For the purpose of realizing this programme, the BH Government asked for the support of international financial institutions in order to secure the funding. The government programme is co-financed by the European Investment Bank (EIB), World Bank (WB) and European Bank for Reconstruction and Development (EBRD).

In the framework of the abovementioned umbrella Programme, the PC Roads of FBH has initiated the FBH Road Sector Modernization Project (the Project). FBH applied for loans from the European Investment Bank (EIB) and from the World Bank (WB) in the total amount of 103, 38 million EUR for funding the Project. The Project comprises several small and mid-sized investment schemes, including road rehabilitation and upgrade, road safety interventions, institutional strengthening and implementation support.

This assessment focuses on the Project's largest activity: proposed construction of the new road M17.3 Buna-Neum, section Neum-Stolac with a total length of 38,2 km, located in Herzegovina-Neretva Canton.

Table 1.1.-1. Population and area of municipalities

Municipality	Population	Area in km^2
Stolac	12988	286
Neum	4364	225

Given the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental and social impacts the project was classified as a Category A. The present study is being carried out to review and update the earlier Environmental Impact Study (EIS) carried out for the same section (Neum –Stolac) in 2009 with the aim to include and evaluate social impacts as well, and to reflect the status on the ground as of 2015. This Environmental and Social Impact Assessment (ESIA) is in line with the Environmental Protection Act of the Federation of Bosnia and Herzegovina (Official Gazette of the FBH, no. 33/03 and 38/09) and the World Bank Operational Policies (OP). The purpose of the Report is to evaluate the project's potential environmental and social risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental and social impacts and enhance positive impacts; and includes the process of mitigating and managing adverse environmental and social impacts

throughout project implementation. Wherever feasible preventive measures are proposed over mitigatory or compensatory measures.

The purpose of the social component of the ESIA is to increment information gathering, enabling the analysis and assessment to define actions, either to remedy adverse impacts or to enhance benefits during preparation and implementation of the project.

1.2. IMPACT ASSESSMENT APPROACH AND METHODOLOGY

Problems of environment protection for the planned road M-17.3 Buna - Neum, section Neum - Stolac, were analysed within the specific study documentation on the level of contents of Previous Environment Impact Assessment (PEIA), and the final Environment Impact Study (EIS). Study documentation was prepared in accordance with statutory legislation of the Federation of Bosnia and Herzegovina (The Environmental Protection Act, Official Gazette of the FBH, no. 33/03). The whole problem was analysed in the framework of some special units that include the basis for the research, characteristics of the planned road, characteristics and evaluation of existing conditions, a complex analysis of the impact on the environment, the necessary measures to protect the environment and a description of alternative solutions[10]. As a result of the EIA process, the environmental permit was issued in 2010.

As mentioned earlier in text, this ESIA document is being carried out to review and update the earlier Environmental Impact Study (EIS) carried out for the same section (Neum –Stolac) in 2009 with the aim to include and evaluate social impacts as well, and to reflect the status on the ground as of 2015.

Approach and methodology of the ESIA preparation are based on the analysis of data from primary and secondary sources. The EIS was conducted through a desk study, sight visits and comparison to the original EIS (2009), while SIA was conducted through a combination of a desk study and qualitative research methods.

Description of the environment that could be threatened by the project is done from various aspects: socio-economic, climate and meteorologic, geomorphologic, geological, engineering-geological and geotechnical, hydrogeological, pedologic and agriculture, flora and fauna, forestry and hunting areas, landscape, protected areas, cultural and historical heritage, population and populated areas, infrastructure, state of noise and air quality, endargement by mine-explosive materials.

A significant amount of secondary data was already available, including publicly available documents and data by the PC Roads of FBH. In addition, maps, digital photographic site documents, observations, interviews, public consultations, key

[10] Excerpt of the Environmental Impact Assessment for M17.3. Buna-Neum, section Neum-Stolac, Roughton International in association with TRT Ltd, United Kingdom and Energoinvest JSC Sarajevo, Bosnia and Herzegovina, 2009

informant interviews, community meetings and other tools were used to draw the features of the baseline conditions of relevance to the environmental characteristics and socio-economic environment of the Neum and Stolac area of influence. The dataset that appeared viable in addressing the requirements of the study were processed and evaluated, thus ensuring the appropriateness of the topic.

The baseline description regarding existing settlements in the area was used together with the Project description to identify the impacts and evaluate their significance. For identified adverse impacts, relevant mitigation and monitoring measures have been developed. As the ESIA progresses, the emphasis shifts to impact evaluation, which consists of the systematic evaluation of each of the identified impacts using criteria enabling the significance of the impacts to be determined and the impacts to be ranked accordingly. As part of this process, management measures are defined to reduce the significance of negative impacts or enhance positive ones. After consideration of the management measures, the significance of the resulting (residual) impacts is re-evaluated using the same criteria.

1.2.1. Desktop review of Secondary Data

The data on physical environment, e.g. climate features, geographic conditions, geological and hydrogeological characteristics and land use were obtained using the physical plans of Municipalities of Neum and Stolac. In addition, data from earlier made studies, programs and plans were also used in order to base ESIA preparation on the relevant data. The key data on biological environment were used from existing EIS Neum-Stolac, drafted in 2009.

Data on water quality were obtained using the Study of the protection of the Blace source, drafted by Integra Ltd. Mostar in May 2014.

Data on infrastructure facilities, e.g. water infrastructure, electric power and telecommunication infrastructure and traffic infrastructure were obtained using the physical plans of Municipalities Neum and Stolac, as well as the Main Design of M17.3 Neum-Stolac, section Broćanac – Cerovica, sub-section Broćanac-Hutovo-Cerovica and section Cerovica-Drenovac, drafted by Divel Ltd. Sarajevo in 2015.

The sources supporting in general the socio –economic baseline section in general were official reports of the Federal Bureau of Statistics, Agency for Statistics in BH and Federal Institute for Development Programming. The methodology used during data collection is explained in text below.

The data on the mortality and birth rate were obtained using the Statistics report of births and deaths respectively.

Data on migrations were provided by the Agency for Identification of Documents, Records and Data Exchange. 2009-2014. **For calculation of the GDP** the key secondary data documents from corporations, banks, insurance companies, administrative bodies, institutions and other legal entities residents of the Federation of BH were used. From the Agency for Statistics of BH data from state-owned institutions on the level of BH and Central Bank of BH were taken (schedule of activities by entities was made by agreement on the principle of allocation of income from indirect taxes), as well as data on input rent. The calculation also encompassed data on agricultural production (farms)

and non-agricultural production (crafts-trades), pursued within a household. Data on subsidies on products and production were collected from competent ministries (budget statistics). Data on taxes on products and production were obtained from the Federal Ministry of Finance and Administration for Indirect Taxes.

Assessments of statistical monitoring of the non-included economic activities were stated in the calculation of gross domestic product, apart from illegal activities.

Data on gross domestic product and gross added value by production approach were done in current prices.

Data on trade balance include data on import and export of goods and are included in the following categories: regular export, export with external processing, export after internal processing, regular import, import after external processing, import with internal processing.

Data on total number of unemployed persons were obtained from the legal entities and natural persons, as a result of regular monthly surveys (Form RAD-1). The key documents on the unemployed were taken from the Federal Employment Institute, the data on average net and gross monthly salary were calculated on the basis of the data collected from monthly surveys on the employed and salary (also Form RAD-1). The survey encompassed legal entities of all types of ownership, bodies of state authority on all levels, institutions and other organizations.

All the data that included the components expressed in monetary terms are stated in BAM, and converted into $ according to average course BAM/$ for the year the data refers to.[11]

The following data sources were used:

Data on birth and mortality rates are taken from the Federal Institute for Statistics Bulletin on Demographics from years 2009 to 2014. Data on migrations are taken from the Federal Institute for Statistics Bulletin on Migrations from years 2009 to 2014. Data on estimate of the present population by age and sex is taken from the Federal Office of Statistics First Release 2013. Data on population census is taken from Census of Population, households and dwellings, preliminary results by municipalities and settlements in the Federation of Bosnia and Herzegovina. Data on agriculture are taken from Federal Institute for Statistics, Plant production in Federation BH from years 2009 to 2014.[12] Data on poverty are taken from the Agency for Statistics Household budget survey in BH in 2011.[13] Data on macroeconomic and social indicators population density, employment and unemployment rates, unemployment rates by qualifications and sex, average net wages, number of pensioners and average pension, foreign trade are taken from the Reports on Socioeconomic and Macroeconomic Indicators by cantons reports of the Federal Institute for Development Programming from years 2009 to 2014.[14]

[11] Official exchange rates at the National Bank of BIH
[12] All data can be found on http://www.fzs.ba/Eng/gode.htm
[13] http://www.bhas.ba/saopstenja/2014/BHAS_HBS_BH_dv5-2.pdf
[14] All data can be founded on http://www.fzzpr.gov.ba/bs/pubs/3/3/publikacije

1.2.2. Field data

In order to complement secondary data, , focus groups, key informant interviews and structured questionnaire interview were conducted to collect primary data and solicit opinions from key interest groups (Table 1.2.2 -1). Additionally, several public consultations were held to disclose information about the alignment of the Project, tentative implementation arrangements were disseminated and comments, concerns and views on the planned activities were collected. Participants of the focus groups were asked to discuss about their opinions of inclusion and awareness of the project activities, positive and negative aspects of construction, possibility of the demographic revitalization of depopulated areas, economic grow from construction and road usage, quality of life, agriculture etc.

Table 1.2.2.-1. Summary overview of primary data collection tools and stakeholder groups

Tools	Date and Place	Stakeholders groups	No of people attending
Structured questionnaire	Stolac December 3,2015	Local citizens (shepherds, a young couple with six children, elderly, people living in the hinterland employed in the municipal centers of Neum and Stolac)	8
Focus Group	Stolac November 23,2015 December 3, 2015 Neum November 23,2015 December 2, 2015	Utility company Stolac Association of women rights Orhideja Stolac Chairman of the hunting association Kamenjarka Stolac Secretary of the Beekeepers association "Zanovijet" Stolac Civil protection office Chairmen JU Radimlja,(public institution for cultural heritage protection and tourism development) Stolac Neveš Boljuni association Association of olive producers Stolac Hotel Managers – (Hotel Sunce, Hotel Neum, Hotel Jadran)	32

Key informant interviews	Mostar: November 30, 2015 Stolac: November 27, 2015 November 30, 2015 Neum: November 20, 2015 December 3, 2015	Tourist office of HNC Ministry of internal affairs of Hercegovina Neretva Canton Principal of the Elementary School in Stolac Principal of the Secondary school in Stolac Principal of the First Elementary School in Stolac Principal of the Secondary School in Neum Principal of the Elementary School in Neum Municipal Departments of Social Services Municipal Departments of Economics Municipal Department for construction, urban development and environmental protection. Neum Health Centre Neum Nursing Home	9

Table 1.2.2.-2. Public consultations

Tools	Date and Place	Information disclosed	No of people attending
Public Consultations	Neum July 11, 2013	Presentation of alignment Broćanac-Hutovo-Cerovica	15
	Neum August 1,2013	Detailed presentation of Broćanac – Hutovo – Cerovica alignment	18
	Hutovo November 11, 2015	Discussion on the updated ESIA, detailed presentation of the main alignment, access roads, possible deposit areas, borrow pits and discussions on the expected social impacts	28

1.2.3. Project impact assessment methodology

Any substantial intervention in the environment results in different impacts, and construction of an infrastructural facility falls into this category. Such interventions alter the situation, cause permanent and/or temporary modification of landscape and the way of life and activities of people in the affected area.

As a result of activities in future road construction were identified, analysed and evaluated the positive and negative environmental and social impacts for the construction phases and road use as well as direct and indirect impacts on: population, socio-economics, climate, water, soil, woodland and agricultural land, flora and fauna, landscape, cultural and historical heritage, hunting, air and infrastructure. Analysis of the impact of the planned road on the physical and social environment is shown that, given the nature of impact and its importance, it can consider that the construction of the road causes the positive and negative impacts as a result of the construction of its physical facilities, construction activities and use.

Once the environmental and social aspects have been identified, the level of each individual impact, or undertaking certain activities in the area that can different environmental and social impacts is assessed.

In this regard, impacts are first identified and classified per nature as positive, negative, short term, long term, direct and indirect; per likelihood of impact as certain, very likely, likely and unlikely; per extent of impact intensity as significant, major, moderate, minor, negligible and none, and per scope of impact as local and regional. In this regards the meaning of each criteria is in detail described below.

Positive impacts are manifested through improvement of environmental and/or social surroundings.

Negative impacts are manifested through degradation of environmental and/or social surroundings.

Short term impacts are occurring over short period of time.

Long term impacts are occurring over long period of time.

Direct impacts are manifested through disruption of the current conditions, the course of current activities and habits (increased noise, traffic or pollution).

Indirect impacts are manifested mostly throughout longer periods of time, they are cumulative and gradual, and therefore in most cases irretrievable.

Likelihood of an impact can be expressed as follows:

Certain are impacts with the estimation of 99% chance of the impact occurring.

Very likely are impacts with the estimation from 50% to 99% chance of the impact occurring.

Likely are impacts with the estimation from 1% to 50% chance of the impact occurring.

Unlikely are impacts with the estimation from less than 1% chance of the impact occurring.

The extent of an impact is expressed as: significant, major, moderate, weak and insignificant, and no impact.

Extent of impact intensity:

Significant intensity occurs when environmental and social functions and processes are severely altered and / or affected.

Major intensity occurs when environmental and social functions and processes are substentionaly altered and / or affected.

Moderate intensity occurs when environmental and social functions and processes are notably altered and / or affected.

Minor intensity occurs when environmental and social functions and processes are slightly altered and / or affected.

Negligible intensity occurs when environmental and social functions and processes are remotely altered and / or affected.

None environmental and social functions and processes remain unaltered.

Scope of impact:

Local within 10km radius of site boundaries.

Regional beyond 10 km radius of site boundaries.

Given project phase, impacts are generally divided as follows:

- Impacts during pre-construction phase ;
- Impacts during construction phase;
- Impacts during operation phase.

No other large infrastructure project is planned to be executed within the same timeframe as the construction of M17.3, therefore no cumulative environmental and social impacts in the Project area are foreseeable at the present.

Measures to mitigate the negative impacts include a wide range of necessary activities within each of the analysed impacts and in the construction phase and operation period of the road. These measures are systematized into two basic groups: general and technical mitigation measures of negative impacts on the physic and socio-economic environment.

Considering some possible potential negative impacts identified during construction and road use, a methodology for ESIA preparation foresees the adoption of monitoring program of long-term impacts of road construction on physical and social environment and proposed measures for their protection. The purpose of monitoring is surveillance of polluting emissions (in the air, water, soil....), changes of environment parameters (air quality, noise levels, groundwater quality, changes of soil quality) and social indicators measuring the projects success. On the basis of results of the monitoring, it undertakes some additional organizational or investment measures.

In order to fully meet the requirements of the World Bank's Operational Policies, as set forth for a Category A project, a detailed and site-specific Environmental and Social Management Plan (ESMP) will need to be prepared prior to the start of works, , so that the ESMP, with all of the obligations set forth are included. The site specific ESMP will build on the requirements of the environmental permit, recommendations of this ESIA and shall include monitoring results that would establish the environmental baseline for the project site, including detailed biological and archaeological surveys, and all other site specific information and details that are determined in this ESIA to be carried out

prior to start of works. This is stipulated in the Loan Agreement for the project, and is one of the conditions that need to be met prior to the start of works.

Application of all identified social and environmental mitigation measures and the State of the Environment Monitoring Program will be provided. The Contractor will be responsible for the implementation of the environmental mitigation measures during construction and will employ environmental experts to supervise the implementation of Contractor's responsibilities and will be in communication with the investor and with the Federal Ministry of Environment and Tourism.

Reduction of negative impacts is envisaged with appropriate measures described in a separate chapter, as well as in the Environmental and Social Management Plan (ESMP), which is drafted as a separate document.

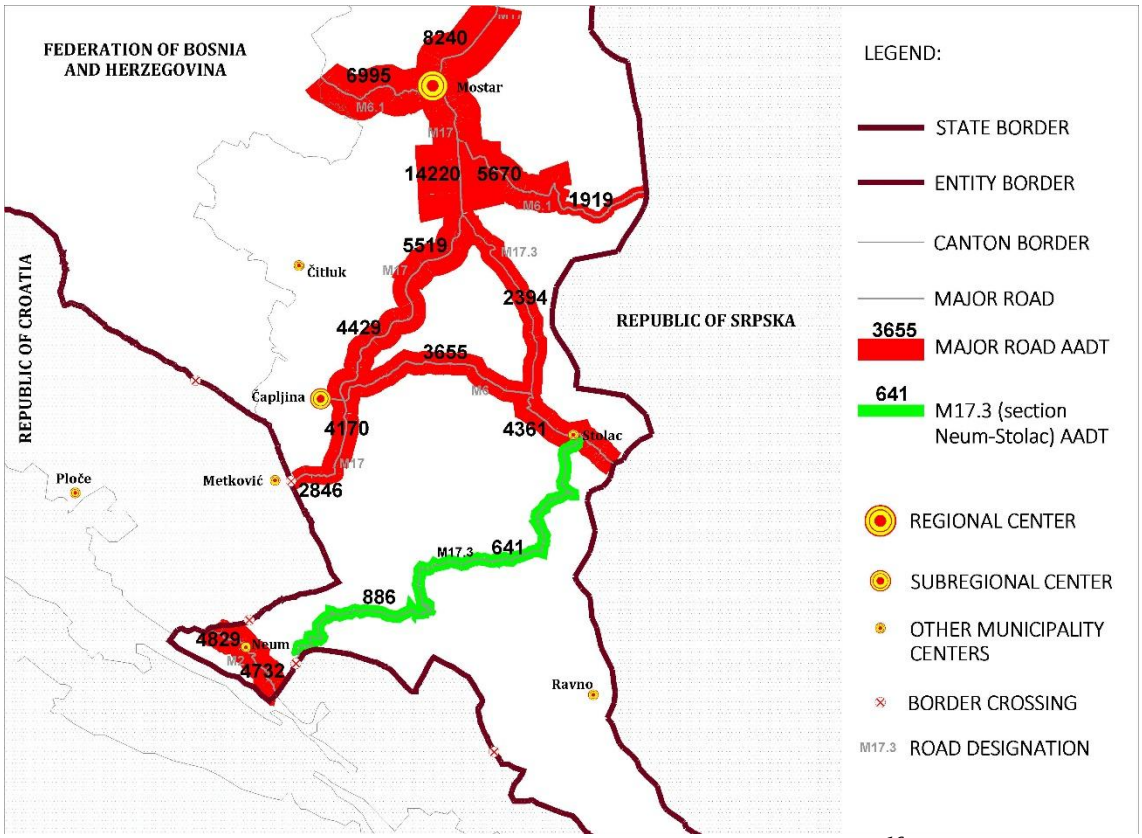
1.2.4. Limitations

All data that were not available on municipal granularity from secondary data and primary data collection cumbersome to gather are generalized to that extent that they could give a precise picture. For example, the data on the population education level were not available, but the data on education levels of the employed and unemployed were available. Considering that the employed and the unemployed population encompasses considerable part of the population, it could be concluded that these data represent the municipal population education level. Therefore a certain margin of error should be taken into account and it will be underlined in the text below, where relevant.

1.3. PROJECT RATIONALE

The existing road Buna-Neum M 17.3 is currently the only connection that Bosnia and Herzegovina has with the Adriatic Sea. Currently the Neum-Stolac section road is in such poor condition that the majority of traffic to the coast is realised through the territory of the Republic of Croatia, assuming two border crossings. After Croatia joined the European Union (2013), some of the traffic moved to the BH territory. Despite the recent increase of traffic on the road Neum-Stolac, M17.3 still remains largely underutilized compared to its potential. The map below shows traffic (AADT - annual average daily traffic) for major roads in the area of the old M17.3.[15]

Image no. 1.3-1. Traffic for major roads in vicinity of M17.3



Source: map by Ecoplan, AADT data (2014) by PC Roads[16]

[16] Faculty of Civil Engineering, Department of Transportation Infrastructure (2015), Sarajevo: Traffic Counting on Main Roads in FBH in 2014 (online) for PC Roads FBH, available on http://www.jpcfbih.ba/ba/publikacije/Brojanje_saobracaja_F_BiH_2014.pdf

The existing Neum-Stolac road has below-standard technical conditions for a road of its category (major road) and importance in the regional transport network. Modest technical elements include minimum radius, total width of 3-4 m, longitudinal inclinations higher than 7%, blind curves, high number of serpentines, etc. Additionally, the existing road suffered substantial damages during the past war (1992-1995) which adds to its low safety profile. In the period 2009 – 2013, 104 traffic accidents were recorded on this section, whereof two were fatal. Although the road was reconstructed, section Burmazi – Hutovo is still in poor technical condition, as the road narrows down to 3 m. Section Hutovo - Duži has a slightly more favourable profile with the width of the roadway of 4 m and better technical elements. From Duži to Neum the roadway width is 6 - 7 m and can be considered as satisfactory.

For Bosnia and Herzegovina, the realisation of the Neum-Stolac road would have multiple advantages. The construction of the road would enable BH access to the Adriatic Sea over its own territory, connecting the interior of the country with its only maritime city and tourist centre - Neum. Besides that, with the construction of M17.3, the M-17 (Mostar-Doljani, i.e. boarder with the Republic of Croatia) would be significantly disburdened, reducing the traffic jam and standstills at the border crossing with the Republic of Croatia.

The Project is expected to reduce relative number of road accidents, reduce local pollution generated by transport sector and vehicle operating costs, and improve road connectivity and safety, thus facilitating trade, enabling tourism development, providing local communities with better access to infrastructure such as hospitals and schools, supporting private sector development and promoting regional and national economic growth and contributing to economic and social cohesion in the region. The cultural heritage of this area will be promoted.

1.4. PROJECT LOCATION

Section Neum-Stolac is a part of the major road M17.3 Buna-Neum, which is a branch of the major road M17 Sarajevo-Mostar-Čapljina-Metković, the latter in the Republic of Croatia. The road M17 is a part of the European Route E73 that connects Central Europe, stretching from Hungary and eastern Croatia to Bosnia and Herzegovina and the Adriatic Sea in the port of Ploče (Croatia). Route M17 connects north of Bosnia and Herzegovina with the country's south, i.e. Šamac-Doboj-Sarajevo-Mostar-Čapljina-Doljani (border with the Republic of Croatia) and is 433 km long.

The M17.3 begins at the settlement Buna, situated 11 km south from the City of Mostar, the regional centre of Herzegovina. From Mostar, the road continues to the South-East through the City of Stolac towards the coast, respectively to the City of Neum.

Image no. 1.4-1. Position of road M17, as part of the European Route E73 and M17.3 as a branch of M17

Source: Ecoplan

The main trade corridor providing connectivity in BH is Corridor Vc, which connects Budapest to the port of Ploče on the Adriatic Sea in Croatia via Sarajevo and runs 340 km in BH. This corridor is a part of the South East Europe Transport Observatory (SEETO)'s Comprehensive Network for both roads and rail. Construction of a motorway is considered a priority by the government in order to improve connectivity of BH with neighbouring countries and to enhance its potential for economic development. Corridor Vc is currently in different stages of construction, i.e. the southern part Zvirovići (Čapljina Municipality)-Bijača (south-west border with the Republic of Croatia in Ljubuški Municipality) is constructed and utilized, while other parts of this corridor in Herzegovina Neretva Canton are still in the project design stage. The nearest connection of the new road M17.3 with the corridor Vc is designed at the intersection Mostar south, as shown in the image below.

Image no. 1.4-2. Position of road M17.3 in relation to Corridor Vc

Source: Ecoplan

From any part of BH one can reach Neum from two directions. One of them is the major road M17, through which traffic goes through the territory of the Republic of Croatia to Neum and through which a major part of traffic is currently running, while the other one is M17.3 as described earlier. With this direction Bosnia and Herzegovina has a direct access to the sea and the transport does not have to cross over the state borders.

1.5. PROJECT BACKGROUND

Regarding the significance and importance of the Neum-Stolac road for Bosnia and Herzegovina, its construction was initiated in 2010. This road is included in the Physical plan of the Federation of Bosnia and Herzegovina, which is still being drafted, and in the physical plans of the Municipalities of Neum and Stolac. The Physical plan of Neum Municipality was completed in October 2015, while the Physical plan of Stolac Municipality is still being drafted.

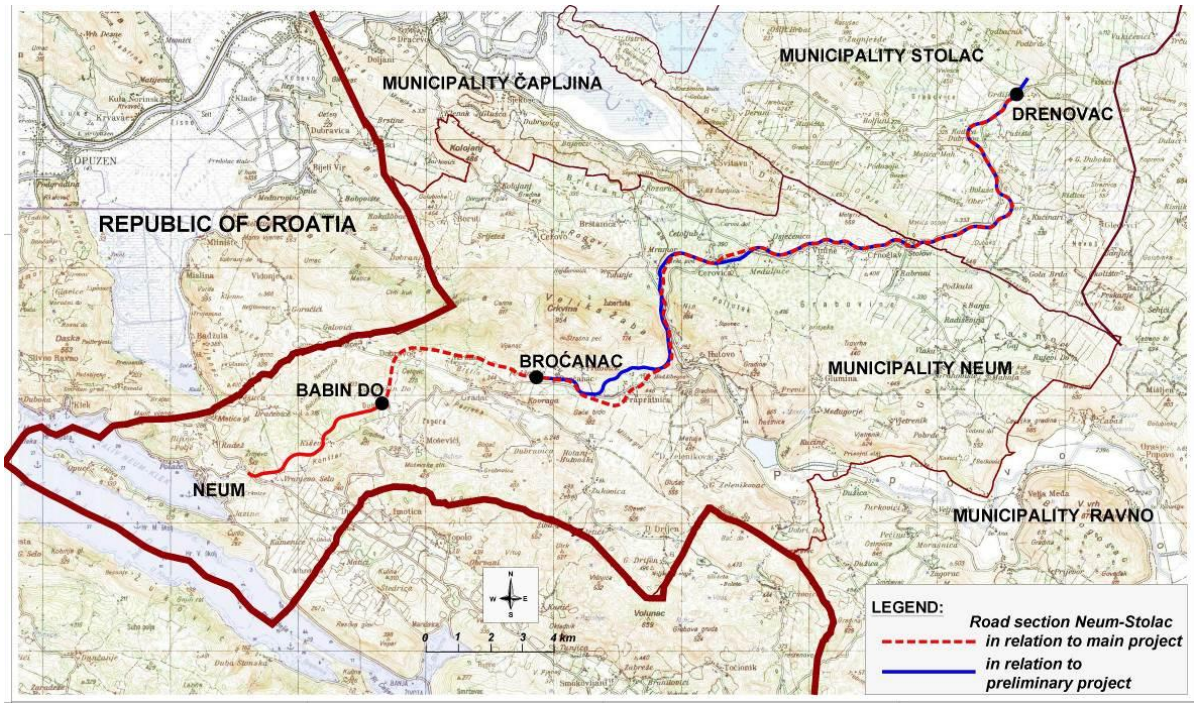
In accordance with local legislation, a Preliminary Environmental Impact Assessment (PEIA) was prepared for the road. Based on the Decision on preparation of the EIA, ref. UPI/05-23-77/09 of 8 June 2009, issued by the Federal Ministry of Environment and Tourism (FMoET) final Environmental Impact Assessment (EIA) was prepared in 2009. As part of the EIA and Environmental Permit procedure, according to the Environmental Act of FBH, the Prior Water Consent was also issued, ref. UP-I/40-1/25-2-56/10.

Based on the 2009 EIA, the construction of the road M17.3 Buna-Neum, section Neum-Stolac, was adopted by the FMoET. The EIS provided the basis for the 2010 issuance of the environmental permit for the road M17.3, Neum-Stolac section.[17] The validity term of the environmental permit is five years, and the extension of the permit is in process.

In the period 2010 – 2015, the first 5,3 km of the new road (Stari-Neum to Babin Do) were constructed. Also, in 2013 the continuation of the road alignment was adjusted several times to reflect the priorities of local communities. Five alternatives between Brocanac and Hutovo were analysed, of which one was from the preliminary design. Alternative without the tunnel Žaba was possible and had significantly lower costs, as proved and calculated by the designer, but at the insistence of Municipaliy of Neum alternative with the tunnel was selected in order to reflect the priorities of local community, i.e. to improve road connectivity to the settlement Hutovo and lesser the road's visual impact on the landscape. Other adjustments imply by-passing olive groves along the section Babin Do-Broćanac, including crossroads for the community Papratnica, and avoiding the shrine in Hrasno. Image 1.5.-1. shows the difference in road alignment between main and preliminary project design.

Image 1.5.-1. Position of the road in relation to the concept and main project design

[17] Decision on issuing an environmental permit for the road M17.3 Buna-Neum, section Neum-Stolac, ref. UPI-05-23-77-4/09 SN, of 6 May 2010



Source: Ecoplan

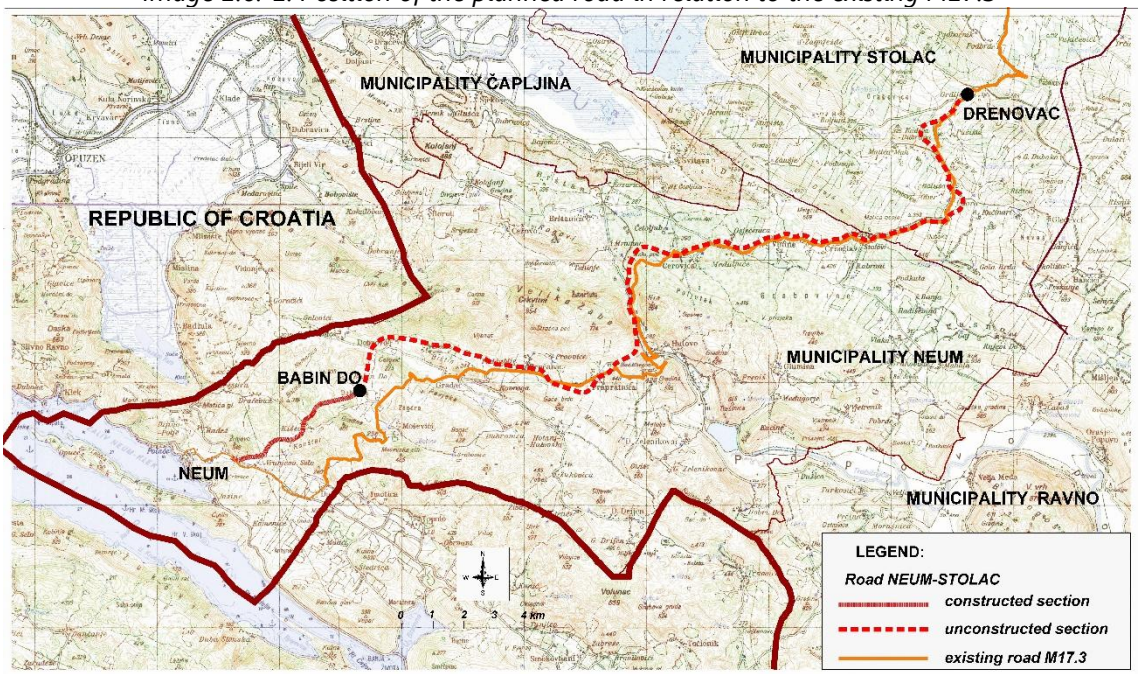
1.6. PROJECT DESCRIPTION

Project documentation for the section Neum-Stolac was prepared on the level of the main project design. On the section Stari Neum- Babin Do constructed works were performed to the level of completed asphalt roadway.

The non-constructed road section begins from the settlement Babin Do in the municipality of Neum and passes near the settlements Broćanac, Hutovo and Cerovica, ending in the settlement Drenovac in the Municipality of Stolac. The total section is 32.9 km long. The position of the planned road in relation to the existing M17.3 is presented in the Image 1.2.-1. The road of the presented project was taken from the main project design[18].

[18] NOTE: All maps, schemes or image which contain topographic bases were created in the process of development of this Assessment, i.e. the source is Ecoplan, Ltd. Mostar. Topographic maps and physical data come from the Consultant's personal.

Image 1.6.-1. Position of the planned road in relation to the existing M17.3



Source: Ecoplan

In accordance with the main project design and ToR for this assessment, the section Neum-Stolac which is planned to be constructed was divided into the following sub-sections:

1. Section **Babin Do** (Tunnel Ostrovac) – Brocanac (length = 6.4 km), land acquisition process largelly completed.
2. Section **Broćanac – Hutovo – Cerovica** (length = 11.2 km), and
3. Section **Cerovica – Drenovac** (length = 15.3 km).

Section **Stari Neum – Kisevo – Babin Do** (Tunnel Ostrovac) (length = 5.6 km), has already been constructed, missing only the final layer of asphalt.

The most important elements and instructions, determining the importance, function and rank of the new road Neum-Stolac are listed below:

- 3rd class road (3000-7000 vehicles/h)
- Rolling field
- Design speed 80 km/h
- Cariageway width 2x3,25 + 0,30 m curb lane;
- Number of lanes: 2
- Drain channel 0.75 m (0.50 m)
- Shoulder width 1,00 m;
- Berms min 1.0 m behind the drain channel
- Widening in a curve for passing of two lorries and a trailer.

Characteristics of pavement structure

- Asphalt concrete HS-SMA 11 4 cm

- Bituminous-bearing course BNS 22s 12 cm (2x6)
- Subbase course 40 cm
- Subgrade 50 cm (maximum fraction ϕ100mm)
- Stone embankment up to the maximum size of 300 mm.

According to the technical description, the **section Kiševo-Broćanac** was divided into 4 characteristic sub-sections.

The first sub-section - this section continues on the ending of the constructed section of M17.3. (section Neum-Kiševo). The route starts in the cutting of cca 8 m depth and continues in the embankment of cca 8-10 m height. After revision of the design, the lanes for slow vehicles were included.

The second sub-section continues to the village Babin Do in the cutting of cca 20 m depth; since the geotechnical conditions are favourable, the road shall be constructed into the embankments along the lane. The cutting is fully opened for good visibility, maximum protection and security of road users and from possible eroding of degraded rocks in the upper layers. During reconstruction it is possible that blasting for the purpose of excavation will be neccesary and the Contractor shall implement such environmental and safety mitigation measures to ensure compliance with the highest standards.

The third sub-section beginnes at Babin Do and continues to the tunnel Oštrovac at the Dobrovo settlement. The planned road shall be connected to the existing major road with the 10 m bridge linking Babin Do.

The fourth sub-section begins at the tunnel Oštrovac and continues to Broćanac. This section follows slightly rolling terrain and by the end it is mostly in the embankment and cut.

Planned facilities on the route of the section:

- Bridge L=10 m on chainage 5+309.50
- Bridge L=10 m on chainage 6+724.0
- Passage 5x3.5 m on chainage 7+272.0
- Passage 5x3.5 m on chainage 8+682.0
- Passage 5x3.5 m on chainage 10+540.0
- Tunnel Oštrovac with length of L=190m

Drainage

In the cuttings the water from escarpments is intaken by asphalt drain channels and further it goes down the escarpment. On the embankments the water slides from the roadway over the shoulder. At higher embankments due to the protection of escarpment of the road bed, the designer envisaged the concrete drain channels, which intake the water from the roadway and further through small canals to the field. At the locations of natural depression, where there is the possibility for higher concentration of water, the designer envisaged the construction of culverts, which may be used also as emergency passage for animals.

Section Broćanac-Hutovo-Cerovica[19] **-** The start of the section Broćanac-Hutovo-Cerovica is connected with horizontal and vertical alignment to the end of previous section Kiševo-Broćanac. The road is connected to the Broćanac settlement with junction, goes by Prapratnica, and ends by Hutovo settlement. This section goes across Žaba hill and designer envisaged construction of the tunnel through the hill.

Planned facilities on the route of the section:

- Underpass 1(5x3m) L=25 m on chainage 13+025
- Underpass 2(5x3m) L=20 m on chainage 15+375
- Entry to the tunnel Žaba L=975 m on chainage 15+670
- Underpass 3 (5x3m) L=10 m on chainage 18+125
- Underpass 4(5x3m) L=20 m on chainage 18+900
- Overpass 1 L=12m on chainage 21+125

The newly designed major road intersects at certain places the existing major road as well as some local roads. Accordingly, it was planned to relocate the existing roads, in order to enable the most convenient possible position for passage construction. Six deviations of the existing roads were planned, i.e.:

- Deviation 1 – relocation of the existing major road at the place of underpass 1
- Deviation 2 - relocation of the existing major road at the place of underpass 2
- Deviation 3 - relocation of the local road for the community Mramor at the place of underpass 3
- Deviation 4 – relocation of the existing local road for the community Mramor along the newly designed road bed.
- Deviation 5 – existing narrow gauge railway line
- Deviation 6 - relocation of the existing major road at the place of overpass 1.

Section Cerovica-Drenovac[20] - The start of the section Cerovica-Drenovac is connected with horizontal and vertical alignment to the end of previous section Broćanac-Cerovica, and it is located immediately after the Cerovica intersection. On several places the road intersects the local roads and on those places the construction of the passage is designed, enabling undisturbed pass of local roads below the major road. Also, on certain places it is envisaged to relocate the major road and to construct the deviations. This section passes alongside many settlements that are connected by junctions with the newly designed major road M17.3.

Most facillities that are designed at these sections are deviations and passages:

- Passage 1 *(7x4,5m)* – near the Osječani settlement
- Passage 2 *(5x3,50m)* – near the Vinine settlement
- Passage 3 *(7x4,5m)* – intersection with the local road LC 3

[19] source: Main project design of the major road M 17.3 Buna-Neum, section Broćanac-Cerovica, sub-section Broćanac-Hutovo-Cerovica; DIVEL doo-Sarajevo, June 2015

[20] source: Main project design of the major road M 17.3 Buna-Neum, section Broćanac-Drenovac, sub-section Cerovica-Drenovac; DIVEL doo-Sarajevo, June 2015

- Passage 4 *(7x4,5m)* – near the Crnoglav settlement
- „T" intersection – connection to the Rabrani settlement and nearby villages
- Passage 5 *(8x4,5m)* and Deviation 1 – partiall relocation of road M-17.3
- Passage 6 *(7x4,5m)* – partiall relocation of the local road LC 6-Kozarica settlement
- Passage 7 *(8x4,5m)* and Deviation 2 – partiall relocation of the major road M-17.3
- „T" intersection – connection with the Ober, Doluša and Udora settlements
- Passage 8 *(7x4,5m)* – near the Matić Mahala and Bjelovčeva settlement. This passage is under major road M-17.3 and is 80 m long;
- Passage 9 *(7x4,5m)* and partially relocation of the local road LC 8 – by the Kadića Dubrava settlements
- Passage 10 *(8x4,5m)* and partially relocation of the local road LC 9 – by the Pučišta settlement.

This section ends with the intersection in Drenovac.

At the last two sections Broćanac-Hutovo-Cerovica and Cerovica-Drenovac, concrete culvert pipe with 1-2 m diameter is planned. Hydraulic calculations for the culvert are given in the separate Study within the Main project.

A situation overview of the road with the afore-mentioned facilities is given at every graphic appendix, enclosed to this assessment in scale 1:25 000.

1.6.1. Linked activities and ancillary facilities

According to the main project, materials excavated by building tunnels and cuts will be used in embankments of the road, and it is assessed that the balance of the masses is equal to zero. However, if there will be an excess material that cannot be implanted in embankments it will be necessary to provide the landfill. The landfill position will be determined in consultation with representatives of Neum Municipality, e.g. local community, where it is necessary to reduce transport distance to the landfill (one or more, as agreed with the local community).

Project designer shall develop the Waste management plan within the main project, as required by local legislations (construction permit) by which the additional information will be provided. However, this part of the project has not yet been adopted by the audit and cannot be considered finalized.

Apart from the landfill for construction material, additional objects can be related to temporary placement of asphalt base (unless there is sufficient capacity at the appropriate distance), as well as the stone crushing plants, which will be used during construction, and all the construction site areas, especially for accommodation of the work force, machines, vehicles and temporary landfills and storage of materials. If needed, these ancillary facilities and areas shall be provided by Contractor, as it is their obligation, as stated in the tender documents.[21]

[21] Information is provided by PC Roads FBH

1.7. ANALYSES OF ALTERNATIVES

1.7.1. Description of variant and selected variants

As already elaborated in text above, the major road project was divided into three sub-sections, which are in different phases of realization:

The first road section, Babin Do – Broćanac (6,4 km in length) – creation of project documents and process of expropriation for this sub-section are completely finished, so procurement and the beginning of work can start immediately;

The second road section, Broćanac – Hutovo – Cerovica (11,2 km in length) – creation of project documents for this sub-section is in its final phase and upon its completion, the process of expropriation as well as procurement of works are being planned:

The third road section, Cerovica – Drenovac (15,3 km in length) – creation of project documents for this sub-section is also in its final phase and upon its completion, the process of expropriation as well as procurement of works are being planned.

Different variants of connection of Neum i.e. the sea with the interior of BH started being explored back in the 1970es during the creation of 'Regional Physical Plan of the South Adriatic'[22]. This research had two directions: Major road Zagorska magistrala and major road Neum-Čapljina (Stolac variant).

The Physical Plan of the Socialist Republic of BH for the period 1981-2000 was approved (and became an Act) in 1982[23]. The amendments thereof were added in 1988[24]. These plans established the obligations that every center of a municipality in BH must be connected with other parts of BH by means of:

1 – major road

2 - this road must have technical characteristics of a major road.

In frames of creation of this Plan several possible alternatives were explored and as the most favorable one, the corridor of 3 km width was established. This alternative was most favourable based on avoidance of natural habitat and based on the geological characteristics. This corridor route was provided globally, considering it was done on a map 1:250 000.

This corridor was taken over on the occasion of creating the Physical Plan of the Municipality of Neum for the Period 1985-2000[25], which was approved in 1986, and within its frames several versions were examined, but this time in more details, on a

[22]In the period 1967-1972 created under sponsorship of UN, Vladimir Matoni; Adriatic Projects, IGH Zagreb, Zagreb 2003.
[23]Official Gazette of SRBH no. 18/82 „The Physical Plan of the Socialist Republic of BH for the period 1981-2000;
[24]Official Gazette of SRBH no. 27/88 and 33/88 from 1988;
[25]Official Gazette of the Municipality of Neum no. 03/86;

map 1:25 000. After analysing several variants, the best one was determined and implemented in the plan, but yet again as a corridor for further research.

Once again, on the occasion of creating the Physical Plan of the Federation of BH[26] which is still in the phase of development and the Physical Plan of the Municipality of Neum for the Period 2010-2020[27] the established corridors were examined again, as well as several alternative routes within the corridors.

All the above documents went through all phases of approval and public consultations, and out of several offered variants, the obliging global corridor was approved on a scale 1:25 000 within which all further research should begin.

After the corridor was obtained this way, project design of several variants began within the corridor, but on a more detailed scale - 1:2500, 1:1000 and 1:500. All these versions were examined in frames of project managed by the PC Roads FBH.

In this period of time, significant activities on compliance of attitudes of the local community, i.e. the Municipality of Neum and PC Roads FBH were performed, with the main aim to ensure support of all included parties to the project, with an additional check-up and optimization of the solution from the concept design. Five alternatives between Brocanac and Hutovo were analysed in 2013, of which one was from the preliminary design.

The variant with planned junctions for settlements in the area of the road section Broćanac-Hutovo-Cerovica[28], tunnel in Hutovo in order to shorten travelling time and to avoid the route on demanding terrain, as well the junction to the settlement of Hutovo was approved. Alternative without the tunnel Žaba was possible and had significantly lower costs, but at the insistence of Municipaliy of Neum alternative with the tunnel was selected in order to reflect the priorities of local community. In addition to that, in the area of the Queen of Peace Shrine, a request by the local community was accepted to place the route more to the north because of unique features of the terrain and access to the Shrine, which was accepted by the Investor and implemented into the final version. Other adjustments imply by-passing olive groves along the section Babin Do-Broćanac, including intersection for the community Prapratnica.

In accordance with everything mentioned above, one can analyse only the 'no project' alternative in this assessment.

Due to several previous rounds of consultations, most of the requests of project affected people regarding alignment have already been implemented in the project. After the final public discussion on this ESIA held on March 2nd 2016 in Hutovo, the affected persons' concerns were mainly focused on the road design, especially the exact location of junctions for settlements. During discussion, all comments were addressed and answered (please see Minutes of the Second Public Discussion on ESIA is in Annex C.

[26] The Physical Plan of the FBH approved at the Parliaments session of the FBH on May 9th 2011;
[27]Decision on creating the Plan no. 0-01-02-968/09 as of 26.6.2009 and Decision on Approval as of 5.10.2015
[28]According to the Minutes of the meeting as of 11.7.2013. in which representatives of the Municipality of Neum, PC Roads FBH and Project Designer (Divel d.o.o. Sarajevo) participated

1.7.2. Alternative „With no Project"

The main road M-17.3 Buna-Stolac-Neum was proclaimed as such about twenty years ago, even though its technical characteristics on its longest part (between Neum and Stolac) do not even remotely comply with the rank of the main road it was classified into. On the occasion of proclaiming this road a main road, the survey was approved by the Parliament of SRBH which analysed several variants.

The existing traffic road, whose roadway is between 3,00 and 5,00 m in width, has sharp horizontal and vertical curves, occasional large longitudinal inclinations (up to 15%), without continuity in vertical and horizontal direction of the route and inappropriate drainage solution. It has remained such up till today.

Besides all these technical deficiencies, the existing road in its positional sense represents a concept which is contrary to contemporary solutions and requirements that a road of this rank must comply with. Considering the fact that the existing road was constructed on a route of what used to be a macadam road, which was asphalted and somewhat expanded, and that it passes though centers of smaller settlements, cutting off the most fertile fields in this area, it is clear that such type of traffic road cannot satisfy the needs of contemporary traffic, the necessary capacity nor the level of service. Therefore, the existing road can have a role only in local traffic, since its technical elements and position mostly comply with the rank of local roads, and can be used as a service traffic road.

This ESIA document was done on a basis of a completed main project design and the obtained building permit and environmental permit. Various alternatives and possibilities were explored and described in the paragraph above in the phase prior to the main project design.

On the most recent opportunity to include additional comments or opinions was during the public consultations held on March 02, 2016.. There have been no changes to the route that were made as a result of these consultations, for which Minutes of Meeting are included in Annex C.

Taking into consideration everything mentioned above, as well as the indisputable fact that this main road is the only direct connection between the Adriatic coast and the interior of BH, as well as on the basis of results of the performed Feasibility Study[29], it is clear that construction of the planned route Neum-Stolac is inevitable and justified. By its construction several benefits will be realized, such as avoidance for customs-administrative procedures, and a whole range of positive socio-economic indicators mentioned in text above will arise, so that the 'no project' variant cannot be taken as relevant.

Construction of the road will be of use not only to the local population but also to the whole region and Bosnia and Herzegovina as a country.

[29] „Economy Feasibility Study FINAL", Regional Road Development Programme; Roughton International, 2009; contractor: PC Roads FBiH;

2. LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1. WORLD BANK SAFEGUARDS POLICIES

The objective of the World Bank's environmental and social safeguard policies is to help identify, avoid, and minimize harms to people and the environment in the development process.

The following sections provide a brief overview of the World Bank safeguard policies applicable to the project.

2.1.1. Operational Policy OP 4.01 Environmental Assessment (EA)

The Bank requires Environmental Assessment (EA) of projects proposed for Bank support to ensure that they do not have, or mitigate potential negative environmental impacts. The EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. The EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The EA takes into account the natural environment (air, water and land); human health and safety; social aspects; and trans-boundary and global environmental aspects. The Borrower is responsible for carrying out the EA and the Bank advises the Borrower on the Bank's EA requirements.

The Bank classifies the proposed projects into three major categories, depending on the type, location, sensitivity, scale of the project and the nature and magnitude of its potential environmental impacts.

- Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

- Category B: The proposed project's potential adverse environmental impacts on human population or environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases migratory measures can be designed more readily than Category A projects.

- Category C: The proposed project is likely to have minimal or no adverse environmental impacts.

Based on the WB Operational policies and requirements this project is classified as Category A project.

2.1.2. Operational Policy OP 4.04 on Natural habitats

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

2.1.3. Operational Policy OP 4.11 Physical cultural resources

Physical cultural resources are defined as movable or immovable facilities, locations, edifices, groups of edifices and natural characteristics and landscapes which have archaeological, palaeontological, historical, architectural, religious, aesthetic or some other cultural importance. Their cultural importance may be on local, regional, national or international level. Physical cultural resources are important as the sources of valuable scientific and historical information, as the tool for economic and social development as well as the integral part of the national culture and identity. The WB supports the countries to avoid or mitigate negative impacts onto physical cultural resources which might be brought by the projects, financed by the Bank.

The impacts onto physical cultural resources are the integral part of the EA. When it is probable that the project shall have negative impacts onto physical cultural resources, it is necessary to identify the appropriate measures for avoidance or mitigation of these impacts. These measures may have a wide range from complete protection of locations to selective mitigations, including also the rescuing and documentation, in cases when the part of the entire cultural resource might be lost.

2.1.4. Operational policy OP 4.12 Involuntary Resettlement

This policy applies in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects (i.e. a resettlement plan or a resettlement policy framework). This policy applies to all components of the project that result in involuntary resettlement, regardless of the source of financing. To achieve

the objectives of this policy, particular attention is paid to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, indigenous people ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation.

2.2. OVERVIEW OF ENVIRONMENTAL AND OTHER REQUIREMENTS IN THE FBH

2.2.1. National legal and institutional frameworks of the environmental policy of Bosnia and Herzegovina

On the basis of the Constitution of Bosnia and Herzegovina (BH), which is an Appendix to the General Framework Agreement for Peace in Bosnia and Herzegovina, also known as the *Dayton Agreement, which* was approved in 1995, BH was defined as a sovereign country with decentralized politics and administrative structure, as well as with several levels of political administration: Authority, at the level of Bosnia and Herzegovina, The Federation of Bosnia and Herzegovina is further decentralized into 10 cantons, Republic Srpska and Brcko District.

According to the Constitution of the Federation of BH[30], Chapter III, Article 2, para. c,) environmental protection is under jurisdiction of the FBH and cantons. The Federal Ministry of Environment and Tourism (FMET) is in charge of environment management on the level of entities with all authorities and jurisdictions, whereas the Cantonal ministries are in charge of environment management in 10 cantons of the Federation responsible for the environment at Cantonal level. Relevant institutions on the level of FBH in the field of environmental management are as follows:

Federal Ministry of Environment and Tourism of the FBH (FMoET) performs administrative, expert and other jobs from jurisdiction of the FBH referring to ecological protection of air, water and soil; Creation of strategy and policy of environmental protection; quality standards of air, water and soil, ecological monitoring and control of air, water and soil. The Ministry comprises five sectors: Environment Sector, Environmental Permit Sector, Tourism and Catering Sector, Project Implementation Sector and Sector of Legal, Financial and General Affairs. It has the role of National focal representative (NFP) of BH within the European Environment Agency (EEA).

Federal Ministry of Physical Planning performs activities regarding planning and development of the Federation, creation and implementation of the physical plan of the Federation and compliance of physical plans of cantons with the Federal plan, use of land on the federal level, long-term planning of the use of natural resources, geological research and protection of natural monuments and areas with large natural construction and cultural-historical importance.

Federal Ministry of Agriculture, Water Management and Forestry with relevant Agriculture, Water Management, Veterinary and Forestry sectors, including the Federal Forestry Administration.

Federal Ministry of Health with Sector for public health, monitoring and evaluation, has relevant jurisdictions of public health and sanitary inspections. The role

[30] Constitution of the Federation of Bosnia and Herzegovina (Official Gazette of FBH, No. 1/94, 13/97, 16/02, 22/02, 52/02, 63/03, 9/04, 20/04, 33/04, 71/05, 72/05 and 88/08)

of public health includes maintaining the population's health by means of organized far-reaching activities of the society aimed at prevention of development of risk factors which cause appearance of diseases, which also refers to conservation of the environment.

The Acts that regulate environmental protection are listed below with a short description of each particular Act.

The Environmental Protection Act (Official Gazette of the FBH, no. 33/03 and 38/09) is the roof act which defines provisions in the field of environment, as well as activities that affect the environment and may pose danger for the environment in the sense of its pollution. The Act introduced a new legal institute called Environmental Permit, which by means of provisions of this Act and its implementing regulations has preventive effect on excessive pollution, was established by limiting values of environmental pollution parameters, and contributes to its conservation and protection of human health. The Environmental Permit is obligatory for all new and existing plants and facilities that might impact the environment, as defined in the Ordinance on Plants and Facilities for which the Environmental Impact Study is Obligatory and Plants and Facilities which may be Built and Put into Operation only if they have an Environmental Permit.

The Air Protection Act (Official Gazette of the FBH, no. 33/03 and 4/10) prescribes technical conditions and measures for prevention or releasing into the air the emissions caused by human activities that must be complied with in the process of production, in the territory of the FBH; planning air quality protection, special sources of emissions, cadastre of emissions, air quality, supervisions and penalties for breaches for legal and private entities.

The Nature Protection Act (Official Gazette of the FBH, no. 66/13) regulates competences of the bodies performing the activities of nature protection, general measures of nature conservation, assessment of acceptability of interventions in the nature, types of habitat and ecologically important areas, species and subspecies, wild birds protection, protection and conservation of biodiversity, forest eco-systems, karst eco-systems, water and wetlands habitats, protection of the sea and coastal natural values, establishing the European ecological network of special areas of conservation and protection – Natura 2000, measures of protection of species and subspecies, measures of protection of minerals and fossils, trans-border traffic of endangered species and subspecies, protected natural values, damages compensation, incentive measures, giving propositions for concessions of protected natural values and protected natural objects, planning and organization, inventory and monitoring, access to information and public participation, nature protection sign, promotion of education and training in nature protection, acknowledgments and awards for achievements in nature protection, funding nature protection, inspections, penalty provisions, transitional and final provisions

The Waste Management Act (Official Gazette of the FBH, no. 33/03 and 72/09) - The aim of the Waste Management Act is to support and ensure the most important requirements for the prevention of waste creation, processing waste for reuse and recycling, separating formation materials and their use for the production of energy and safe waste disposal.

Waste Management Plan is to be attached to the application for obtaining an environmental permit. The contents of the Waste Management Plan are defined in the Waste Management Act (Official Gazette of the FBH, no. 33/03, Article 19).

The Water Act (Official Gazette of the FBH, no. 70/06) - The Water Act prescribes the ways of water management in the territory of the FBH. Water management comprises water protection, water use, protection from adverse effects of water, developing watercourse and other waters. The Act also determines water resources and public water resources, water facilities, legal entities and other institutions competent for individual issues in water management and other problems regarding waters in the Federation, such as the procedure of obtaining a Water Permit.

The Act regulates that the Environmental Permit is issued on the basis of previously obtained water approval i.e. water guidelines which decide on exercising the applicants' rights of water, as well as the way of exercising those rights. It is ensured that the competent ministry integrates into the environmental permit the recommendations and measures of protection of water from prior water approval. The Application for issuing prior water approval, according to legal regulations, is filed by the body in charge of issuing the environmental permit. It is necessary to point out that the practice is different than prescribed. Namely, it is required form the investor that he initiates the procedure for obtaining the prior water approval.

In FBH, water-related documents are issued in accordance with the Ordinance on contents, form, requirements, manner of issuing and keeping water-related documents (Official Gazette of the FBH, no. 06/08, 57/09 and 72/09).

For plants and facilities which prior to obtaining an environmental permit must undergo the procedure of Assessment of Impact on the Environment, the body in charge of issuing the water-related documents participates in the procedure of Assessment of Impact on the Environment, upon the request of the body which leads the procedure of Assessment of Impact on the Environment.

Agencies for water regions are in charge of issuing water-related documents. In the concrete case, depending on the location of project for issuing water-related acts, the Adriatic Sea Watershed Agency is the competent agency.

The Noise Act (Official Gazette of the FBH, no. 110/12) - The Noise Act prescribes the permitted level of noise, measures of noise protection, manner of noise measuring and recording, limiting values of noise categorized by ambient, intended purpose of the area and time of day (day or night), for the purpose of protection of people, protection of work and living area and environment in general.

The Act on Physical Planning and Use of Land (Official Gazette of the FBH, no. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) regulates as follows: planning the use of land on the level of the Federation of Bosnia and Herzegovina (hereinafter referred to as: Federation) by means of creation and approval of plan documents and their implementation, type and contents of plan documents, use of land on the level of the Federation, supervision of implementing plan documents which are important for the Federation, supervision of implementing this Act, as well as penalties for legal and physical entities. The planning in the sense of this Act is considered planned management and use of land, as well as protection of the area of the Federation as a

particularly valuable and limited resource. This Act also regulates the procedure for obtaining an Urban Planning Permit, Building Permit and Exploitation Permit.

The Roads Act (Official Gazette of the FBH, no. 12/10 and 16/10) - The Roads Act regulates: categorization of public roads, road management and legal position of the management, planning, construction, reconstruction, maintenance, contracting and works assignment, protection of roads and conditions of traffic on the roads, concession of public roads, funding public roads, supervision of implementation of the Act, penalties and other issues which are important for the Federation of Bosnia and Herzegovina in the field of roads.

The Road Safety Act (Official Gazette of the FBH, no. 6/06, 75/06, 44/07, 84/09, 48/10 and 18/13) establishes as follows: basic principles of mutual relations and behaviour of participants in traffic, basic requirements that roads must comply with in relation to traffic safety on the roads, maintenance of the Central Registry of drivers and vehicles, traffic rules on the roads, system of traffic signs and signs given by authorized persons, obligations in case of traffic accident, training in driving schools, requirements for acquiring the rights of driving motor vehicles, taking the drivers' test, requirements for devices and equipment in the vehicles, basic requirements which all vehicles in traffic must comply with, work of professional organizations in Bosnia and Herzegovina, and other issues of traffic safety on the roads which are unified for the whole territory of Bosnia and Herzegovina.

The Act on Safety at Work (Official Gazette of the FBH, no. 22/09) prescribes rights, obligations and responsibilities of employer and workers in relation to implementation and improvement of health and safety of employees at work, as well as the system of rules of safety and health at work, by implementing of which it is possible to prevent injuries at work, occupational diseases and other diseases in connection with work, as well as protection of work environment.

The Fire Protection Act (Official Gazette of the FBH, no. 64/09) regulates organization and functioning of fire protection and fire service, planning and implementation of fire protection measures, organization and functioning of fire service and fire extinguishing (fire-fighting interventions), training and education of employed persons and fire-fighters, funding and other issues important for organization and functioning of fire protection and fire service in the Federation of Bosnia and Herzegovina.

The Agricultural Land Act (Official Gazette of the FBH, no. 42/10) regulates definitions, basic principles and management, protection, use, development, disposal, record-keeping, supervision of implementation of the Act, criminal provisions and other important issues relating to agricultural land in the territory of the Federation of Bosnia and Herzegovina. The aim of this Act is conservation, use in accordance with intended purpose, and increase of production capability and improvement of managing agricultural land as a limited and non-renewable natural resource.

The Hunting Act (Official Gazette of the FBH, no. 4/06, 8/10 and 81/14) and the Act on the Amendments to the Hunting Act (Official Gazette of the FBH, no. 81/14) regulates organization of hunting and hunting grounds, breeding, protection, hunting and use of wild game and parts thereof, cadastre of hunting grounds, hunting management plan, gamekeeper service, administrative and inspection supervision of

implementation of this Act, criminal provisions and other issues important for the field of hunting in the territory of the Federation of Bosnia and Herzegovina. In the sense of this Act, hunting is a public activity and encompasses measures of protection and breeding wild game, development of hunting grounds, hunting wild game and rational use of wild game and hunting grounds that contribute to conservation of biodiversity of ecological systems and balance of natural habitats.

Currently in the FBH there is no Forest Act.

Conservation and protection of forests and forest management are regulated by Cantonal laws. General provisions in all Cantonal laws are that forests are considered natural resource and protected by public interest no matter if they are private forests or owned by cantons. In case of deforestation where the land is thereafter converted to a non-forest use, user must obtain a permit.

The Law on Expropriation (Official Gazette of the FBH no. 70/07, 36/10 and 25/12) regulates the conditions and procedure for expropriation of property for construction of facilities in public interest, compensation eligibility and amounts, handling of grievances and disputes handling and other issues pertaining to the expropriation process. Property can only be expropriated upon the establishment of public interest for projects that bring greater benefit for the public. Expropriation may be carried out for the needs of FBiH, cantons, cities, municipalities, public enterprises and public institutions, unless otherwise provided by the Law. A condition to start expropriation is the existence of evidence that the required funds have been secured and deposited with the bank in the assessed total sum for payment or proof of existence of replacement properties. The subject of expropriation are the properties owned by physical and legal entities.

A general principle of the Law on Expropriation is that compensation is to be provided at market value of the affected property. Market value is calculated based on prices of property in the area in which the particular property is being expropriated, which can be achieved for a particular property on the market, depending on supply and demand at that moment of setting the price. The Law sets out in detail how compensation is determined for buildings, orchards and vineyards, forest land and trees, agricultural, construction and building land. In the process of expropriation, property owners are entitled to compensation for any losses of benefits they would otherwise have from that property.

The Law on Proprietary Rights (Official Gazette of the FBH, No. 66/13, 100/13) stipulates acquisition, use, disposal, protection and termination of ownership rights and other proprietary rights as well as possession rights, including issues of restricting such rights, the right of servitude, co-ownership and joint ownership rights, the procedure for acquiring property rights over land and/or structures build on someone else's land. Protection of ownership rights and other proprietary rights is guaranteed by this Law and their rights can only be limited or taken away in public interest, protection of natural resources etc. and under specific conditions defined by the Law in accordance with principles of international law. A significant provision of the Law is that occupants of property acquire ownership rights upon 10 years of conscientious and legal occupancy, or upon 20 years of conscientious occupancy. In addition, the Law provides that the conscientious builder of a structure on land owned by another person is

entitled to acquire such land, if the land owner did not oppose to the construction. The land owner is in this case entitled to request to be compensated for the market value of the land.

2.2.2. Multilateral contracts in the field of environment

Bosnia and Herzegovina became a Contracting Party of a numerous international contracts, conventions and protocols and is obligated to use them. All of those who refer to environmental protection will apply to current assignment, and here are listed some of the most significant:

- Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971, 2001,[31]
- Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972,
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Geneva, 1957,
- Protocol amending Article (14) of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), New York, 1975,
- Protocol amending Article (14) of the European Agreement concerning the International Carriage of Dangerous Goods by Road ADR, Vienna, 1979,
- Convention concerning the Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration, Geneva, 1977.,
- International Convention for the Prevention of Pollution of the Mediterranean Sea by Oil, London, 1954,
- International Plant Protection Convention, Rome, 1951,
- UN Convention on Biological Diversity, Rio de Janeiro, 1992,
- UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Aarhus, 1998,
- Protocol on Pollutant Release and Transfer (PRTR), Kiev, 2003,
- Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, 1991,
- Protocol on Strategic Environmental Assessment, Kiev, 2003,
- Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979,
- Protocol on Water and Health, London, 1999,
- Framework Convention of the Council of Europe on the Value of Cultural Heritage for Society, Faro, 2005,
- European Landscape Convention, Florence, 2000,
- European Outline Convention on Transfrontier Co-operation between Territorial Communities or Authorities, Madrid, 1980.[32]

[31] Connection of the road M17.3 and Hutovo blato

[32] Relevant due to the vicinity of the boarder with the Republic of Croatia

2.2.3. Environmental impact assessment and procedure of obtaining and environmental permit in FBH

In the FBH, the investments which require the Environmental Impact Assessment (EIA) are identified by the *Regulation on plants and facilities which require obligatory EIA and on plants and facilities which may be put into function only if they have the environmental permit*[33]. The regulation provides a list of activities and industrial plants subject to obligatory EIA and the procedures of issuing the licenses on the FBH level, as well as the activities and facilities subject to the individual evaluation related to the EIA request. If such individual evaluation shows that no EIA is necessary, Federal Ministry of Environment and Tourism (FMET) issues the Environment license based on the already submitted documents, if the respective activity or plants are not fully exempted from issuing the environmental permit. When the EIA request is evaluated, FMET takes into account the individual characteristics of the project (size of industrial plants/facilities, waste generating, pollution, etc.), project location and environmental vulnerability, as well as the characteristics of potential impacts (scope of impacts, credibility, etc.).

Federal Regulation regulates the value thresholds on the facilities under the scope of competence of the FMET. For certain plants and facilities the FMET determines on case-by-case basis whether the EIA is necessary or not. If no EIA is necessary, the FMET issues the environmental permit based on the Request/Application for issuing the environmental permit. For plants and facilities, which require no EIA, as well as for plants and facilities below the value thresholds regulated by the FBH regulations, the environmental permit is issued by the competent cantonal ministry. With regard to the infrastructure projects and according to the Article 4., the EIA is obligatory for:

- Construction of high-ways,
- Construction of new road or route and/or expansion of the existing road with two or three lanes in order to get four or more lanes, where such new road or re-marked and/or expanded part of the road would have a constant length of 10 km long, or more,

The EIA that is made based on the FMoET estimation with regard to the infrastructure facilities apply also to the construction of new cantonal roads and regional roads with incessant length of more than 2 km.

The Procedure of obtaining an environmental permit is presented in Annex D of this ESIA.

[33] Official Gazette of the FBH 19/04

2.3. DIFFERENCES BETWEEN THE WB OPERATIONAL POLICIES AND FBH LEGISLATION

The environmental laws of the FBH provide an adequate framework to integrate environmental provisions and measures that are in general compatible with WB requirements. A brief summary report is presented in the following sections through:

a) Investment Preparation: Screening Procedures, Content of EIA Documentation, Public Consultation Procedures, Institutional EA Review, Approval and Environmental Permits.

b) Investment Implementation: Mitigation Plan, Monitoring Plan, Institutional Responsibilities for Environmental Management Plan (data collection, data analysis, report preparation and dissemination, environmental management decision making), Permits and Licensing.

The process of environmental impact assessment in the FBH is based on the environmental permit, which is in turn a requirement for other necessary permits (such as the urban consent). The steps required for obtaining an environmental permit are laid during both categorization and screening. It is anticipated that the requirements of the WB with regards to specific components of the EA process can be easily incorporated into the overall FBH EIA process. The borrower and other agencies implementing the project are responsible for satisfying these specific requirements of the WB.

The requirements for environmental impact assessment are to a large extent similar to the requirements of WB, there is also certain amount of differences which are presented in the Table below.

Table 2.3.-1. Comparison of WB Requirements and FBH Legislation regarding the EA for Category A project

Subject	**FBH requirements**	**WB requirements**
Screening	Categorization and screening is based on lists of Installations and facilities requiring EP obtained through either an EIA or without it	Screening is based on type, location, sensitivity, and scale of the proposed project identifying key issues including any resettlement and cultural property concerns
Significant impacts	Cat. 1. Installations and facilities to be assessed for their impact on environment requiring full Environmental Impact Assessment. EIA Study must include the Preliminary Impact Assessment. The study also must incorporate the comments and suggestions of governmental and non- governmental sector as well as the results of public consultations.	Category A: Projects likely to have significant adverse environmental impacts that are sensitive (irreversible).
EA	Projects which require an EIA (Cat.1.):	Category A:

Subject	FBH requirements	WB requirements
documentation content	Phase I: A request (written application) for PEIA needs to be submitted by the project holder to the competent ministry in order to determine the scope of the EIA study. Phase II: The Ministry defines the content and scope of the EIS based on the results of the PEIA.	Full Environmental Assessment is required, usually an ESIA. The Environmental and Social Management Plan (ESMP) is an integral part of the ESIA.
Consultations	Public consultations are the responsibility of the competent institutions. Cat. 1 projects: The first round of public consultations in the PEIA development stage, after preparation of the study. The competent ministry will decide whether the second round of consultations, to be held after submission of the EIA draft is required.	The borrower is required to consult project affected groups and local NGOs about the project's environmental and social impacts and take their views into account. For Category A projects: It is necessary to hold public consultations at least twice: (1) shortly after screening and before the terms of reference are finalized; and (2) once a draft EA study is prepared.
Disclosure	Category 1 projects: For Projects for which the EIA is required, PEIA is disclosed 15 days prior to the public consultation. After completing the EIA the competent ministry sends the EIA copy to relevant institutions and other stakeholders with a deadline of 30 days to receive comments on the report.	For Category A projects: Information on the proposed objectives, project description and potential impacts are provided for the initial public consultations. After the draft Environmental Assessment report, it is necessary to disclose in local language.
Environmental Assessment Review and Approval	Depending on the type of project, competent (federal or cantonal) ministry reviews and approves EIA and EA request or just EP request in case EIA is not required.	Before formal clearance of environmental and social aspects of the project, the WB reviews the results of the EA (especially consultations, ESMP and institutional capacities), ensuring that the EA is consistent with the ToR.
Permitting	For construction of new facilities and reconstruction of existing facilities it is necessary to obtain the following licenses/permits: -Environmental Permit -Urban/Location Permit -Construction Permit and	WBG Environmental Health and Safety Guidelines

Subject	FBH requirements	WB requirements
	- Use Permit/ Inspection Acceptance Certificate	
Mitigation Plan	For projects requiring EIA, mitigation measures are described in the EIA study, which are also included in the EP. For other categories for which an EP is issued, measures for protection of air, water, soil, flora and fauna and Solid Waste Management Plan are included in the permit itself. These measures can be considered as mitigation measures.	Mitigation measures are included in the ESMP. Obligation to carry out the ESMP and additional measures contained in the ESMP need to be included in the loan conditions.
Monitoring Plan	The competent ministry may require the preparation of a monitoring plan during preparation of EIA. A Self-monitoring plan is included in the EP. Besides self-monitoring, the Law on Environmental Protection of FBH states that monitoring of installations and facilities will be carried out every 3 years in order to ensure that the requirements of the EP are met. Other environmental laws (e.g. Law on Air Protection, Law on Water Protection etc.) also specify monitoring to be carried out by competent institutions.	Monitoring plan is included in the ESMP.
Permits during implementation	EP's are reissued every 5 years or earlier if necessary.	None

One of the major shortcomings of the EIS or EIA produced to meet the local legal requirements is the lack of a detailed social assessment and inclusion of social data and indicators in the EIA report itself. As such, this was one of the main reasons why the EIS prepared in 2009 needed to be revised in the form of this ESIA.

The key difference between the content and requirements of the ESIA as per the World Bank policies and the Environmental Impact Assessment for the environmental permit is reflected in the monitoring of different parameters, in particular the environmental baseline. Since the environmental permit is issued per laws of FBIH as part of the process for issuing the construction permit, majority of baseline indicators and project impacts are determined to be monitored in the environmental permit, while the EIA proposes the parameters to be monitored. As such, a number of monitoring requirements, as set forth in this ESIA are also determined to be the responsibility of the contractor and to be carried out shortly prior to the start of works.

In order to fully meet the requirements of the World Bank's Operational Policies, as set forth for a Category A project, a detailed and site-specific Environmental and Social Management Plan (ESMP) will need to be prepared prior to the start of works, , so that the ESMP, with all of the obligations set forth are included. The site specific ESMP will build on the requirements of the environmental permit, recommendations of this ESIA and shall include monitoring results that would establish the environmental baseline for

the project site, including detailed biological and archaeological surveys, and all other site specific information and details that are determined in this ESIA to be carried out prior to start of works. This is stipulated in the Loan Agreement for the project, and is one of the conditions that need to be met prior to the start of works.

3. PROJECT AREA OF INFLUENCE

The route of the section Stolac-Neum transits mostly through rural area of Neum and Stolac municipalities, except in the area of Stari Neum, which is significantly more urban than the remaining towns of the road will be connecting.

In line with the approach of the existing EIS, the influence area of the study is defined as the space along the route, i.e. the area of the corridor of 200 m (100 m on the left and 100 m on the right from the road axis). However, in areas where the route goes through or next to a populated area – the study area was extended to include those communities, and identify potential environmental impacts of the road.

Area of influence for social impacts of the project can be divided to area of direct and indirect influence.

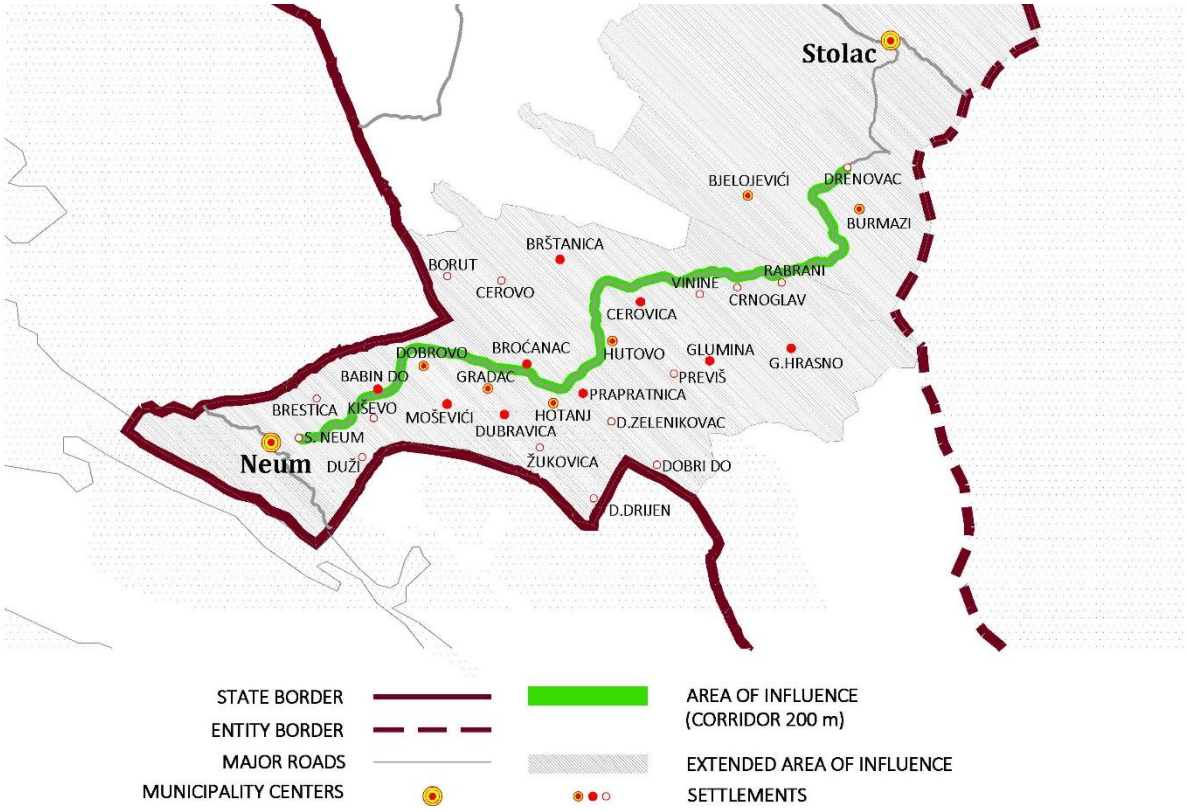
Area of direct influence can be described as territory of settlements which have direct connection to the constructed road within a radius of 1400 m. These communities will experience the most of the negative, but also the positive impacts of the project. In the Municipality of Neum the following populated areas have been included in the area of direct influence: Gradac, Hutovo, Dobrovo, Hotanj Hutovski, Cerovica, Moševići, Broćanac, Brštanica, Babin— do, Dubravica, Glumina, Gornje Hrasno, Neum, Prapretnica, Vinine, Dobri do, Donji Zelenikovac, Rabrani, Duži, Previš, Cerovo, Žukovica, Crnoglav, Borut, Donji Drijen, Kiševo and Brestica. The area of impact of Stolac Municipality comprises of three communities: Burmazi, Bjelojevići and city-centre of Stolac.[34] The entire population of Stolac lives in 21 communities with no organisation of local communities.

The indirect influence can be described as territory of settlements which are not located along the constructed road, but will have access connections to the same. These communities will evade negative impacts related to road construction (dust, noise etc), but will benefit from the positive impacts like local economy development. Settlements indirectly affected are identified as 18 other communities in northern part of Stolac municipality and they are beyond radius defined in paragraph above.

When in the social section of the ESIA both the direct and indirect area of influence will be considered, this will be indicated with the use of the term *area of influence* without any specification such as direct or indirect.

[34] These communities are within ROW and are likely to be impacted directly by construction activities (access to infrastructure and public services, dust, noise, vibrations air pollution, etc)

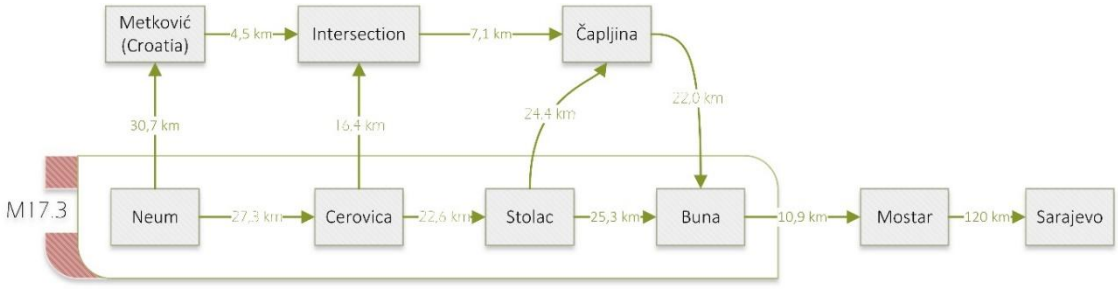
Image 3.-1. Area of influence



source: Ecoplan

The M17.3 starts in the community Buna, 11 km in the South from the City of Mostar, where from it continues to the South-East towards Stolac and it further goes from Stolac in the direction South – South-West in the of Neum towards the coast, resp. towards the City of Neum.

Image 3.-2. Distances and relationships between key points on M17 and M17.3 route



4. ENVIRONMENTAL BASELINE

For preparation of environmental part of this ESIA, a relevant background documentation was used, primarily the existing EIS from 2009, and data from physical plans of the Municipalities of Neum[35] and Stolac[36]. A significant amount of secondary data for this part of the ESIA was already available to the team, another part was provided by the PC Roads FBH, publicly available documents were downloaded and desk review was organized, while allowing deductive actions.

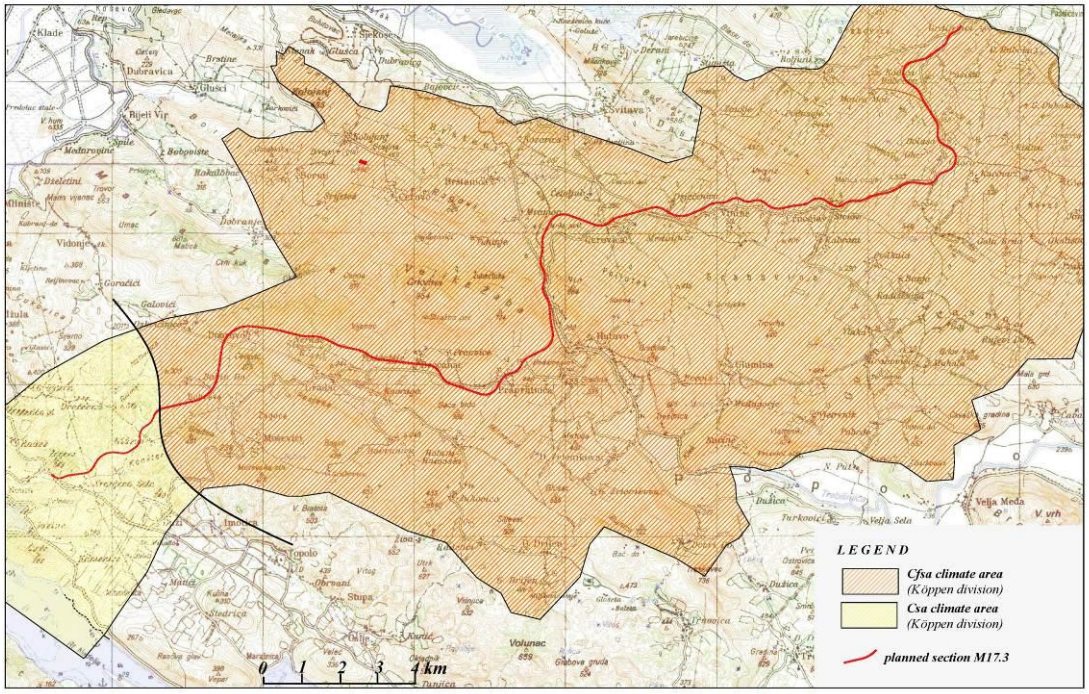
4.1. CLIMATIC AND METEOROLOGICAL CHARACTERISTICS

The area of construction of the major road belongs to the Mediterranean climatic and vegetation land area. With regard to the morphological features and position, there are two climate type in this area according to the Köppen classification scheme:

Csa – area in close vicinity to the Adriatic coast, and

Cfsa – hilly – inlands with hills and mountains, encompassing the largest part of this area.

Image 4.1.-1. Approximate Köppen classification scheme of climate zones



[35] Physical plan of the Municipality of Neum for the time-period 2010-2020, adopted by the Municipal Council of Neum on 9 November 2015,

[36] Physical plan of the Municipality of Stolac for the time-period 2013-2023 is in the phase of preparation of the plan proposal, while the Draft plan was adopted on 28 April 2015;

source: Ecoplan

The area of Csa climate according to the Köppen classification has a moderate warm rainy climate with dry summers. As compared to the route of the major road, a border between Csa and Cfsa is approximately at the direction Moševići - Vidonje.

The winters of Csa climate are mild and rainy, and the summers are warm and dry. In the wide coastal area there are approximately 215 sunny days per year with 2.623 sunny hours. The highest possible annual insolation amounts to 4.770 hours (Penzar, I., 1989).

Annual mean value of air temperature is 15.6 °C. The lowest monthly mean value of the air temperature was in January and it amounted to 8.2 °C, while the highest mean value was in July: 24.1 °C. The highest absolute air temperature in the time-period 1981 – 1992 was recorded in August 1981 (38.2 C), and the lowest in February 1991 (-6.5 °C).

Annual allocation of precipitation is typical Adriatic. In total there is a proportionally high quantity of precipitation per year, 1122.4 mm. There are about 110 days with precipitation in average per year.

For separated Cfsa area according to the Köppen classification (data of MP Hutovo) the average sum of annual precipitation amounts to 1639 mm, the maximum amounts to 2454 mm and the minimum to 1189 mm. The maximum precipitation is higher than the average by 34.8 %, and the minimum is lower than the average by 35%.

Cumulative frequencies of annual precipitation for the area of Hutovo:

- $P_{1/10}$ = 2020 mm
- $P_{2/10}$ = 1890 mm
- $P_{5/10}$ = 1660 mm

According to the amount of cloudiness the subject area belongs to the region with relatively fair weather because for the major part of the year the cloudiness amount is low. The increased cloudiness during the winter season comes as the result of the movements of Southern warm air masses which bring a high quantity of humidity. A contact with relatively cold interior brings the condensation of these masses and creates the cloud. The cloudiness during the winter season would be by far higher if a strong north-eastern wind (''*bora*'') did not appear over the area, conditioning fair, cold and dry weather.

The area is under the impact of two basic air circulations: dominant northern and less dominant southern winds. During winter strong bursts of north-eastern wind appears in a form of a bursting, strong and dry wind, but the southern wind is also common appearing as a constant, humid and less strong wind than the north-eastern wind which brings precipitation.

4.2. MORPHOLOGICAL, GEOLOGICAL, HYDROGEOLOGICAL AND ENGINEERING GEOLOGICAL CHARACTERISTICS

4.2.1. Morphological Characteristics

Wide area of the route of the major road Neum-Stolac was constructed out of carbonate and very disturbed tectonic shattered and extremely karst rocky masses.

The whole terrain belongs to the group of hilly and low mountain area.

The route of the road passes through the area which was constructed out of extremely karst carbonate rocks, respectively through the area of the so-called high karst. Important features are the presence of almost all karst forms on the surface of the terrain, lack of surface waters and karst collector characteristics with relatively deep levels of underground water directed into narrow zones of concentration with high speeds of flow and relatively more significant impact of the sea in the coastal area.

According to the prevailing high-altitude characteristics, the area through which the road passes has the characteristics of the rolling to the low mountain relief. The following categories can be differentiated:

- rolling-lowland part with average heights lower than 200 m.a.s.l.;
- hilly-rolling part with average heights of approximatly 200 - 500 m.a.s.l.;
- low mountain part with terrain heights from 500 to 1000 m.a.s.l.

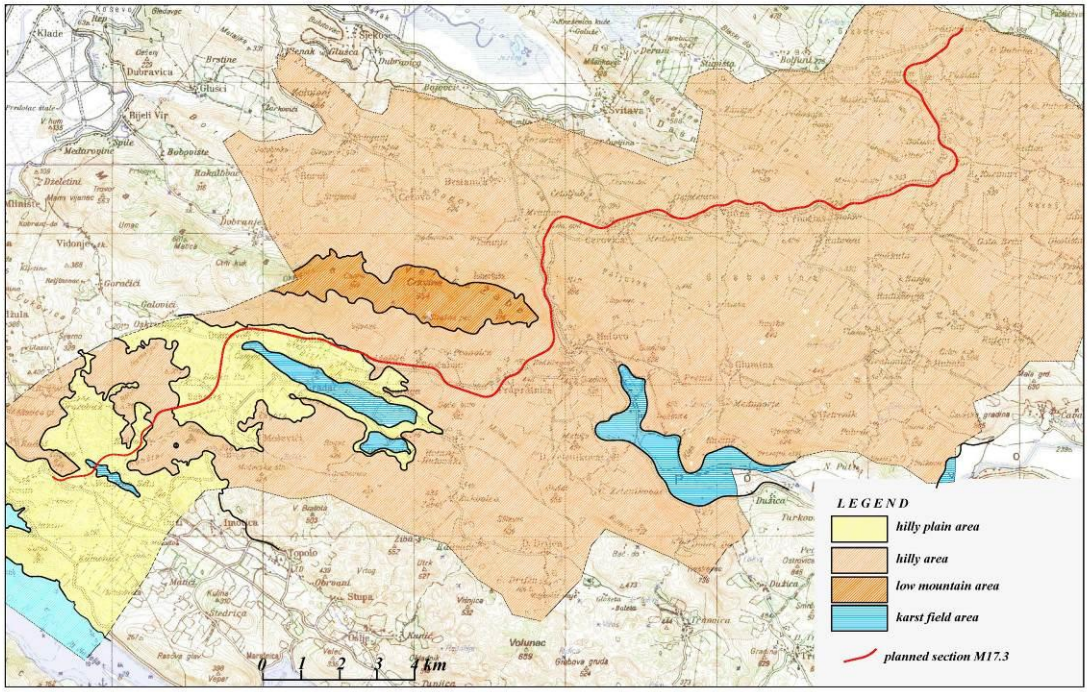
As presented in the Image 4.2.-1., the area through which the road goes is mostly rolling-lowland, respectively hilly-rolling terrain. The route goes to the largest extent through the hilly parts of terrain, whereby only central part (around Prapratnica and Hutovo) goes around the mountain massif Žaba (Mala Žaba).

Within the hilly-rolling units there are two large karst valleys, where the road intersects one of them, or to be more precise Blace karst valley the average height of which is 100 m.a.s.l. The route goes around Gradac karst valley (90-100 m.a.s.l.), although it is next to that valley. Along the route there are also other numerous karst forms such as: grooves, karren, small area with cracks in limestone, stones and karst sinkholes, developed by the processes of chemical decomposition of calcareous rock under the impact of surface waters. The most common forms of relief are karst sinkholes with relatively high frequency, with round to elliptic form, with diameter of 20 - 50 meters or more, and with depth of 10 - 20 m. They are distinguished by steep sides to the valley bottom with levelled cultivated bottom, filled up with red soil. Round karst sinkholes are most common encountered as irregularly allocated in the calcareous massif, and sometimes they may be encountered in the form of straight-line series which follow the fault structures. Hilly-rolling relief of average height of 400 m.a.s.l. encompasses a major part of the subject area presented in the Image 4.2.-1., respectively the parts at the far South-West of the Municipality of Neum, then the major part of the central part which is in the southern and south-western slopes of the massif Velika and Mala Žaba, eastern parts within which there is also the part of Popovo Polje karst valley with the average height of about 230 m.a.s.l., and the entire northern and north-eastern part of a wide scope. For this unit the relatively high inclinations of the slopes are significant at certain high ground, in particular in case of the slopes of Velika and Mala Žaba where the inclination of the terrain ranges from 35 to 45^{o}.

Low mountain part encompasses the areas of the massif Velika and Mala Žaba with the heights above 500 m.a.sl. and it reaches the elevation of 954 m (Crkvina) and 817 m

(Carina). Very high inclinations of the slopes are significant which range from 35 to 50°. The average height of this unit is about 750 m.a.s.l.

Image 4.2.-1. Morphological units of area, which the section Neum-Stolac passes through



source: Ecoplan

Except for Trebišnjica in Popovo Polje valley, there are no constant surface flows in a wide area of the very route. Out of the occasional ones, the most interesting one is the flow which goes from occasional spring Vir in north-eastern periphery of Blace valley towards the abyss on the south-eastern periphery of this valley and in the area of Moševići where the occasional flow is also formed through the Quarternary layers from the spring of Batin up to the abyss near Babin Do (elevation of 145 m).

Both of these occasional flows are outside the route of the major road.

The widest area of the future rout of the road represents a very karst massif and it belongs to the so-called deep karst with the outstanding karstified forms of high density, which is significant for the areas of pock-marked karst and has a very strong karst massif. Infiltration of surface-precipitation waters is very high with the estimated very high infiltration coefficient of about 0.8.

4.2.2. Geological Characteristics

Wide areas of the designed major road are built mainly from Mesozoic layers of Trias, the Jurassic period, the Cretaceous Age and Eocene, as well as the local Quarternary layer in the form of alluvial, delluvial and prolluvial layers. Lithologic materials and thickness of the stratigraphic units are quite unhomogenous.

Trias layers are the oldest and they were built from dolomites.

Sediments of lower Jurassic period were built from layered limestones and the layers of the transition between lower and medium Jurassic period were built mostly

from oolithic limestones with low-density intercalations of dolomite limestones. The lower part from the Upper Jurassic period was built from multi-layered and thickly layered limestones, and the upper levels from the Upper Jurassic period from dolomites, dolomite limestones and limestones. At the wide area of the terrain of the major road the Cretaceous Age layers are the most represented. The Lower Cretaceous Age were devided into two levels. The lowest levels contain some dolomites but nevertheless they were built as a whole from massive and banked limestones. A transition zone between the Lower and the Upper Cretaceous Age was made of limestone, dolomite limestone and dolomite.

The Upper Cretaceous Age was built from limestones, dolomites, dolomitic limestones and layered limestones. The highest levels of Upper Cretaceous Age were built from layered massive and banked limestones. Paleogene layers were built from Paleocene and Eocene limestones. In addition to reverse faults and there are also cores of syncline. Along large reverse faults there are flysch marls, sandstones and conglomerates as well as limestone breccia.

Quaternary layers were developed in karst valleys in the form of alluvial layers of clay, sand and gravel as well as prolluvial layers of karst, humus and red soil.

4.2.3. Hydrogeological Characteristics

Looking as a whole, the widest area of the designed major road is built from rocky masses with very developed fracture-cavernous porosity, respectively the area of intensive karst and the so-called „pock-marked karst". The following is very characteristic for this karst: very deep karst of the rocky masses with the function of hydrogeological collectors with large permeability and speeds of flowing of ground water.

Dolomite rocky masses, which appear in immediate hinterland of Neum, and narrow zones of flysch poorly porous layers along with big reverse faults have the function within the terrain as partial hydrogeological barriers which together with the terrain structure significantly affect the directions of ground waters flowing.

The rocks with inter-granular porosity are allocated on local level at the terrain surface and these refer mainly to surface layers of karst valleys and high number of karst sinkholes which are situated at this karst area. These layers have no major hydrogeological importance within the terrain of wide area.

4.2.4. Engineering Geological Characteristics

In the engineer – geological sence, the area of the route of the major road is made of three basic groups of rocks, which are presented by:

- Solid carbonate layers within which the rocky masses are distinguished which were built from limestone, dolomites and of exchanging layers of dolomites and limestones,
- Clastic rocks mainly related to the stronger tectonic breaks – damages of rocks,
- Not-connected and partly connected rocks – Quartery and Flysch layers.

According to the Eurocode 7 (EC7/1), which defines the geotechnical categories, these solid stone rocks of A category belong to the *first geotechnical category* (at designing and construction of the facilities, they may be performed based on the comparable experience, pursuant to which it is known that they meet the geotechnical conditions of the construction). They encompass the biggest part of the road of the rocks. Intensively damaged zones, classified as B, belong to the *second one* (designing and construction of the facilities in this category of rocky mass require numerical geotechnical parameters based on the results of laboratory experiments, while the important requirements are proved by calculations). They are mostly connected to the narrowest zones of that very big fault zone. Crashed, partly poorly connected breccia rocks and marl rocks, classified as C, belong to the not-connected and partly connected Quartery and Flysch rocks and they appear next to the reverse faults or as Quartery cover. They belong to the *third geotechnical category* for which it is necessary to include the non-standard methods of researching, designing and construction.

Quartery layers, which the partly connected and not-connected rocks belong to, are predominantly prolluvial and fluvio glacial layers, built from karst, red soil, clay and sand. According to the EC7/3, these soils, where the thickness of layer is bigger and where there is no possibility for their removal, belong to the *third geotechnical category.*

Flysch layers (Paleogene or Upper Eocene Age) which appear next to the front of cover and fronts of big reverse faults, were built from marl clay, marl, breccia and poorly connected conglomerates, belong to the group of connected rocks with quite poor geo-mechanical characteristics. They also belong to the *third geotechnical category.*

The depth of the zone of disburdening of stone rocks outside the break zones, since it is about the intensive karst rocks, amounts to 3 – 4 m.

4.3. SEISMIC ACTIVITY OF TERRAIN

In seismic terms, for project area the possibility for earthquakes is without increase and it amounts to 8^0 MCS (100 events according to the data from Geo-Physics Institute). For the zones of tectonic damage or construction soils on solid rocks with the events of tectonic damage, it should be taken care of and expect the seismic strokes of even up to 9^0 MCS.

4.4. HYDROLOGICAL CHARACTERISTICS

The new road does not come into collision with any of the surface flows or 1^{st} protection zone of the springs.

On the constructed part of the section, between Stari Neum and Kiševo the route goes through the karst valley Blace, where an eponymous spring is situated and at

which the terrain is flooded during the winter. Besides that, for the Spring of Blace the Protection Study was prepared and the decision on its protection was adopted by the Municipal Council of Neum in 2014. In accordance with those protection zones of the spring, as defined in the Study and in the Decision, the constructed route goes through the 2nd protection zone from Stari Neum to Kiševo, and from Kiševo to Babin Do in the length of cca 3 km the road is in the 3rd protection zone, whereof about 650 m of the route was already constructed.

In the period of intensive precipitations, the lower parts of the karst valley are flooded in the community Dobrovo, when the estavel which is at its periphery cannot accept all surface waters so it floods. In addition, near the communities Prapratnica and Hutovo a small pond was noticed; but since they are not near the road, they are not endangered.

4.5. SOIL AND AGRICULTURAL LAND

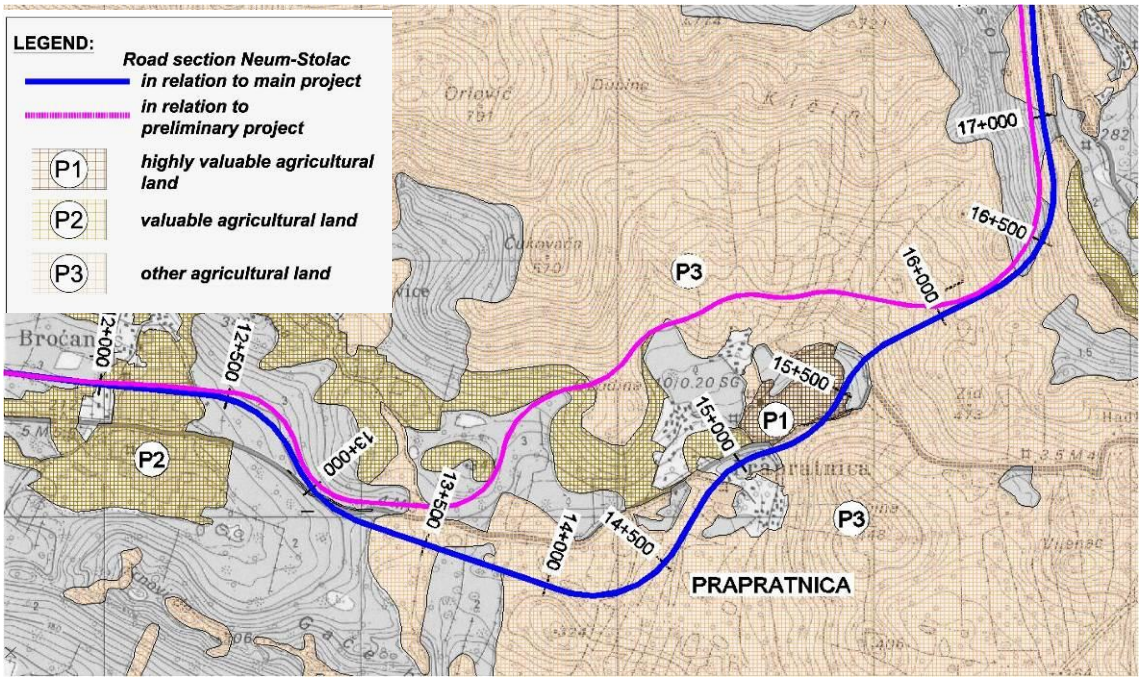
According to FAO *Land capability classification* of land, the alignment along the road belongs to:

- land of the 1st – 4th quality category is defined exclusively as the agricultural land (1st agro-zone);
- land of the 5th – 6th quality category is defined as the agricultural land and only exceptionally as the land for other purposes (2nd agro-zone);
- land of the 7th – 8th quality category is defined as the land that may be used according to the needs also for some other purposes (3rd agro-zone).

The soils of the 1st agro-zone are mostly situated in the areas of the plateau at the foot of the hills and small hills such as the one at Blace, Dobrovo, Prapratnica, Cerovica and Burmazi.

In the EISA from 2009 the soil and agricultural land in the corridor of 200 m were analysed in details for the selected route, and the conclusion is that in most localities or geographical position, regardless of the limited production properties, the soil is natural resource on which it must take special care. The route was changed to the largest extent near the community Prapratnica (from 12.5 km to 16 km), where on the basis of requests of the local community the route was changed, as it is presented in the Image 4.5.-1.

Image 4.5.-1. Change of the route in the area of the community of Prapratnica



Source: Ecoplan

4.6. WOODLAND AND FORESTRY

According to physical plans of the Municipalities of Stolac and Neum, three categories of woodland were defined: categories V, VI and VII based on the appropriateness criteria for production of bio-estate[37]. The woods in this area belong to the wood communities of Mediterranean and Sub-Mediterranean which in the phyto-geographic view belong to the East province of the Mediterranean, i.e. Mediterranean region. Wood resources in the entire corridor have limited options in terms of its development, because of natural (climatic, geological) and anthropogenic constraints. Along the entire corridor a state of forest communities is changed significantly by negative anthropogenic influences. In recent years in the Mediterranean and Sub-Mediterranean, fires are frequent, which represents a great danger for the entire belt through which passes the corridor of the planned project. In the corridor, a deforested area mostly dominates that has the characteristics of rocks or open karst. Then, in

[37]According to FAO *Land capability classification* system (adopted to Bosnia and Herzegovina conditions), which defines capability of land production; land is divided in eight categories. Under the term of classification of land, one refers to the relative assessment of quality and its productive capability. Determining bonitet categories of land is carried out on the basis of morphological, chemical, hydrological and physical features of soil, general features of terrain (expressiveness of relief, inclination, exposition and the like) and production characteristics. Categories from I-IV represent classes of land capable for agricultural production, and categories V-VIII are land limited in use and generally less suitable/or unsuitable for cultivation (low humus accumulation value, a shallow layer of soil production and low resistance to erosion processes), only capable for pasture and woodland.

significant part are identified: shrubbery, bushes and maquis. In the smaller part of the corridor there are still coppice degraded forests. In order to the above mentioned, forest systems are characterized by their fragmentation and mosaic mode of presence in a very wide interval of regression.

The vegetation and woods in these areas have small economic value, mostly to the limited size and degradation stages, but do serve a number of environmental functions that area valuable to the karst area. These include mitigation of climate extremes, in particular when it comes to wind effects and insolation, land protection and prevention of its erosion, filtration of precipitation waters, absorption of carbon dioxide and oxygen releasing, air purification, preservation of biological diversity, biological and environmental balance of eco-system, aesthetic and landscape colours of karst zones, etc. As such, adequate measures have been listed in the mitigation plan to ensure the maximum level of protection of soil, agricultural land and woodland.

4.7. LAND USE

Categorization of the land along the alignment of the road was described in the above text. Using the current methods, the soil was analysed as well as the agricultural land, woodland and building areas of the communities. The analysed area refers to the corridor scope of 200 m in width. In the graph no. 2. Agriculture, forest and building land in the corridor scope of 200 m in width, on the scale of M 1:25 000, the overview was presented per types of land and tabular overview together with the calculation of chainage 5+500 at place Babin Do, Municipality of Neum to the chainage 36+410.906 at place Drenovac, Municipality of Stolac. A detailed calculation of the land type was made for the entire area per chainage for every 2000 m.

In total, for the whole planned section, in the corridor in width of 200m, the area of building land is 11.11ha or 1.85%, whereof the constructed part of the building area of the community (map mark G1) is 8.46 ha or 1.41% and unconstructed part of the building land of the community (map mark G2) is 2.65ha or 0.44%. When it comes to agricultural land, highly valuable (P1), valuable (P2) and other (P3), there is in total of 269.15 ha or 45%. The corridor takes the highly valuable land in the area of 5.96ha or 0.99%, a large portion of the valuable land in the area of 144.92 or 242% and other agricultural land – 118.27 ha or 19.81%. Concerning the other part, the corridor goes through the wooded area of the municipalities which is defined as uncategorized (map mark Š1), protective woodland (Š2) and woodland with converted purpose (Š3), which is in total 316.54 ha or 53.03%. Individually, the woodland encompasses: uncategorized woodland - 86.74ha or 14.53%, protective woodland – 103.07ha or 17.27% and woodland with converted purpose – 126.73ha or 21.23%. These data are given in the table below.

Table 4.7.-1. Analysis of the land[38] type in the scope of the road corridor

[38] Physical planning categorization system.

Land types from the corridor scope of 200m	***Total (ha)***	***%***
Constructed part of the building land of the community G1	8,46	1,41
Unconstructed part of building land of the community G2	2,65	0,44
Agricultural land (highly valuable) P1	5,96	0,99
Agricultural land (valuable) P2	144,92	24,2
Agricultural land (other) P3	118,27	19,81
Woodland – uncategorized Š1	86,74	14,53
Woodland – protective Š2	103,07	17,27
Woodland – converted purpose Š3	126,73	21,23
Total:	**596,80**	**100%**

Source: Ecoplan

4.8. FLORA AND VEGETATION

Within the Environmental Assessment Study, the future road location was thoroughly investigated from flora and vegetation point of view, therefore the basic characteristics of flora and vegetation of the specified territory shall be pointed out.

In the area where the route Babin Do-Drenovac goes the following shall be noted:

1. Forest ecosystem including Mediterranean evergreen vegetation (Quercion ilicis), in the smaller part and Sub-Mediterranean shrub woods – leafy vegetation (Ostrypo Carpinion) in the bigger part of the route. The vegetation of the wider area consists of woods and shrubs of Oak downy and Hornbeam oriental (Querco – Carpientum orientalis). In the bigger part of the route the most thermofilic variety of forest vegetation exists, with a large number of plant species of Mediterranean hard-leaf forests, which can be explained by the

Since for the subject area no forestry-managerial basis was made which represents the key document and framework for regulating the management of woods and woodland in some area, it is not possible to specify the area of woods and woodland so the results of different assessments are used. The results that are presented here were obtained by the creation of Regional plans of the Municipalities of Neum and Stolac. Because of the problems regarding the legislation on the level of FBH and previous bad management, physical plans suggest urgent initiation of forest management plan making in order to determine relevant data on forest areas and woodland. Only based on these data and rules of planning categoritation of woodland could be possible to provide guidance on the use of these lands.

strong influence of Mediterranean climate and low sea level. Those forests have suffered major anthropogenic influence, so that now in fragments or in full, all their regressive (degraded) stages can be found. Among the Oak downy and Hornbeam oriental forests the Herzegovinian-Dalmatian part of Macedonian oak (Quercetum trojanae) can be found. In the parts where degradation is well ahead, the base is rocky and the ground is shallow and scarce, thorn bushes (Rahmno – Paliuretum) develop. As the result of suppressing the forests and shrubs of Querco – Carpinetum – Paliuretum vegetation, open underwoods have been developing in the first stage of degradation, which, according to certain authors (Horvatić,1963) mostly belong to Rhamno-Paliuretum vegetation or they can represent its fragments.

2. Rocky pasture and dry meadow ecosystem, and as the most important vegetation order of dry grasslands and rocky pastures of eastern- Adriatic coastal belt is Scorzonero – Chrysopogonetalia which is characterised by grass species, which mostly coincide with the belt of forest vegetation of black and white hornbeam (Ostryo – Carpinion orientalis). In the steep slopes and hillsides which are exposed to north-eastern wind, rocky pasture of feather grass and sage are formed (Stipo – Salvietum officinalis). All grassland communities in their original form are highly diverse and characterized by a large number of species, and classified in numerous associations depending on the degree of degradation and ground exposure, which highly depends on the human influence and exploitation (pasture, meadow). Some grass vegetation (range Scorzonero – Chrysopogonetalia) is connected to Sub-Mediterranean and Mediterranean- woodland belt (the area of Oak downy), whereas the belt of butcher's broom and staple Cymbopogo – Brachypodietalia, is specific for the EU-Mediterranean zone (holm oak area).

Sinkholes with fertile fields where oak downy (tall trees Quercus pubescens) is common, appear alternately (mostly depending on the ground depth) with Hornbeam oriental scrubs (Querco-Carpinetum orientalis), as well as the emery subtype, marked as vegetation Juniperetum oxycedrii. Thorn bushes (Rhamno – Paliuretum), are common vegetation in that area.

In the expositions towards the closest western borders of Hutovo Blato Nature Park, the most common form of vegetation is Querco – Carpinetum orientalis (Jaspirca and Carić, 2002), followed by Quercetum trojanae and Phillyreo – Carpinetum orientalis. According to the combination of species, pasture vegetation could be marked as Koelerio – Festucetum illyricae. It is rich in species, which is a general characteristic of rocky pasture and dry meadow ecosystem of the range Festuco – Brometea (Trinajstić, 1992). Within that vegetation there is a big portion of vegetation range Scorzonero – Chrysopogonetalia, with the series of elements which are specific for typical Mediterranean range Thero – Bracyhipodietea.

Moreover, at the sea level extending 500 m the following vegetations develop: Rusco – Carpinetum orientalis, Punico – Carpinetum orientalis, Querco – Carpinetum orientalis, Quercetum trojanae, Ostryo – Quercetum pubescentis, Petterio – Carpinetum orientalis. (Jasprica 2003).

Most of the vegetation is under the strong anthropogenic influence with a clear change of structure and elements of the habitats. Some of this vegetation has degradation tendency.

Rare and protected botanical species

The species which could be found at the project area Stolac-Neum, listed according to Šilić (1996) are as follows:

1. Helleborus hercegovinus Martinis (=H. multifidus auct. non Vis.) (R)
2. Rhamnus intermedius Steud. et Hochst. (R)
3. Anthyllis illyrica G. Beck (R)
4. Genista sylvestris Scop. subsp. dalmatica (Bartl.) Lindb. (R)
5. Genista sericea Wulfen in Jacq. (R)
6. Petteria ramentacea (Sieb.) C. Presl (R)
7. Calycotome infesta Guss. (V)
8. Seseli tomentosum Vis. (R)
9. Chaerophyllum coloratum L. (R)
10. Cyclamen repandum Sibth. et Sm. (V)
11. Cyclamen neapolitanum Ten. (Syn.: C. hederifolium Aiton) (V)
12. Acanthus spinossisimus Pers. (V)
13. Teucrium arduini L. (R)
14. Stachys recta L. (aggr.) (K)
15. Satureja subspicata Vis. subsp. subspicata (V)
16. Origanum heracleoticum L. (V)
17. Campanula pyramidalis L. (R)
18. Edraianthus serpyllifolius (Vis.) A. DC. in DC. (R)
19. Tanacetum cinerariifoliurn (Trev.) Schultz Bip. (V)
20. Inula viscosa (L.) Aiton (Syn.: Dittrichia viscosa (L.) W.Greuter) (R)
21. Inula graveolens (L.) Desf. (Syn.: Dittrishia graveolens (L.) W.Greuter) (R)
22. Centaurea glaberrima Tausch (R)
23. Asphodelus fistulosus L. (R)
24. Ruscus aculeatus L. (local) (V)
25. Sternbergia lutea (L.) Ker-Gawler ex Sprengel (V)
26. Romulea bulbocodium (L.) Seb. et Mau. (V)
27. Iris pseudopallida Trinajstić (R)
28. Gladiolus illyricus Koch (V)
29. Anacamptis pyramidalis (L.) Rich. (V)

In the brackets, following the name of every species, the endangered category (according to IUCN) has been specified:

R – rare species
V – sensitive species
K – insufficiently known species

(Source: ŠILIĆ, Č. 1996 The list of botanical species (Pteridophyta I Spermatophyta) for the Red book of Bosnia and Herzegovina. Glas. Zemalj. Muz. Bos. Herc. N.S. 31, 323-367).

Within the project Forests and Mountains Protected Area issued by the Federal Ministry of Environment and Tourism the Red list of endangered botanical species in Bosnia and Herzegovina was created in February 2013. Within the new red list the categorization of status of taxa was created in relation to the list made in 1996. There is only the draft version of the red list from 2013, and after it is adopted it shall be published in the Official Gazette of the FBH (in accordance with the Environmental Protection Act no.66/13, article 64.).

4.9. FAUNA

The fauna representatives in the project area are: hedgehog (Erinaceus sp.), martens (Martes martes), fox (Vulpes vulpes), rabbit (Lepus Europaeus), wild boar (Sus scrofa), squirrel (Sciurus vulgaris, weasel (Mustela vulgaris).

The majority of Mediterranean bird species use the coastal territory in its full length, with a smaller number of those species which are exclusively attached to one of the vegetation belts. The most well-known birds in this area are: rock partridge (Alectoris graeca), black-eared wheatear (Oenanthe hispanica), orphean warbler (Sylvia hortensis), subalpine warbler (Sylvia cantillans), black-headed bunting (Emeriza melanocephala), sombre tit (Parus lugubris), rock dove (Columba livia), turtle dove (*Streptopelia turtur*), barn swallow (*Hirundo rustica*), house sparrow (*Passer domesticus*), green woodpecker (*Picus viridis*), nightingale (*Luscinia megarhynchos*), snipe (*Lymnocryptes minimus*), buzzard (*Butteo butteo*), sparrow hawk (*Accipiter nisus*), mistle trush (Turdus viscivorus), fieldfare (Turdus pilaris), song trush (*Turdus philomelos*), blackbird (*Turdus merula*). A large number of them spend the winter in this area and they feed among rocks, shrubs and woods mostly with prickly juniper (*Juniperus oxycedrus*), mock privet (*Phillyrea media*) and ivy (*Hedera helix*) fruits.

Among reptiles the most important representatives in this area are of family *Amodytes* - viper, especially specific for this climate is legless lizard (*Ophisaurus apodus*), green lizard (*Lacerta viridis*), gecko (*Tackorantula turcicum*).

This region abounds with large number of insects (*Ineseecta*), spiders (*Aranea*), centipede (*Myriapoda*), etc.

4.10. WILDLIFE AND HUNTING

Hunting activity on the territory of the municipalities of Neum and Stolac has been performed based on annual plans for hunting management. According to these plans the hunting-ground refers to the whole area of the municipality except for those areas which are excluded by the law (Articles 31-44 of the Hunting Act), i.e. settlements, graveyards, public roads, orchards, vineyards, parks in the settlements, treatment, leisure and recreation facilities, airports, industrial yards and other facilities stated by special regulations.

According to the Physical plan of the Municipality of Stolac the total hunting area of the municipality covers the area of 280 km^2, and the total area of the Municipality of Neum according to the Physical plan covers the area of 246 km^2.

In the parts where the route passes there are two hunting-grounds which are governed by two hunting societies: Kamenjarka Stolac and Jadran Neum.

Table no. 4.10.-1. The hunting area of the hunting societies and number of members

Hunting society	Hunting area (ha)	Number of hunters
Kamenjarka – Stolac	29.067,00	248
Jadran – Neum	22.000,00	151

Source: Interview with Hunting societies

Borders of the nearby hunting-grounds are also shown in the map no. 3. Environmental conflicts in the area, and in the table below:

Table no. 4.10.-2. The hunting area of the nearby hunting societies and number of members

Hunting society	Hunting area (ha)	Number of hunters
Galeb – Čapljina	25.636,00	247
Lisac – Ravno	44.700,00	76

Source: Interview with Hunting societies

The following tables show the wildlife which inhabits the hunting-grounds in the area of the route, as well as the number of wildlife per hunting-grounds.

Table no. 4.10.-2. Wildlife which inhabits the project area

Local title Latin title	***Local title Latin title***
Wolf	*Canis lupus*
Wild boar	*Sus scrofa L.*
Roe deer	
Mouflon	
Rabbit	*Lepus europeus Pall.*
Fox	*Vulpes vulpes L.*
Stone marten	*Martes foina EHR.*
Pine marten	*Martes martes*
Wildcat	*Felix sp.*
Jackal	
Mongoose	
Badger	
Skunk	*Mustela putorius L.*
Weasel	*Mustela vulgaris*
Squirrel	*Scirius vulgaris*
Pheasant	*Phasianus sp. L.*
Snipe	*Lymnocryptes minimus*
Stone partridge	*Alectoris graeca*
Partridge	
Rock dove	*Columba livia*
Turtle dove	*Streptopelija turtur*
Green woodpecker	*Picus viridis*
Buzzard	*Buteo buteo*

Sparrow hawk	*Accipiter nizus*
Falcon	*Falco f. L.*
Owl	*Bupo bupo L.*
Blackbird	*Turdus merula*
Magpie	*Pica pica L.*
Hooded crow	*Corvus corone cornix L.*

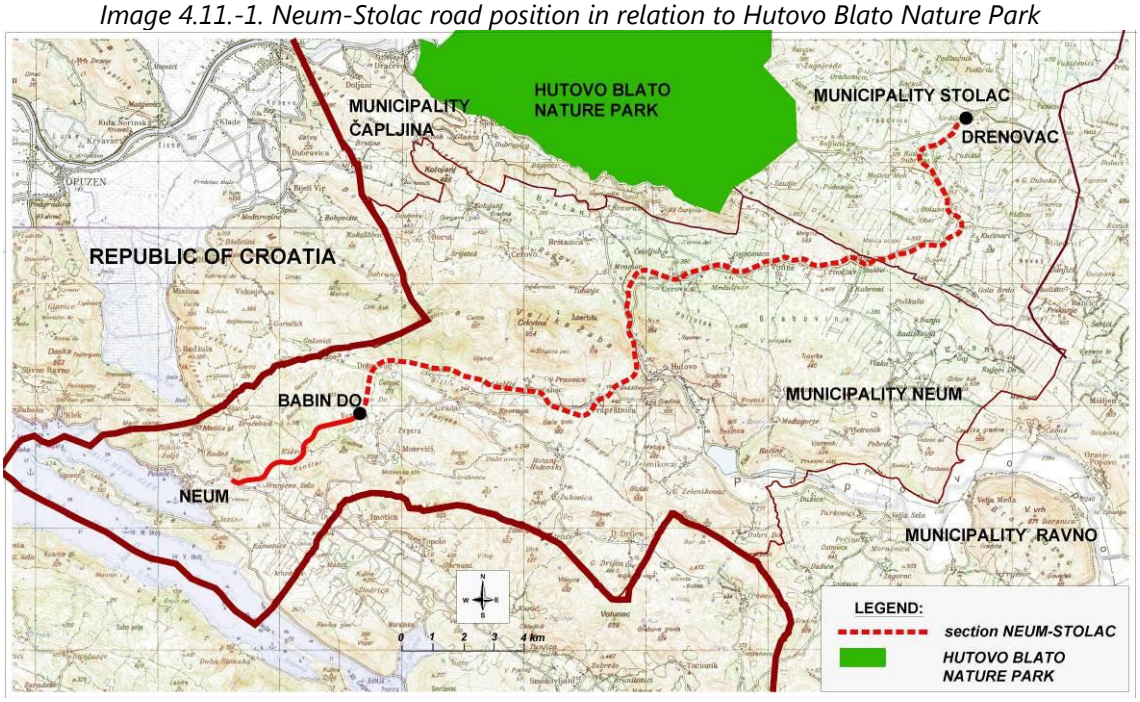
Source: Interview with Hunting societies

4.11. PROTECTED PARTS OF NATURE

In the project area, according to the Protection Institute within the Federal Ministry of Culture and Sport there are no records of protected parts of nature. However, at an average of 2,5 km distance from the corridor there is Hutovo Blato Nature Park which was declared a protected area in 1995.

The closest air distance from the borders of Hutovo Blato Nature Park is ca. 1,7 km away in the area of Cerovica. The space relation between the route and Hutovo Blato Nature Park is shown in the image 4.11.-1.

Image 4.11.-1. Neum-Stolac road position in relation to Hutovo Blato Nature Park



Source: Ecoplan

Hutovo Blato, as the biggest bird nature reserve, is extremely valuable area, not only for bird fauna, but also for other groups of living organisms such as reptiles, amphibians and also includes insects which form the most numerous group of organisms in the world.

These characteristics of Hutovo Blato are the results of warm Sub-Mediterranean climate, small amount of precipitation, vegetation diversity with long growing season which is very suitable for the growth of many animal and plant species.

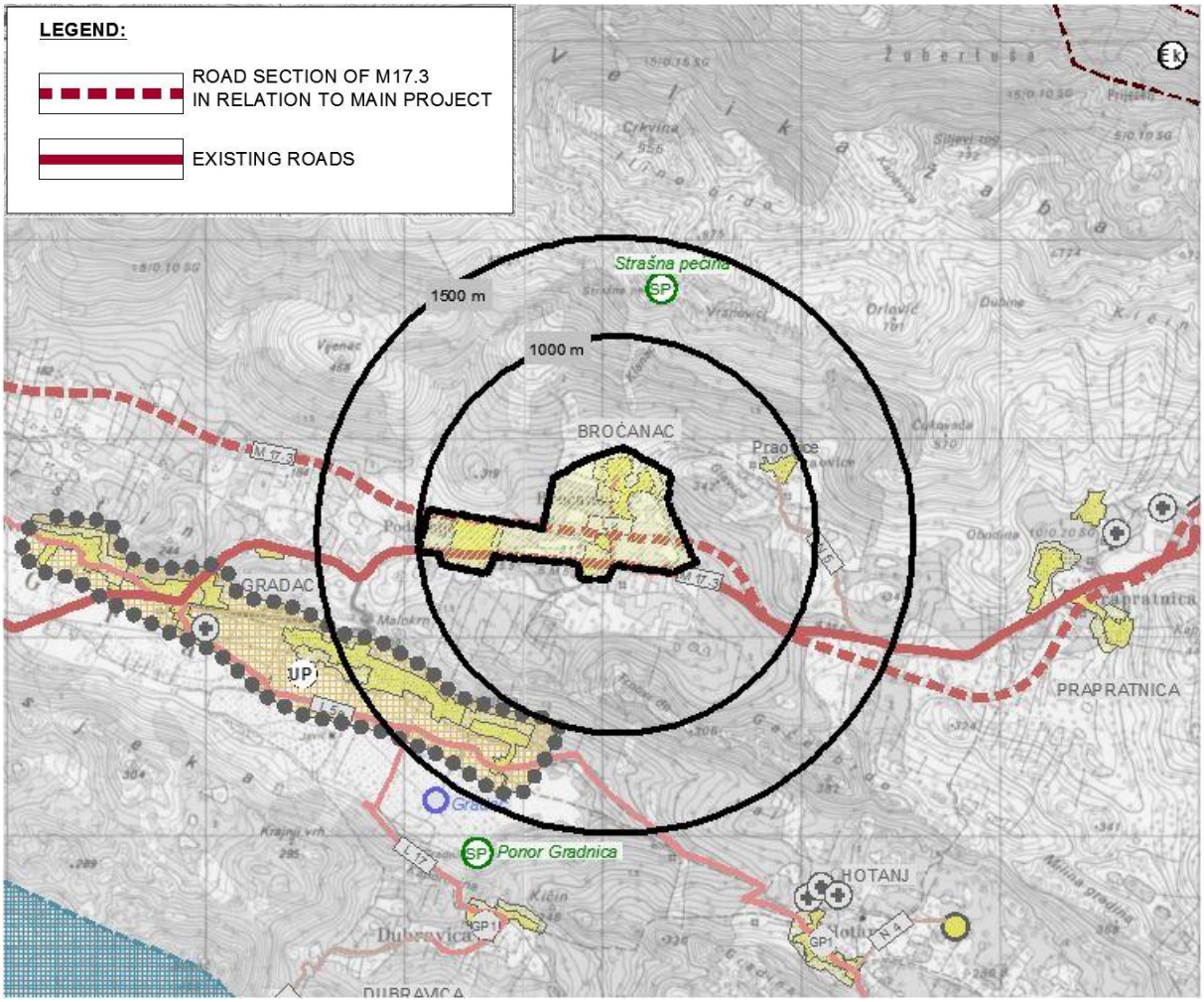
Considering the distance mentioned above, Hutovo Blato will not be directly influenced by the project.

In the wider area of the corridor there are some areas with high geomorphological value, and the closest to the corridor are:

- Gradnica abyss (estavela), geomorphological monument, Gradnica Polje valley, Hutovo
- Velika Žaba Mountain Cave, Neum.

As shown in the image 4.11.-2. the caves mentioned above were recorded as natural resources by the Institute for Protection of Cultural and Historical Heritage of Socialist Republic Bosnia and Herzegovina.

Image 4.11.-2. Excerpt from PP Municipality of Neum - the mark SP represents the natural monument registered at Monument Protection Institute within the Federal Ministry of Culture and Sport



The stated protected monuments of nature are out of the direct influence of the project, moreover they are located more than 1 km away from the planned road route.

Apart from rare and protected species stated in chapter *Flora and vegetation* of this Environmental baseline, project area does not include elements of fauna, cultural resources and parts of nature that are formally protected on national (BH) level.

4.12. LANDSCAPE

The basic limitation while writing this study case is absence of unified methodology for their assessment and classification at the national level.

The fact that Bosnia and Herzegovina signed the *European Landscape Convention* in 2010 implies that the legal support is present. However, the process of active protection has not begun yet. It is expected to cover the identification of valuable landscapes at the national level, the methodology for its classification and *The Catalogue of Valuable Landscapes* as a result. The beginning of this process should have a priority of national importance and its completion is an essential precondition for legal and real protection of the landscapes.

Also, in this text we will consider only the route from the main project.

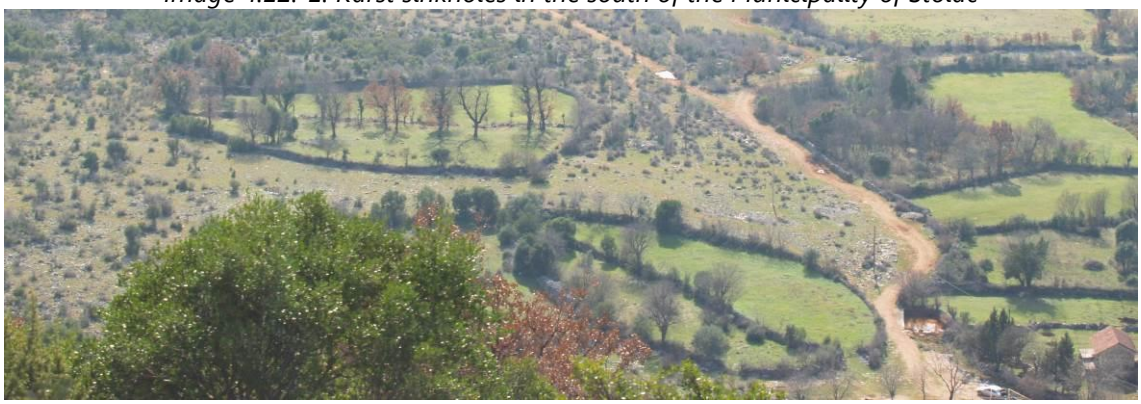
Natural features

The area of south and south – east Herzegovina is specific by its natural and social characteristics. In the last decades it has suffered significant demographic and economic changes but precisely because of the poor economic situation its landscape remained complete and intact. As such, it represents an invaluable recourse.

Karst hinterland of the Adriatic Sea is rich in uniform and preserved landscapes which are an important component of its spatial identity. The most important feature of those landscapes is their uniformity due to natural factors, anthropogenic influence and specific historical development.

There are almost no degrading landscapes or their spatial influence is negligible. Žaba Mountain dominates the area and the huge vastness of intact, wild, authentic rocky ground is visible from its tops. These stone landscapes are preserved from aggressive human interventions and intersected with small fertile coves with tight, compact villages around. The existing roads have been laid according to the terrain and do not distort the landscape wholeness in this area.

Image 4.12.-1. Karst sinkholes in the south of the Municipality of Stolac



source: Ecoplan

Image 4.12.-2. South of the Municipality of Stolac

source: Ecoplan

Anthropogenic features

Natural landscape elements and the level of human intervention are balanced in the area through which the route passes. The most important anthropogenic impact in the landscape comes from the settlements, agricultural space and the roads network.

Settlements and architectural complexes

The settlements of the Neum and Stolac Municipalities are characterized by their adjustment to the relief and by the preservation of traditional architectural forms. The settlements are spread into many hamlets which were built near the small fertile coves. Due to the lack of the arable land it was common to respect fertile fields, by avoiding population or using them for other purposes.

Image 4.12.-3. Typical traditional construction

source: Ecoplan

Neum hinterland is characterized by the series of smaller, mainly inaccessible, dispersed and abandoned sites which are extremely interesting because of the authentic complexes of traditional architecture. In these hamlets, measure, spatial distribution, relation towards surrounding area, material and other architectural and urban parameters have remained preserved and authentic.

Image 4.12.- 4. Typical traditional building complex

source: Ecoplan

The importance of human presence can be seen by many cultural monuments and archaeological sites, and by dry stone wall – the most striking part of the traditional fencing system. The Adriatic Sea hinterland is inwrought with the network of dry stone walls. The dry stone walls were used to define ownership boundaries, also terraces were built, the pastures and watering places were enclosed. Within the dry stone walls residential buildings and stables were built. The dry stone wall construction technique has not changed or improved much, it depended of the builder's skills and of the stone type in certain regions.

Image 4.12.-5. Dry stone walls as the most striking part of the traditional building in Neum hinterland

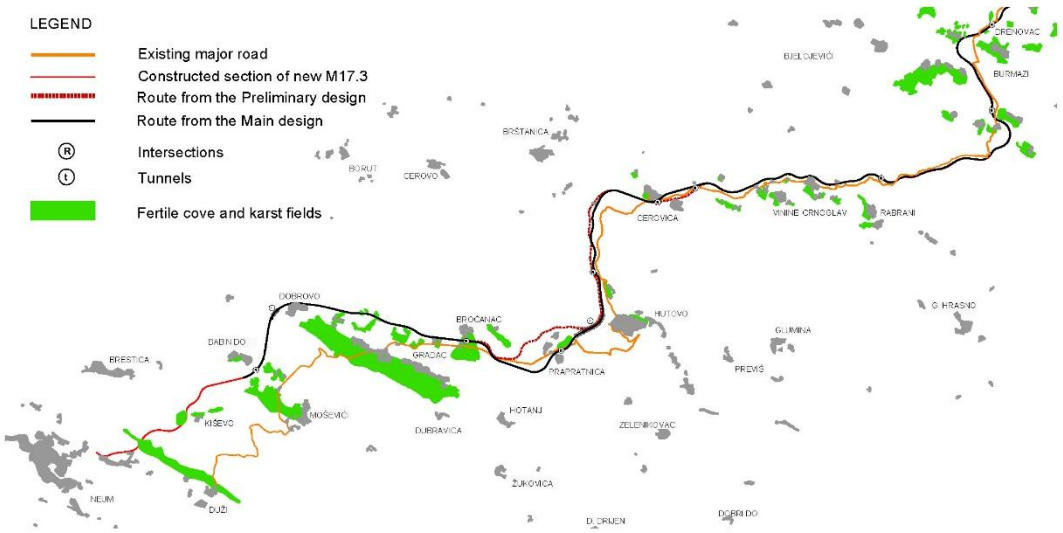
source: Ecoplan

Agrarian landscape

Although the amount of the arable land in the municipality area is very scarce, as in other karst areas, it is still an important factor in moulding and experiencing the landscape.

The arable areas are mostly cultivated and enclosed by dry stone walls or used for pasture. Preservation of the agrarian landscape in the areas where the fertile land is scarce is a priority.

Image 4.12.-6. Display of anthropogenic factors in the landscape (roads, agrarian areas, and settlements)



Source: Ecoplan

Ambient (sensory) features

Ambient (sensory) components of the landscape are especially intangible and hardly describable category therefore they could be researched in details only through professional assessment with the cooperation of the local inhabitants. Their evaluation should implicit the previous phase of recording the associations, feelings, customs, skills, language, beliefs and legends.

Valorization

Cultural landscape is landscape that changes under the influence of human activities. It is *volatility* that is a constant feature of all cultural landscapes and it is welcome as such, provided that ***the influence on the landscape*** is taken into consideration as an important factor when choosing a route or location of major infrastructural facilities. Otherwise, the damage is irreparable. Preservation of scarce and irreplaceable resources, in this case ***fertile land and untouched landscape***[39] is absolute priority.

4.13. AIR QUALITY

[39] Area of south and southeast Herzegovina (Neum, Ravno, Trebinje and south part of Stolac) is the only area of karst landscape preserved in its original form.

The area where the road passes has small population and no industrial pollution, therefore air quality is rather good. The existing route M17.3. is one of the rare pollution sources in this area. However, due to the low traffic frequency the air in this area is relatively clean.

4.14. NOISE

Pursuant to the Act on Protection from Noise (*Official Gazette of the Federation of BH no. 110/12*) the allowed noise levels are prescribed as well as the measures for protection from noise, threshold levels classified per ambiance, purpose of space and time of the day, and for the purpose of protecting the human health, working and living space and environment in general.

Within this Act the highest allowed levels of noise are defined in decibels (dBA), as presented in the text below:

Table 4.14.-1. – Allowed level of external noise for planning of new facilities or sources of noise

Area (zone)	Purpose of space	The highest allowed level (dBA)		
		Equivalent levels Leq	Peak level	
		day	night	L1
I	Hospital-sanatorium	45	40	60
II	Tourist, recreation, nursing-home	50	40	65
III	Pure, housing, educational and health institutions, public green and recreational areas	55	45	70
IV	Trade, business, housing and housing with traffic corridors, warehouses with no heavy transport	60	50	75
V	Business, administrative, trade-craftsmen, service (utility service)	65	60	80
VI	Industrial, warehousing, service and roads area with no residence	70	70	85

Source: Art. 31. of the Act on Protection from Noise, Official Gazette of the FBH 110/12

Further elaboration is included in the law.

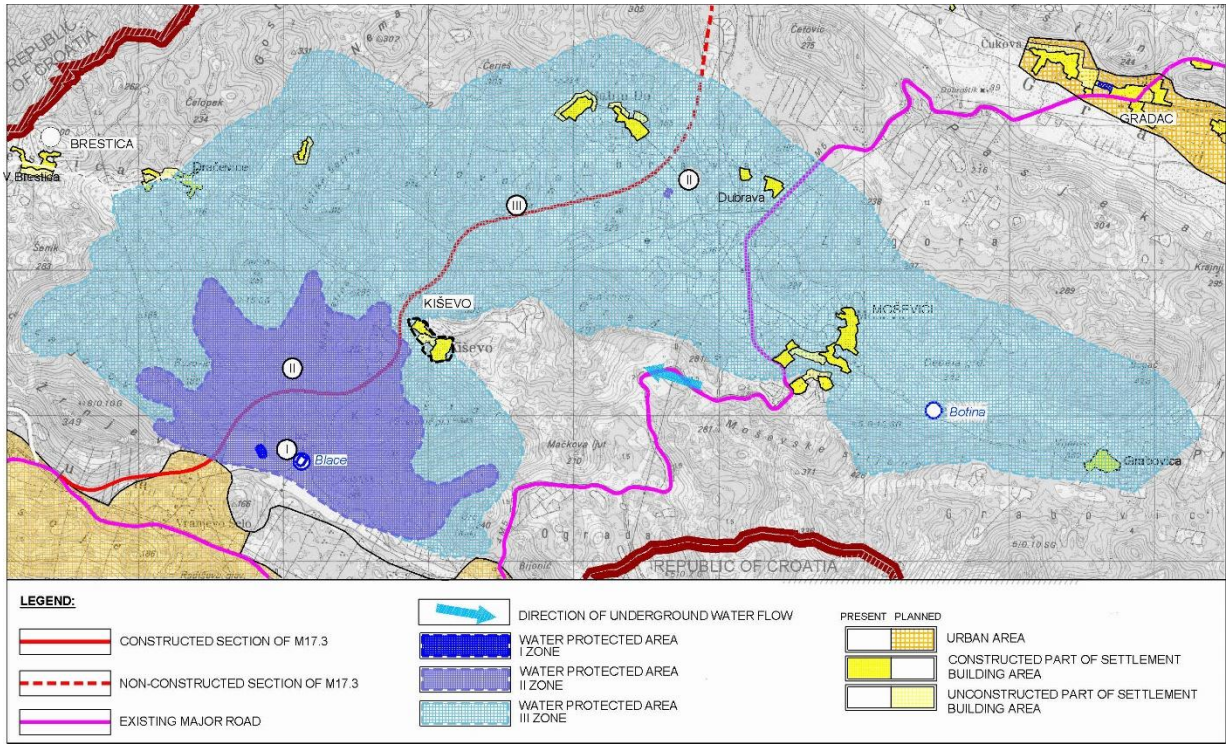
4.15. INFRASTRUCTURE AND FACILITIES

4.15.1. Water infrastructure

Water supply of the Municipality of Neum is executed from the Spring of Gabela (Municipality of Čapljina) and Spring of Blace which is in the karst valley of Blace, South-West from the community Kiševo (coordinates of the spring: 6472117; 4753685). In 2005 the water supply pumping site of Blace was constructed and put into function by the Municipality of Neum, and it meets the needs for water supply of the city by the beginning of June, i.e. beginning of summer season. During the summer season both springs are used.

For the spring of Blace the Spring Protection Study was prepared[40], and the decision on protection of potable water from this spring was adopted by the Municipal Council of Neum (*OG of the Municipality of Neum 5/14*). These Study and Decision defined the zones and safety measures pursuant to the implemented geological, hydrogeological and hydrological research based on the Regulation on the Methods for Determination of Sanitary Safety & Safety Measures for Springs for Public Water Supply of Population (*OG of the Federation of BH* 88/12). As it can be seen in the image, the biggest part of the new road was already constructed (up to Babin Do), and only small part of the planned route is within the third zone of the spring.

Image 4.15.1.-1. Water-protection zones of the spring of Blace (excerpt from PPO Neum)



source: Ecoplan

Examination of water quality at the river source of Blace

The samples of raw water at the spring of Blace were taken several times during and before the preparation of the study, which approximately encompassed the hydrological periods of high and low waters. The ground waters of the river source of Blace are of bicarbonate type, i.e. alkaline and earth alkaline, since the analyses of ground waters show that the alkalinity in water is higher than the total hardness. These ground waters have small share of organic nitrogen which is the form of nitrate which

[40] Spring Protection Study - „Blace", Integra d.o.o. Mostar, May 2014

indicates the old organic pollution. Ammonia, nitrite and nitrate from the taken samples of ground water were not detected.

The results of chemical research show that the water of the spring of Blace correspond according to the defined parameters to the standards of good water for drinking as prescribed by the Regulation on Health Appropriateness of Drinking Water (*OG of BH no. 40/10*).

The analyses of the sample of ground water, performed for the needs of the Spring Protection Study were made for periods of high and low waters. These analyses showed that the organic pollution indicators (consumption of $KMnO_4$, ammonia, nitrite and nitrate) are below the values prescribed by standard or they are not registered at all, which definitely suggests the low organic pollutions of the ground water.

Insignificant bacteriological pollutions of the ground water at the spring of Blace can be expected immediately during and after the intensive precipitation, respectively flood of the field of Blace.

During the preparation of the study, within the chapter polluters register and risk intensity index, a comment was given, among others, related to the road under construction, as presented in the table no. 4.15.1.-1.

Table no. 4.15.1.-1. List of existing and potential polluters with the data on index and category of risk, roads – extract from the study of the spring of Blace

No.	Location description	HI	RII	Risk category	Comment
Roads					
1.	Neum – Stolac (M17.3) under construction	48	0,02	HR	Road under construction. At the length of 1320 m closed drainage system was built (between the profile P17 and P68) with constructed four separators on the profiles P28; P36; P45 and P55a. Since the route of the road cuts the basin area on the relatively long length and over the zones with high natural sensitivity, it is necessary to assure at the sections within the basin area a regulated drainage of waters from the surface of the roadway.
2.	Existing old road Neum – Stolac	32	0,01	HR	The route of the old road goes on relatively big distance from the river source through the 3rd zone of protection and predominant zone of high natural sensitivity. Intensive traffic on this road during summer season increases the overall risk of this road.
3.	Local roads	8	0,2	VS R	Very small traffic and position to the highest extent in the zones with medium sensitivity index

V S R = very small risk, and H R – high risk.

Water supply infrastructure[41]

In the following chainage marks the alignment of the road intersects the existing water supply pipelines in the Municipality of Neum:

- km 5+309 the alignment is in collision with the water supply pipeline for the Babin Do settlement. In this location the pipeline runs underneath the planned bridge;
- km 12+060 the alignment is in collision with the water supply pipeline for the Broćanac settlement, in the location of the planned intersection. To the left of the grade level of the trunk road above the settlement, in the distance of cca 300 m to the north, there is the Broćanac reservoir (V=100m) with the bottom elevation of 300 m above sea level;
- km 13+300 the planned alignment touches the pipeline of Gabela-Neum Regional water supply, diameter of DN 350 mm;
- km 13+480 the alignment intersects the existing local pipeline for water supply of the Praovice settlement;
- km 15+500 to the left of grade level of the alignment there is the „Prapratnica" reservoir (V=150 m3) with the bottom elevation of 367.70 m above sea level;
- From km 14+900 to 16+500 the alignment is passing by the tunnel of the existing Gabela-Neum Regional water supply, diameter of the pipe DN 500 and in that stretch intersection of the alignment of the road may occur (which at km 16+570 chainage mark enters the "Žaba" tunnel of 975 m in length) with the pipeline tunnel of 773.5 m in length, with the bottom elevation of 370 m above sea level. The pipeline tunnel is constructed without a concrete base and blasting during the construction of the trunk road tunnel could cause the collapse and backfilling of the existing tunnel, thus damaging the water supply pipeline;
- km 16+250, in the locality of Hutovo, to the right of the grade level of the trunk road in the tunnel, at the exit of the pipeline tunnel, there is the Hutovo reservoir (V=2x500 m^3) at a distance of about 120 m, with the bottom elevation of 364 m above sea level;
- at km 18+120, in the locality of Mramor, the planned road intersects the pipeline of the Gabela-Neum Regional water supply, the diameter of DN 500 mm;
- at km 21+170, in the locality of Cerovica, the road intersects the Reversible tunnel of Čapljina Hydroelectric Power Station.

[41] Data is taken from the existing Environmental Impact Assessment and the available data from the Main Design of the road were used. Graphic Appendix of the study was drawn up based on the data in Physical Plans of the municipalities of Neum and Stolac, which are developmental documents and present the outline of significant developmental infrastructure systems.

In the area of the Municipality of Stolac, through which the subject section passes through, there is no constructed water supply nor sewage system networks. The population is supplied by the water just like many communities of this karst area from their own cisterns (wells), or they bring water from distant river sources.

4.15.2. Electric power infrastructure

In the area of the Municipalities of Neum and Stolac there is electric power infrastructure which is on the satisfying level.

In several locations along its course, the alignment is in collision with overhead transmission towers of the electrical network set on wooden or concrete posts, so it will be necessary to perform their relocation bearing in mind the free profile of the new road.

- In Babin Do-Broćanac section at km 5+309.50 the alignment intersects underground 10kV line for the Babin Do settlement, and at km 6+950.00 10 kV line for the Oskrušnica settlement.
- In Broćanac-Drenovac section the alignment is in collision with 10 kV trunks at chainage marks at the Broćanac settlement at km 12+075.00; and from km 12+900.00 to km 13+500.00; from 15+550 to 15+200 at Papratnica, at km 21+500.00 and km 22+700.00 at the Cerovica settlement; at km 24+550.00 at the Vinine settlement; at km 28+000.00; at km 31+800.00 and km 32+500 at the Udor settlement; from km 33+300.00 to 33+750; km 34+800.00 at the Drenovac settlement).

4.15.3. Telecommunication infrastructure

Telecommunication infrastructure in the area of the Municipalities of Neum and Stolac encompasses providing services of land-line and mobile network as well as the radio and TV transmitters, whose condition currently meets the needs of the Municipality population.

The major road electric wires and cables of telecommunication infrastructure were deposited along the route of the existing major road M17.3 in the Municipality of Stolac, while in the Municipality of Neum the existing network along M17.3 is situated only at the section from Neum to Gradac[42]. At the remaining part of the municipality it was planned to construct this network, i.e. partly alongside the existing route of the road M17.3 up to Hutovo, and from Hutovo to Hrasno and further on towards the Municipality of Čapljina.

The alignment of the planned road along its entire length intersects underground cable lines of different ranks and design of fixed telecommunications network in several locations: In the Broćanac-Drenovac section at the chainage marks km 12+075; km 13+150.00; km 15+400; km 18+100; km 21+760.00; km 22+375.00; km 22+910.00; km

[42] Based on the data of the Physical plan of the Municipality of Neum

24+860.00; km 26+110.00; km 28+000; km 32+200; km 33+000; km 33+500; km 35+000)

The routes of the existing and the planned telecommunication infrastructure in the area of the observed corridor are presented in the map no. 4. *Conflicts with infrastructure*.

4.15.4. Traffic infrastructure

The road network in the project area is very suitable in the view of the position, but its condition and technical elements are mostly poor. The major road M17.3 is the most important road of the area. At its beginning (from Stolac to Drenovac) and at the end (from Duži to Neum) it has a common profile. From Drenovac to Stolovi it has the roadway width of 3 m and poor technical elements. It is actually old macadam road which is asphalted with no reconstruction. From Hutovo to Duži the road is somewhat more suitable because it is technically formed, and the roadway width amounts to 4,00 m.

In the observed area of the Municipalities of Stolac and Neum there are 10 local roads which connect all settlements impacted by the project to the existing M17.3: L23 to Babin Do, L4 to Oskrušnica, L6 to Broćanac, L18 to Osječanica, L19 to Zaušje, L20 to Vinine – Crnoglav, L15 to Stolovi – Hrasno, L9 to Orahovica, L10 to Bjelojevići – Hutovo and L12 Burmazi – border of the Municipality of Stolac.[43]

The collision points of the existing transport infrastructure are at the following chainage marks:

- In the Babin Do-Broćanac section at km 5+309.50; km 6+724.00; km 7+272.00; km 8+682.00; km 10+540.00;
- In the Broćanac-Drenovac section at km 12+057.00; km 12+350.00; km 13+025; km 14+890.00; km 15+133; km 15+375; km 18+125.00; km 18+900.00; km 21+125.00; km 21+145.00; km 21+425; km 22+500.00;
- In the Cerovica-Drenovac section at km 23+130.00; km 24+408.00; km 25+134.00; km 26+348.00; km 26+348.00; km 28+125.00; km 30+550.00; km 32+160.00; km 32+310.00; km 33+440.00; km 34+630.00; km 35+110.00; km 35+435.00.

Apart from the existing one, the transportation corridor for the Adriatic-Ionian highway is planned in the respective area from the chainage mark of about km 17+500 to 22+000. The direction of the Adriatic-Ionian highway is set in the Physical Plan of the Municipality of Neum, as well as in the physical planning documentation of a higher order, primarily the Physical Plan of the Federation of Bosnia and Herzegovina. However, the exact location of its alignment has not yet been defined.

Also, in the same section, from km 16+645 (exit of the tunnel) to km 19+500 the planned road in several locations intersects the alignment of the Čapljina-Dubrovnik

[43] The categorisation was made within the Physical plans of the Municipalities of Neum and Stolac

narrow-gauge railway which has not be used since 1970s, but the project of its revitalization for tourism purposes has been initiated.

In addition to the reconstruction of the existing railway, in the future period it is also planned to construct the Regional railway Čapljina-Trebinje-Nikšić. This railway is the part of the planned Adriatic – Ionian transport corridor, whose fundamental goals are presented through „Adriatic Ionian Initiative". Basic goal of the Initiative is to make connections with the „Trans-European Axis" - Corridor. According to the data from the Regional plan of the Municipality of Neum, until now the Preliminary Transport Study was prepared, PEIA, Preliminary Costs Assessment and Feasibility Study for preliminary project solution. Within the technical study two corridors were considered as well as 27 alternative variants. For further phases of the preparation of study-project documentation the following sections were proposed through the FBH: Čapljina-Ravno, Ravno-Hum and Hum-Trebinje, which make the basis for definition of corridor under consideration. As a conclusion of consideration about this railway the following is pointed out: „A part of the route of this railway must be fully aligned with the regional restrictions of the protected area of Hutovo Blato. For this reason a so-called „Southern Corridor" of the route of this railway was selected in this area which railway is not in collision with the given restrictions." However, an exact position of this railway shall be defined by detailed analyses but it is evident that it shall go through the area of the Municipality of Neum, as presented in the graphs from the attachment of this Assessment.

4.16. MINE THREAT

Road M17.3 passes through the area where war took place in period 1992-1995. According to the data obtained from BHMAC and used for creation of the physical plans Neum and Stolac in the area through which this road goes, there is one *surface with no risk determined*[44] at the section Cerovica-Drenovac in the area of the community Stolovi, as presented to the map 3. *Environmental Conflicts in the Area*. Although the area along the road is proclaimed safe, a special attention is needed during the earth moving works and blasting works, and in case of any doubt, MAC BH will be contacted for further instructions.

Mine-fields left behind pose a danger for people's safety and large restriction in the space, i.e. they are obstacles for any kind of use which is purposed for them in the physical plans (exploitation of land for agricultural purpose, expansion of communities, construction of infrastructure, etc.) and further economic and social development. This problem is considered as a temporary restriction in space but its resolving is aggravated to a large extent, because it is about mine-fields of the unknown allocation with individual mines or groups of mines spread in a wide area. Some areas were mined

[44] According to the classification of BIHMAC the areas of not-defined risk (M3) represent those areas for which the investigation was carried out and no risk was detected so they are proclaimed safe.

and cleared of mines for several times during the war. Contaminated areas in the municipality correspond to the zones of war operations.

The data used for creation of the Physical plans of Neum and Stolac were obtained from BHMAC and updated in 2011. Systemic investigation, carried out by BHMAC, reveals the size and seriousness of the problem and it was used as a starting point for preparation of the Strategy counter-mine activities of Bosnia and Herzegovina 2009-2019, which envisages that Bosnia and Herzegovina shall be without mines in 2019.

5. SOCIOECONOMIC BASELINE

5.1. LOCAL OVERVIEW

The area of the Municipalties of Stolac 45,41[45] inhabitants /km² and Neum with 19,39 inhabitants /km has low population density with a density of relative to the standard European average of 116,4 inhabitants / km² [46] and the average at the Federal level 75.2 inhabitants /km², and Cantonal level with 50,9 inhabitants/km² [47].The entire population of Stolac lives in 21 communities with no organisation of local communities. City of Stolac is the only urban community in Stolac municipality.

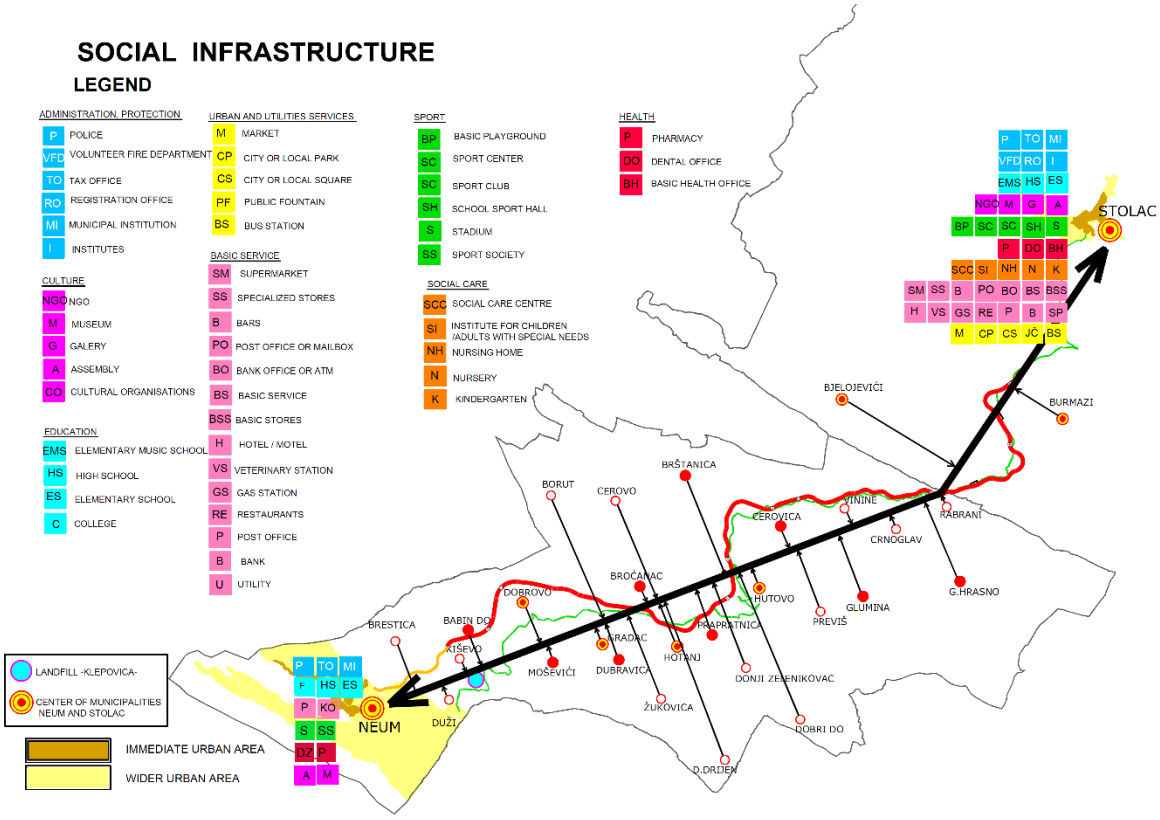
In the Municipality of Stolac, three communities are directly impacted by the road Stolac-Neum, namely, Burmazi, Bjelojevići and city of Stolac. The communities Burmazi and Bjelojevići have a low population density and dispersed communities, often composed of hamlets smaller than one ha, grouped around small karts valleys and karst sinkholes, which are very distant from each other. For instance, the villages Bjelojevići and Poplat each have 18 hamlets[48]. The village Kruševo 12 hamlets and the village Burmazi 11 hamlets, which is in total 59 hamlets in the area of about 14 400 ha.

The Municipality of Neum has an area of ca. 256 km² and consists of 28 communities, whereof one urban communities (Neum) and 27 rural ones. Today the number of pint-size villages is increased, the hinterland of the municipality emptied and people inhabit the coastal area. That process started in the 1970s by cancellation of the railroad, which went through the back, and by the construction of the major road near the sea circumventing everything except the urban Neum community, and it continued because of the war, poor economic development and road connection. The biggest community in Neum is concentrated along the coast. Hutovo and Gradac are at the edges of the fertile karst valleys, while the other communities are situated in the hilly-rolling areas. They are small, straggling, and poorly economically developed and demographically spare, while some of them are on the border of extinction. The hinterland of Neum is a rural region. The communities and infrastructure take only small part of the total land area. In natural environment the following is dominating: pasturelands, woods, neglected and abandoned lands, low population density, a part of population (35%) that deals with agriculture. Farmland is available at low costs due to underdeveloped infrastructure and relatively high distance from city centres. In the past 20 years there were no significant changes to shape the socioeconomic environment of Neum. The biggest change was when in 1976 the narrow gauge railroad connecting Čapljina over Hutovo to Dubrovnik was closed down. This started biggest emigration trend documented in Neum municipality. According to one of the focus group held in

[45] Socioeconomic indicators in municipalities in FBH in 2014.
[46] Eurostat database data on Population density, persons per km² in EU(28 countries)
[47] Federal Bureau of Statistics; Federation of BiH in figures 2015
[48] Small settlement (few houses) which is administratively part of a village, but phisicly deppadred from it

Stolac on November 23, 2015, this closure resulted in decrease of pupils in the Hutovo Elementary School from about 800 to 10 over a period of 40 years.

Image 5.1-1 The social structure of Stolac and Neum municipalities



Source: Ecoplan

5.2. DEMOGRAPHICS

Data on demographics in FBH and Stolac and Neum municipalities are given in Annex B, table 1. According to data presented in annex it is estimated that in 2015 Stolac there were 12.898, and in Neum 4.335 inhabitants. It is important to notice that these numbers are only estimates. According to census 2013 data, there was 14.889 inhabitants in Stolac, and 4.960 in Neum.

Estimated population data is disaggregated by three age cohorts and there is no gender disaggregation. Nevertheless, comparing census data from 1991 and 2015 estimates, change in population age structure is evident. It is noticed that only 0-14, and 15-65 cohorts changed in numbers, and number of old inhabitants stayed the

same. This means that working age population emigrated and that this area had low birthrate.

5.2.1. Migration and population change

Classic alongside with war and post war caused migrations are shaped in table below showing Immigration (I), Emigration (E) and Net migration (I-E).

Table 5.2.1.-1. Emigrations, immigrations and net migrations in Neum and Stolac for years 2010, 2012 and 2014

	2010					2012					2014				
	Total BH	Federation of BH	Republic of Srpska	Brčko District	Abroad	Total BH	Federation of BH	Republic of Srpska	Brčko District	Abroad	Total BH	Federation of BH	Republic of Srpska	Brčko District	Abroad
Emigration total (E)	145	102	17	0	27	73	63	17	0	11	102	60	8	0	34
of which from Neum	70	50	1	0	19	24	31	4	0	7	56	31	3	0	22
of Which from Stolac	75	52	16	0	8	49	32	13	0	4	46	29	5	0	12
Immigration total (I)	79	63	16	0	0	88	60	10	0	0	63	54	9	0	0
of which from Neum	44	39	5	0	0	42	23	1	0	0	31	30	1	0	0
of Which from Stolac	35	24	11	0	0	46	37	9	0	0	32	24	8	0	0
Net migrations (E-I)	-66	-39	-1	0	-27	15	-3	-7	0	-11	-39	-6	1	0	-34
of which from Neum	-26	-11	4	0	-19	18	-8	-3	0	-7	-25	-1	-2	0	-22
of Which from Stolac	-40	-28	-5	0	-8	-3	5	-4	0	-4	-14	-5	3	0	-12

Source: source: Annual migration bulletins of Federal Bureau of Statistics 2010, 2012 and 2014

More than two million people have had to leave their original homes, and more than one million people have left Bosnia-Herzegovina altogether, as a result of the war in that country. Although large groups of refugees returned to the country in the late 1990s, the majority of refugees have resettled permanently in the receiving countries. In addition, tens of thousands of Bosnians migrated after the Dayton Peace Agreement was signed.

The most significant migration flows in BH has occurred in the last two decades. These migration trends in Bosnia and Herzegovina in the last two decades can be divided into three periods with quite distinct migration trends. The first period, which matches with the war 1992-95, was marked by mass population displacement of about half of the entire population of the country. Second period is post-war period 1996-2000, which was characterized by mass return (repatriation) of refugees from abroad,

but also significant return of internally displaced people to their homes. Third period is period of voluntary emigration of the 21st Century.[49]

The table below presents detailed migration and population changes trend during the last 42 years.

The table 2. in Annex B presents detailed migration and population changes trend during the last 42 years and shows changes in number of residents of settlements in Stolac and Neum municipalities. Also white and light blue colour shows change in number of small villages, and darker shades number of larger villages and urban areas.

5.2.2. Age

The Age structure shows that the share of young cohort (0-14) in the two municipalities is significantly smaller (10 %) compared to the Federation (17%) or entire BH (18, 5%). Contrary to this, the share of the working age cohort is higher, representing (70,8 %) of the population in the impacted areas compared to the Federation (68,7%) and entire BH (68,3%). The most significant difference is noted in the cohort representing the population over 65 years of age. The percentage of this category is at a level of 19,3 % in the municipalities in contrast with the Federation which is at 14,2% level. This indicates that the population in the influence area is aging, because of the outflow of younger generations looking for schooling and employment opportunities in the closest administrative centres of Mostar, Sarajevo, Dubrovnik, Split and Zagreb.

Table 5.2.2.-1. Estimate on population in BH, Federation and municipalities Neum and Stolac disaggregated by age.

Area	**Total No.**	**Age groups**					
		0-14		15-64		65+	
		No.	%	No.	%	No.	%
Bosnia and Hercegovina (thousands)	**3832**	786	20,5%	2617	68,3%	429	11,2%
Federation of B&H (thousands)	**2337**	400	17,1%	1606	68,7%	331	14,2%
Project area total	**17414**	1795	10,3%	12250	70,3%	3369	19,3%
Neum	**4407**	450	10,2%	3119	70,8%	838	19,0%
Stolac	**13007**	1355	10,4%	9090	69,9%	2562	19,7%

Source: First release population estimates 2014 – Federal Institute for Statistics

5.2.3. Gender

The population if analysed on the gender disaggregated base shows the females component as the larger part (between 1-2%) of the population at both municipalities which actually corresponds to the structure on the State and Cantonal level as well.

[49] Zehra Kačapor-Džihić and Nermin Oruč ;Social Impact of Emigration and Rural-Urban Migration in Central and Eastern Europe, Final Country Report – Bosnia and Herzegovina; April 2012

Table 5.2.3.-1.Population in area influenced by project by gender and Age

Area	**Total No.**	**Gender** [3]			
		Males	%	Females	%
Bosnia and Hercegovina (thousands)	**3832**	1878	49,01%	1954	50,99%
Federation of B&H (thousands)	**2337**	1150	49,21%	1187	50,79%
Project area total	**17414**	8479	48,69%	8935	51,31%
Neum	**4407**	2170	49,24%	2237	50,76%
Stolac	**13007**	6309	48,50%	6698	51,50%

Source: Ecoplan calculation[50] based on first release estimates and general population gender distribution

If we take the population sample affected by expropriation as a proxy, land ownership among women tends to be twice as low as among men (see Table 6.5.2.-1. above)

Today women are entirely included in social life in this area. The majority of qualified staff in kindergartens, schools, banks, even in state administration are women. In the administrative structure of Neum 2 women are representatives within the local government while in Stolac there are 4 and another two women lead major departments within the municipality.

5.2.4. Displaced persons

According to data of statistical report of Federal Ministry of Displaced Persons[51] and Refugees of December 31, 2014, there were a total of 89 internally displaced[52] persons or 24 families living in Stolac, and there were no displaced persons in Neum. They are living mainly in urban areas since in time of their displacement (war) urban areas were more secure than rural ones. They gave better protection from war events in form of proximity to army, civil government protection and health services accessibility.

5.3. EDUCATION, SKILLS AND EMPLOYMENT

[50] Dedactive approach as described in 1.2.4 was used

[51] This displacement does not refer to economic and physical displacement due to land acquisition in line with OP 4.12.

[52] An internally displaced person (IDP) is someone who is forced to flee his or her home but who remains within his or her country's borders. They are often referred to as refugees, although they do not fall within the current legal definition of a refugee.

5.3.1. Education

The literacy rate among the population aged 15 years and over is very high on the national level, and assumptions are made that the same ratio mirrors the level in the area of influence. There is an equal 98 %[53] amongst the men and women.

The analysis of the education level of the municipality Stolac reveals that 35,96% of the population are skilled professionals, 27,90% are with secondary school education, 24,34% are unskilled, 2,94% have a higher education level, 7,43% with university degrees and the remaining fall within the categories of highly skilled and unskilled.

The analysis of the education level of the municipality Neum show similar data 42,23%, skilled professionals, 28,62% are with secondary school education, 16,40% are unskilled, 5,24% have a higher education level, 6,46% with university degrees and the remaining fall within the categories of highly skilled and unskilled.

Although social structure of these towns represents a group of easy to access service functions for its inhabitants, accessibility for inhabitants of the ones at the boundaries of the municipalities greatly depends on the quality of the roads. Current poor connections with municipality centres mean that these settlements are not desirable for living and those that live there have a low quality of life from the point of view of service access.

5.3.2. Employment and skills

Although BH has been going through an economic growth with somewhat positive trends in The last years, the employment situation is weak and administrative barriers, poor business climate, insufficient entrepreneurial, financial and physical conditions make one side of the coin. The other is the problem of long term unemployment.

Stolac municipality has high unemployment rates and Neum, as one of the most developed municipalities, has need for seasonal labour force. During the summer months, labour force demand in Neum is much higher than offer, consequently leaving the room for employment from neighbouring municipalities. Evidence for this claims could be seen in Tables 7 and 8 Annex B.

Difference in employment and unemployment rates between these two municipalities is clearly visible. Compared to Stolac, Neum has high employment rates, but in comparison with EU standards even Neum lags behind.

Activity rates in Stolac and Neum are much lower than in EU. In 2014 in Neum the activity rate[54] was 46,14% while in Stolac it was 33,22 %. When comparing with Romania ,the lowest activity rate in the EU (65,7%) and Sweden, the highest (81,5%) [55], the conclusion is that a large portion of people between the ages of 15-64 in Stolac and Neum are inactive, i.e., not looking for a job officially.

[53] http://www.unicef.org/infobycountry/bosniaherzegovina_statistics.html
[54] The activity rate is the ratio of the total labor force to the population of working age
[55] Eurostat database on activity rates in EU

Although there are no available data on the ratio employed vs. unemployed man and women in these two municipalities, data are available on total unemployment rate per professional qualification. Data shows that in 2014, 46,9% of the total unemployed population in Neum were women and that more men than women are unemployed. Whereas in Stolac the situation is slightly different and the rate of women unemployment is slightly higher at 51,81% (see tables 9, 10, 11 and 12 in Annex B).

5.4. VULNERABLE GROUPS

Vulnerable categories include the individuals or groups which are extremely impacted by the Project and which have limited abilities to influence the Project and cope with the changes. Vulnerable categories should be notified and consulted in a specific manner, adjusted to their needs and status of vulnerable category.

The criteria of vulnerability adopted by this project singles out vulnerable member of the following categories, which are likely to be impacted by the project:

- The old and the frail
- The poor and the unemployed
- Self-supporting parents
- Children
- Disabled persons
- Mentally disabled persons

In the municipalities of Stolac and Neum vulnerable groups are recorded and supported if they meet the criteria for social benefits by initiation of the vulnerable person themselves. Such systems may overlook persons who do not ask for help.

Municipality of Neum has 55, and the Municipality of Stolac 176 beneficiaries of social welfare.[56] In both municipalities, heads of municipal Departments of Social Services during key informant interviews held through telephone conversation on December 3, 2015 reported that the majority of vulnerable people belong to the category old and frail living in the hinterland villages of the municipality. Such persons are disconnected from municipal services away and rely on their relatives and close friends to provide them with supplies and medicines from municipal centres.

There are no researches about poverty classified by municipalities, but it can be assumed that all unemployed people or those living on retirement as the main source of income, live or are on the verge of the poverty line.

There are not many single parents (5 in the area of the two municipalities). As there is no available data specifically on self-supporting parents in municipalities, data on pupils living with one parent only from schools were used to identify this vulnerable group.

[56] Interview with municipal Departments of Social Service

The number of the disabled due to war events between 1992 and 1995 is large. These persons will have direct benefit from the development of commerce of this area and a higher possibility of employment. Since the census results have not been published yet, there are no exact statistics about the number of children in the municipalities. What is known is that the number of children in the age 0-14 based on the estimation of the population number for 2014 amounts to 1.343 in the Municipality of Stolac and to 443 in the Municipality of Neum.

Concerning the ethnic minorities, in the municipality of Neum it is known about one Roma family which occasionally comes to the local waste area, which is near the existing route but they are not inhabited in the municipality. Their basic activity of collecting secondary raw materials on the waste area will not be endangered. In the Municipality of Stolac there are four Roma families which are inhabited near Radimlja. It is important to mention that settlement of Roma families are not situated near the project route and that they will not be subject to resettlement.

5.4.1. Ethnicity and nationality

In Bosnia and Herzegovina there is no available data on number of people by ethnicity and nationality. This data should be available when 2013 Census data is completely analysed, but in time of completion of this study, this data is still unavailable. The most recent data on nationality is available from 1991 Census and this data shows that in 1991 in Stolac there were 8101 Bosniaks (for the majority Muslims), 3917 Serbs, 6188 Croats, 307 Yugoslavs and 16 Roma. In same period in Neum, there was 190 Bosniaks (for the majority Muslims), 207 Serbs and 3792 Croats. It is assumed that today's data is significantly changed, but there is no easy way to obtaining this data. All data existent are in the realm of speculations and basis for political disputes between nationalities.

5.5. INFRASTRUCTURE, UTILITIES, PUBLIC AND SOCIAL SERVICES

5.5.1. Water Supply

Water supply of the settlements in the municipality of Neum is performed from two water sources. One of them is in settlement Gabela in the municipality of Čapljina, by means of water supply system built in 1982. Length of the main water duct is 38 km, while its capacity is 200 l/s. This regional water supply duct should have supplied the municipality of Neum, but also a part of the municipality of Čapljina, the municipality of Ravno and several municipalities of Dubrovnik Riviera. Considering that this is a complex system with three water transfers overcoming 370 m altitude, the costs of work of this system are enormous, as a result of which only 100 l/s is currently used. The second water source, Blace, was reactivated in 2004 and is completely gravitational. The capacity of its main water supply duct is 27 l/s, with a possibility of capacity enhancement by another 60 l/s.Public Company „Komunalno" Neum manages the water supply system.

Water supply connection in the municipality of Neum has 3000 inhabitants[57] in the following settlements: Brštanik, Hutovo, Prapratnica, Broćanac, Gradac, Moševići, Babin Do, Oskrušnica, Duži, Vranjevo selo and Neum.

Population of all other settlements in the municipality of Neum have water supply from family cisterns (water wells) in which rainwater is collected, or in lack of rainwater, they fill the wells with water obtained from tank trucks. About 11% of households in the municipality still have water supply this way.

Water supply system in municipality of Stolac relies from the river of Bregava well. Today only 48% of population is supplied by this system and the rest of municipality is still supplied by water from cisterns (water wells) in which rainwater is collected. It is important to notice that southern part of municipality as at a higher altitude than Bregava well, which disables supply through Stolac supply system.

5.5.2. Drainage

Most of Neumuses cesspools for drainage of wastewater. Only a small part of these cesspools in the area of Neum have adequate sanitary standards.All other cesspools are drained directly into the field.

Interstate regional main sewage system passes through the settlement of Neum, connecting settlements in Republic Croatia: Komarna, Duboka, Klek in Bosnia and Hrezegovina and Neum again, Ston in Republic Croatia up to Malostonski Bay into the sea. This system is a separation one, meaning that it only collects sewage water and takes it into the area of Malostonski Bay by means of the main collection in length of about 38 km. The designed capacity of the system amounts to 220 l/s. Before the discharge of water into the sea, there is a primary mechanical treatment plant. Mostly hotels, larger residential buildings, corporations and some private residential and business buildings are currently connected to this sewage system, which is about 20% of the area of Neum. The physical state of the secondary network is satisfactory. There are about 40 major consumers with a total capacity of consumption 15 l/s wastewater, which represents 70% of total wastewater in sewage system from the area of Neum in 2013.

Small consumers - households had about 400 connections in 2013 and 30% of sewage water in the system on the level of one year.

One part of Neum, above the Adriatic major road is not connected to the sewage system, but rather uses cesspools. The overall coverage of the town by sewage system is about 30% of the necessary capacity.

A large problem of Neum in the unsolved issue of rainwater, which, due to configuration of the terrain, causes large material damages on the facilities during heavy rainfall.

5.5.3. Electrical Energy

[57]Source: Physical Plan of the Municipality of Neum for the Period 2010-2020, Neum, 2015

In the municipality of Neum, there are currently only 5 households which are not connected to the municipality's electric energy supply. At the end of 2014, there were 2.714 low voltage connections and 4 high voltage connections in Neum. Structure of the low voltage system was as follows: 2.384 household connections, 44 connections for public lighting system and 286 other connections (businesses). [58]

Electric energy supply of consumers in the area of the municipality of Neum is performed from Transformation stations in Neum, Hutovo and Svitava.

Transformation stations of the urban zone have an average of 0,4 large interruptions annually, which is significantly less than the target value of 2 interruptions annually at the most. Interruptions are not satisfactory in terms of the length of interruption duration.

Transformation stations of the rural zone have an average of 4,2 large interruptions annually, which is less than the target value of 8 interruptions annually at the most. They are satisfactory in terms of the length of interruption duration.

As for the area of the municipality of Stolac, only on the lateral line Burmazi, settlement Košćela, there are three households without electrical energy, but are included in the plan of upcoming electrification.

5.5.4. Post and Telecommunications

Postal system is performed by post office in Neum, as well as by post offices in Hutovo and Gradac. Besides postal traffic, the post offices provide the services of exchange office and paying individual utility services.

Postal system in Stolac is provided by its Post office and serves not only the needs of community of Stolac, but neighboring communities as well.

There is a land line system in all settlements in Neum except Klek, Glumina and Previši. There were 1.624 connections in 2014. Noticeable decrease in number of connections occurred in the past five years. The coverage of the municipality area by mobile network is complete and of good quality. There were 980 connections to the Internet network in Neum in 2014[59].

During field interviews held in Bjelojevići and Burmazi on December 3, 2015, it was identified that there are no telephone landlines in these settlements, while the coverage of the mobile network is satisfactory.

5.5.5. Health services

Health services (emergency, primary and secondary services) to citizens of Neum are provided by the Health Center in the City of Neum. In addition, there are five outreach clinics in the area of the municipality, which are opened once a week. In

[58] Electric Energy Studies of Development for the Municipality of Neum(for the period 2001 – 2020)

[59] Integrated strategy of Neum municipality development for the period (2014-2024)

sparsely populated rural areas where communities have to travel long distances to the nearest clinic, accessing basic health services can be difficult. As a result, outreach services, where medical staff provide basic medical care directly in the communities, are vital for helping community members stay healthy. Emergency medical service is available 24 hours a day and is provided by Neum Health Center. There is one doctor per 450 citizens in Neum, which is significantly better than the average in Bosnia and Herzegovina, which is one doctor per 700 citizens. The Health Centre does not have sufficient material or technical equipment.

Besides providing services in the Health Centre Neum, visiting nurses performed 5.400 house calls in the field in 2014. In the same year, there was one home birthand three births were performed at the Health Centre Neum. In 2014, 40 women from Neum gave birth in hospitals in Mostar, Dubrovnik and Metković in the neighbouring Republic Croatia,

The main problem in provision of health protection is large population dispersion and distance of settlements in the municipality up to 40 km.;

During the high tourist season, the number of health care assistance increases three times the regular. This deteriorates the quality of service due to staff deficiency and out of date technical equipment.

Secondary health care (specialist doctors) is insufficient in Neum, and Neum has no hospital. The nearest hospital is in Mostar or in the neighbouring Republic Croatia, i.e. in Dubrovnik and Metković. During 2014, 320 ambulance transports to Mostar were recorded. Traveling time to Mostar is 2 hours, while in peak season, due to large traffic jams on border crossings, it rises to over 3 hours. Costs for medical treatment in Dubrovnik and Metković are significantly higher. [60]

Neum has one elderly nursing home "Mirna luka" with a capacity for 30 persons providing accommodation, care and basic health care services.

Stolac has several privately owned elderly nursing homes and one public nursing home for elderly and disabled with capacity for 250 persons.

Primary health services for Stolac and settlements Bjelojevići and Burmazi is provided by Stolac Health Care Centre. It is the regional centre for physical therapy and mental health care for Stolac, Neum, Čapljina and Ravno municipalities. For secondary health services as well as surgeries Stolac has to rely to the closest hospitals in Mostar and Sarajevo.[61]

5.5.6. Local transportation system

Public local transport system is provided by one private corporation with a single bus. This bus maintains local transport of pupils and other passengers on the existing

[60] Interview with the director of Health Care, and Integral Strategy of the Development of the Municipality of Neum (2014 – 2024), Neum 2015 and Physical Plan of the Municipality of Neum for the period 2010 – 2020, Neum 2015

[61] Key informant interview, Stolac Health Centre Employee, held over the phone on January 5, 2015

major road route M17.3 from Neum to Cerovica twice a day, five days a week. This bus extends its line after Cerovica to Čapljina and Mostar – also on its way back, twice a day.

Inhabitants of Burmazi and Bjelojevići in the municipality of Stolac do not have any local transport to Stolac.

Transit bus lines from Dubrovnik to Metković and Mostar pass through the municipality of Neum, and they can take a part of passengers in local transport, as well as in target transport to larger towns in the surroundings. All these lines travel on the Adriatic major road, touch the area of the municipality on its coastal line and pass through Neum.

There is no public passenger transport through the interior of the municipality of Neum (apart from the above mentioned single bus line), neither through the southern part of the municipality of Stolac (plateau with the settlements of Burmazi and Bjelojevići).

All other passenger transport is performed individually, by personal vehicles.

5.5.7. Schools

The baseline data show the town of Stolac, the same as Neum, as municipality centres providing adequate accessibility to elementary and secondary education.

There is one kindergarten in Neum, one elementary school and two branch schools in the villages of Hutovo and Gradac. Since 2012, there is one secondary school in Neum. Children from settlements within the influence area of Stolac municipality attend elementary and secondary school in Stolac. There are no children from this area of the municipality who attend kindergarten in Stolac. The travelling distance from homes to schools is between 0-25 km.

The table 3. in Annex B shows the number of enrolled pupils disaggregated by gender. Within the area of influence the latest number from 2014 show an enrolment figure of 555 boys (42 %) and 797 girls (58%) of the universe of 1352.

Table 5.5.7-2 Number of children in kindergartens

	Children		
Year	2012	2013	2014
Neum	59	65	80
Stolac	30	32	37
Total	89	97	117

source: Statistical bulletin on Preschool education years 2012-2014.

As shown in table 3., Annex B the elementary school service is satisfactory in the municipalities of Neum and Stolac. Most secondary education pupils must travel outside of their respective municipality to attend high school.. Most university students

from Neum and Stolac study in Mostar (75%), while 25% study on universities in Republic Croatia.[62]

Commuting pupils transportation is provided by school vans which was confirmed during key informant interviews conducted on November 27, 2015 in Stolac and November 20, 2015 in Neum with principals of Elementary and Secondary Schools in Stolac and Neum respectively.

5.6. ECONOMY AND LIVELIHOODS

5.6.1. Dominant Sectors

The municipalities Stolac and Neum differ vastly in their economic structures. Stolac is considered underdeveloped, and Neum is the second most developed municipality in Bosnia and Herzegovina, based on Socioeconomic indicators. [63] Neum's development could be attributed solely to tourism and the fact that Neum is located on important transit route along the Adriatic sea. This provides excellent conditions for trade development.

Economy of Stolac can be defined as trade oriented and Neum can be described as mainly tourism and trade oriented. In 2015, in Stolac there was 256 Companies, 110 affiliates and 341 crafts. Neum on the other hand had 142 companies, 90 affiliates and 241 craft. Considering that Stolac has 300% larger population and only 150% more legal entities, it could be concluded that Stolac is underdeveloped in relation to Neum. Data to support this claims is presented in Annex B, Table 4.

Looking at the structure of the local economy, one can see further evidence that trade and other service businesses[64] are dominant sectors in Stolac while trade, accommodation and food services are most developed parts of Neum's economy[65].

5.6.2. Income level

In 2014, average monthly wage in Stolac was $ 545,45. which is 97 % of FBH average[66].

[62] Federal Institute for Statistics of F BH; Statistical bulletin on Higher Education in F BH 2014/2015 (From this bulletin it could be seen that only 296, out of 433 pupils from Stolac High school enrolled in higher education. As higher education in BH is free, it is estimated that almost all students try to enrol to some kind of high education. This was prevailing opinion of school headmasters in phone interviews as well.)

[63] Federal Institute for development programing; Socioeconomic indicators in F BH by municipalities in 2014; pg. 77; Sarajevo; April 2015

[64] These businesses include shoemakers, electronic repairs, furniture repairs, watch repairs, cleaning services, hairdressing and other beauty treatments, etc.

[65] See footnote 50

[66] Federal Institute for development programing; Socioeconomic indicators in F BH by municipalities in 2014; pg. 37; Sarajevo; April 2015

For the same year, Neum municipality had average monthly wage of $ 523,74, which is lower than Stolac. Based on the fact that Neum is considered to be second most developed municipality in Federation and average monthly wage is 93% under the Federation average, this could mean that big portion of Neum economy is informal.

Annual trends show that average wage in Stolac is dropping related to Federation average and Neum average wage is growing related to Federation average. Within six years the average wage in Stolac has dropped from 105% of Federal average wage to 97%, where as the average wage in Neum increased from 85,6% to 93% of Federal average wage. The detailed increase / decrease trend is presented in table 5.6.3-1.

5.6.3. Poverty

The Poverty in Bosnia and Herzegovina is monitored by Household consumption Survey in Bosnia and Herzegovina. This survey is conducted by the Agency for statistics and the latest was done in 2011. Unfortunately the results does not disaggregate data by municipalities or cantons. However, results of the survey showed that the poverty line in Bosnia and Herzegovina in 2011 was drawn at the income level of $ 296,13 for single households plus $ 148,07 per additional adult household member, and $ 88,84 per child. This amount is assessed to cover 60% of the total costs of living. Although average income data per household is not available, one could conclude that three-member family with only one average income could be considered as living below the poverty line. When comparing the poverty line assessed in the 2011 Poverty survey with the average pension it is concluded that this amount is below the line of poverty. One could conclude that one pensioner household with average pension could be considered at the edge of poverty.

Table 5.6.3.-1. Average wage and average pension in municipalities expressed in USD

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Average net monthly wage in Stolac municipality	$ 591,16	$ 551,73	$ 574,43	$ 522,76	$ 534,74	$ 545,45
Index FBH=100	105	101,3	98,6	95,9	94,4	97
Average net monthly wage in Neum municipality	$ 482,07	$ 500,95	$ 550,47	$ 499,11	$ 524,57	$ 523,74
Index FBH=100	85,6	92	90,8	91,6	92,6	93
Average net monthly pension in Stolac municipality	$ 226,27	$ 214,75	$ 235,43	$ 218,48	$ 254,26	$ 235,20
Average net monthly pension in Neum municipality	$ 239,50	$ 225,39	$ 257,38	$ 240,51	$ 250,86	$ 261,11
Number of pensioners	1670	1808	1936	1965	2018	2071
Number of employed in Stolac municipality	888	908	904	899	888	889
Number of unemployed in Stolac municipality	2232	2143	1930	2051	2103	2127
Number of employed in Neum municipality	966	961	955	949	986	1035
Number of unemployed in Neum municipality	332	347	358	403	421	390

Source: Federal institute for development programing, Socioeconomic indicators by cantons years 2009 -2014

According to Survey on household expenditure in 2011, which was conducted on whole territory of BH average household spent $ 1.067,57 on life necessities. $ 348, 02 was spent on food and drinks, and rest $ 719, 54 on non-food items. These data are at BH level, and are not available on municipal level.

5.6.4. Agriculture and Farming

Statistics of land use for agricultural purpose are managed by the Federal Bureau of Statistics. However, in the reports by the Bureau there was no mention of the methodology of data collection. From annual production bulletin, it was evident that not all types of plant production are recorded. Some plant sorts which are common for the climate of Neum and Stolac, such as olive trees, pomegranate, figs, mandarin and lemon, spices and aromatic herbs etc. were not listed in the bulletin.

Nevertheless, the available categories (16 classes of sown area, 15 classes for grains and vegetable yield and 9 classes for fruit yield) can provide reliable data on development of these commercial activities in the municipalities. The data for the municipalities of Stolac and Neum are presented in tables 5 and 6 in Annex B:

The municipality of Neum had a downfall in agricultural production in the past 6 years. This can be attributed to two causes. By development of tourism and trade in the municipal centre in the previous years, people are pursuing agriculture less and less. Due to poor traffic connection, population moves to the municipal centre where tourism can currently provide better living conditions for them. It is worth mentioning that agriculture along with tourism and trade can provide synergy effect for the development of commerce in Neum. The rural inland has potential of agricultural growth. The current condition of the overall road network is partially responsible for difficulties in transport of agricultural goods to potential markets. The current condition of the overall road network is partially responsible for difficulties in transport of agricultural goods to potential markets. In addition, tourism is more feasible in comparison to agriculture. This draws the population to engage in the tourism sector rather than agriculture. Therefore, the migration trend is towards the coast where people have more tangible resources and better returns on their investments. Besides this being common knowledge it was also the common opinion of the participants in focus groups held with hotel managers in Neum on November 23, 2015.The additional factor influencing such low agricultural production is land fragmentation. A large number of small land parcels are mainly appropriate for household consumption.

The largest part of the arable land is used for potatoes (Table 6, Annex B.) followed by cereals and vegetables, respectively.

During the past 6 years, the municipality of Stolac had a slight increase in agricultural activities, but considerable increase in yield of agricultural crops in tons.

It is important to point out that the majority of agricultural production in Stolac does not take place in the area of construction of the new road, but in the northern part of the municipality. The reason of poor development of agriculture in the southern part of the municipality is scarcety of water, which is essential for development of agriculture. Water supply infrastructure does not exist in the southern part of the

municipality, so rural population mostly pursues cattle breeding as their main source of income. The population has access to water only in form of their own wells which are filled with rainwater or by bringing water in cisterns during summer months.

Data on livestock for the two municipalities was considered inconclusive.

5.6.5. Tourism

Tourism is one of the main economies of the Municipality of Neum. This has largely been confirmed during the focus group discussions on November 23,2015 held in Neum with the main topic impact of the road. However, data on the number of visits and overnight stays are kept only for the officially registered arrivals and stays. The data from The Tourist Community of HNC has recorded 20 times less tourist activities during 2015 than the Federal Bureau of Statistics. In more detail, he Federal Bureau of Statistics disclosed that between January to October 2015 72.076 tourist visited Neum and 201.030 overnight stays were recorded, while according to the records from the Tourist Community[67] for the same time-period, there were 3.017 visits and 11.130 overnights.

Table 5.6.5.-1.Comparison of the Federal Institute for Statistics and Tourist community data for tourist arrivals and stays

Municipalities	**Arrivals**			**Stays**		
	Federal institute for Statistics	**Tourist Community of HNC**	**Average nights per arrival (Federal institute for Statistics)**	**Federal institute for Statistics**	**Tourist Community of HNC**	**Average nights per arrival (Tourist community)**
I - IX 2015	**169.650**	**52.453**	**2,36**	**400.772**	**105.770**	**2,02**
Čapljina	3.112	2.585	1,70	5.305	4.310	1,67
Čitluk	43.785	9.783	2,65	116.305	30.903	3,16
Jablanica	290	0	2,07	602	0	0
Konjic	5.845	3.668	1,70	9.967	6.842	1,87
Neum	72.076	3.017	2,78	201.030	11.130	3,69
Prozor	63	3	4,95	312	3	1,00
Mostar	44.479	33.397	1,51	67.251	52.582	1,57

Source: Tourist community of HNC

The influence of informal tourism on the overall economy in Neum will be assessed by means of indirect indicators. These data contribute somewhat to the above referenced estimation of overnight stay. The relevant data in the Business Registry clearly states that in 2015 there was a significant number of legal entities (473) in

[67] Interview with Tourist Community of HNC

Neum. The prevailing economic and sector activity registered were resorts and similar facilities for short vacation, camps and camping sites, other accommodation. In total 163 legal entities in Accommodation and food service sector. These activities undoubtedly point to tourism as the most developed sector. On the other hand, tourism in Stolac relies on the cultural and historical components of the city. It is an evolving branch of the economy. The most significant landmarks are presented in section 5.8. Cultural Heritage.

The tourism in Neum and Stolac has a very strong seasonal component and the peak season lasts only two months. The focus group meeting held in Neum with hotel-managers on November 23, 2015 confirms that the tourist season starts at the beginning of July and ends at the start of September (beginning of school year). Due to lack of activities during the remaining months of the year (October – May), the hotels are closed to reduce overall winter cost. Only hotels located next to the major road M 2 accommodating guests transiting to Dubrovnik are open throughout the year.

5.7. LAND USE PATTERNS AND LAND ACQUISITION

5.7.1. Land use patterns

The data acquired from the Physical plan for municipalities Neum[68] and Stolac[69] show the prevailing type of land is agricultural land and forests. These data are at the municipality level and are not available for the specific influence area.

Table 5.10.-1.Land use in Municipality of Stolac

Stolac	Hectares	%
Farmland	13.266,12	46,2%
Woodland and forestry	13.800,40	48,0%
Infertile land	837,53	2,9%
Building land	613,83	2,1%
Water surfaces	223,70	0,8%
Total	**28.741,58**	**100,0%**

Source: Physical plan of Stolac

Table 6.10.-2. Land use in Municipality of Neum

Neum	Hectares	%
Farmland	7.383,36	30,0%
Woodland and forestry	13.141,45	53,4%
Infertile land	27,68	0,1%
Building land	2.594,13	10,5%
Water surfaces	1.464,93	6,0%

[68] Physical plan of Neum municipality 2010 – 2020. pg. 26
[69] Physical plan of Stolac municipality 2013 – 2023. – Plan draft pg. 48

Total	**24.611,55**	**100,0%**

Source: Physical plan of Neum

5.7.2. Land Acquisition

The Land acquisition for construction of this section is still in the planning phase. Site specific RAP is prepared and once endorsed shall facilitate the expropriation process to commence. The construction requires land acquisition of 281 Land plots, with 99 owners and 257 users. The land along the road corridor affected by expropriation is primarily under private owners with only a small part government owned. Only 6 land plots to be affected by land acquisition (2.2%) are publicly owned. According to the Cadastre, the majority of land plots affected by land acquisition are registered as forests (61.7%), pastures (18.6%) and agricultural land (6.2 %). Data on land plots affected by land acquisition is shown in the table below. Total area affected by land acquisition amounts to 511,972 m^2.

The Project will result in complete (permanent) land acquisition however, no physical displacement is expected as no residential structures nor business facilities were identified[70] Temporary land occupation during construction works shall be necessary and a number of private and state owned land plots may be temporarily occupied for purpose of construction of access roads and placement of staff, machines and material during construction works. The exact locations of such plots will be identified by the Contractors to be engaged in civil works. The contractor will follow the RPF and RAP when taking temporary possession of the land.

A summary data about land plots to be expropriated by this road are presented in a table below.

Table 5.7.2.-1. Number of owners and beneficiaries of land plots to be expropriated disaggregated by gender[71]

Cadastral municipality	Owners - men	Owners - women	Beneficiaries - men	beneficiaries women	Total plot area under expropriation in m^2	Average size of plot per owner in m^2	Average size of plot per beneficiary in m^2
Čarići	25	10	51	14	96.278	2.751	1.481
Donje Hrasno	7	2	12	9	75.627	8.403	3.601
Hutovo	14	6	20	3	99.224	4.961	4.314

[70] Source: Expropriation Elaborate

[71] "The presentation of disaggregated data of the entire universe of owners/users cannot be quantified currently with an absolute certainty. It is common for one owner to be the proprietor over several individual land plots. These are listed in the expropriation design individually and owners are therefore repeated on several occasions. Furthermore co-ownership is largely present and it is therefore only possible to have the exact data disaggregated by gender at the time of preparation and submitting of individual expropriation proposals."

Bjelojevići South	2	-	9	3	24.670	12.335	2.056
Burmazi South	10	4	13	10	101.934	7.281	4.432
Bjelojevići North	4	1	9	9	49.804	9.961	2.767
Burmazi North	3	1	6	6	239.171	59.793	19.931
Total	65	24	120	54	686.708	7.716	3.947
Genders ratio	73%	27%	69%	31%			

Source: Expropriation elaborate

An Owner is a legal or natural person who has the authority to decide freely and at will to use and alienate.

The holder is a person who holds a property de facto, regardless of the legal basis of ownership.

The differences are mainly, that the owner has the absolute right and therefore stronger than possessions. Moreover, the owner is also the possessor unless a separate legal arrangement does not convey the right to use the other person (leasing, usufruct, etc)

No structures will be impacted by expropriation.

5.8. CULTURAL HERITAGE

The area of the Municipalities of Stolac and Neum has been inhabited since the Historic times, which is witnessed by numerous archaeological sites found in the area of these municipalities. The road M17.3 is planned in the vicinity of known artefacts and sites from the Historic times, but will not directly affect those.

Within the influence area, prehistoric sites of tumuli and hill-forts with some pieces of hill-fort settlements are the most numerous cultural heritage sites. In the past, many moveable archaeological artefacts dating ancient times were found as well as the remains of Roman settlements. There are some sites with the smaller groups of standing tomb-stones, whereas largest numbers of them can be found at the sites in Dobrovo, the Municipality of Neum, and in Udora, the Municipality of Stolac. List of all cultural and historical heritage assets could be found in table 13, Annex B

The first category of cultural and historical protection of the assets includes the assets which were proclaimed by Commission of National Monument Protection of Bosnia and Herzegovina. The commission listed six assets in the Municipality of Neum and thirty assets in the Municipality of Stolac as the national monuments. The major road route does not affect any of these monuments, but it goes in the immediate vicinity of the following:

- N1[72] Hutovo town (the Hajji bey fort), historical area (Official Gazette of BH 84/09), - town is situated about 900 m from Tunel Žaba,
- N2 Saint Ana Catholic Church in Nemuski Gradac, historical structure (Official Gazette of BH 78/05) – church is 700 m distant from the route.

[72] The monument index accompany the graphic illustration index

Images 5.8.- 1. and 6.8.-2. Hutovo town– Hajji bey fort

(source: Ecoplan)

Images no. 5.8.- 3. Saint Ana Church in Neumski Gradac

(source: Ecoplan)

The second category includes monuments and cultural assets of regional importance. The third category includes all other recorded sites and cultural and historical monuments within the territory of these municipalities which were defined by the regional plans. The protection measures defined by the Cultural and Historical Protection Act of the Herzegovina Neretva Canton (Official Gazette of Herzegovina Neretva Canton, no-02/06), are valid for the listed sites, and they come within the jurisdiction of the Institute for Cultural and Historical Heritage Protection of Herzegovina Neretva Canton. The Act clearly defines the protection measures not only for the site but for the surrounding area.

The case study based upon these data included the area of 200 m wide (100 m on the left and 100 m on the right from the route axis) where the researched sites, which are in direct conflict with the route, exist. The range had to be expanded depending on the asset location and its proximity to the road.

In table 13. annex B all recorded cultural and historical heritage assets have been listed, which could be under the influence of the major road construction, moreover under the influence of all construction stages, as the case study had shown. The sites were counted in the order following the route from Drenovci, the Municipality of Stolac to the settlement Babin Do, the Municipality of Neum.

The analysis has shown that none of the protected assets exist at the route location or its access roads or planned crossroads. During the entire section of the route there are 13 recorded tumuli which are in direct conflict, and the following chapters shall define the protection measures. The stone tumuli as the archaeological site do not have the material and monumental value after the excavations, but the moveable artefacts

can be stored at the museum and presented to the public. The tumuli which are directly influenced by the major road are:

- G1 - 1 tumulus between the chainages 32+000,000 i 32+500,000
- G2 - 1 tumulus at the chainage 23+500,000
- G3 - 4 tumuli between the chainages 14+500,000 i 15+000,000
- G4 – 1 tumulus at the chainage 13+500,000
- G5 – 2 tumuli at the chainages 9+000,000
- G6 – 1 tumulus at the chainage 8+500,000
- G7 – 1 tumulus at the chainage 8+000,000
- G8 – 2 tumuli at the chainage 6+500,000

Image 5.8.-4 Distinctive tumulus

source: Ecoplan

In the area of the Municipality of Neum, there is the narrow-gauge railway which was protected according to the regional plan together with other structures within the railway. According to the main project the major road crosses the railway by the overpass, but the additional measures for suppressing the effect on the narrow-gauge railway shall be provided later in this paper.

This analysis did not include the sites where some moveable artefacts were found in the past, which was not a rare case. There is also a consistent number of recorded Roman settlements and future excavations of certain tools, weapons and similar objects from the Classical period are quite probable.

5.9. VISUAL PERCEPTION

While observing the area we notice that landscape is harmonic and pleasant, mostly because it is intact, pristine and authentic. In horizontal and vertical projection, three

basic surfaces dominate: karst, field and settlement. In the eye of the beholder they seem pleasant but contrasted. Fields have soft and tender outlines, the colours are warm as if they were chosen from the same palette and with their warmth they defy the karst coldness. Opposing to them there is magnificent karst with its sharp, bare edges and fragmented greenery.

The basic outline consists of: roads, access roads, paths, vegetation and open vistas. The opening vistas are important for our understanding of a certain area and feeling the spirit of the place (genius loci). The most important elements of the area are settlements - compressed among huge rocks and scarce fertile land.

6. PUBLIC CONSULATIONS, STAKEHOLDER INDENTIFICATION AND ANALYSIS

Stakeholders that need to be informed and consulted in connection with the project activities throughout the project cycle are listed in this chapter.

They include persons or groups which are:

- Directly and/or indirectly affected by the project activities;
- Have certain "interest" connected with the Project or its activities;
- Have the ability to influence the Project itself or its final outcome.

Identified interest groups are listed in the table 6.-1. Stakeholder must be informed and consulted about the project activities during the entire project cycle. Vulnerable categories must be kept up to date and consulted in appropriate ways, and engagement activities adjusted to their needs.

Table 6.-1. Stakeholders

Definition of interest group	**Identified interest group**	**Detailed description of the interest group**
Individuals, households, owners or users to whom acquisition of land and/or use of land (temporary or permanent) in connection with the project activities are directly affected by the project.	Project Affected Population	Persons and households identified during the census as well as listed in the expropriation elaborate.
Persons affected by the project activities, permanently or temporarily	Local population in the area of the project	Population affected by the construction and limitations of the access to road
Vulnerable groups including individuals or groups that are greatly affected by the Project and have limited power to influence the Project.	Affected vulnerable groups (especially if affected by involuntary resettlement)	The old and the weak The poor and the unemployed Single parents Children Disabled persons Members of minority ethnic groups
Interest groups with the special interest for the project, which have the power to influence the final outcome of the Project	Municipalities and local community boards	The Municipality of Neum The Municipality of Stolac All relevant committees of local communities

Interest groups with special interest in the project with power to influence the final outcome of the Project	Authorities in the area of the project: Competent cantonal ministries and public institutions	Ministry of transportation and communications of HNC and the Government of FBH
NGOs in different spheres of action, environmental NGOs and other organizations of the civil society that expressed the interest in the project and/or may influence the Project	Interested NGOs in country or local level	Bee keepers Olive growers Livestock breeders Farmers
Entrepreneurs in different spheres around project.	Interested entrepreneurs	Construction and temporary workers Contractors Civil works supervision consultant
Interest groups of high importance for the success of the Project which are directly or indirectly in charge with design and implementation of the Project	Employers and workers	Employees of PC Roads FBH Construction and temporary workers Contractors Companies in charge with supervision and control of the works

The population and household directly affected by the project is the population whose property will be subject to expropriation, who will manage to get a job on traffic road construction and maintenance, be members of Grievance Committees, whose movement during time of works will be temporary limited etc. In this project, 99 owners and 257 users of land were identified, whose land will be subject to expropriation. At this moment it is not possible to define the number of persons who will have the opportunity to work on traffic road, while all conditions of employment depend solely on the Contractor and company that maintains the road. It can be said that the entire population in inlands of the municipalities at some point of construction will have limited movement due to construction work, but frequency of the restrictions cannot be foreseen at the moment due to several variable (dynamics of construction, weather conditions, research works on discovered archaeological sites etc.).

The entire population of the municipalities of Stolac and Neum is the population which will have direct and indirect benefits from this road after its construction. Notwithstanding the previous statement and a long term positive impact due to the history of this planned construction the community might express their doubts about successful implementation this time. This state of mind is a consequence of several attempts during the past 30 years to finally complete this section. In order to convince the communities in successful completion, due consideration should be taken when choosing the concept of the public consultations and presentation of the project at that occasion. The presentation should contain the design, the financing method, the stage

of land acquisition and similar details which shall account to the readiness of government and PC Roads FBH to complete this infrastructure project.

Vulnerable groups include the population of the municipalities on which the project might have more direct impact than on the general population. This document defines the following vulnerable groups: The elderly and infirm, particularly in rural settlements, to which the new road means better access to social infrastructure, primarily to health services. The poor and unemployed, with significant number of people in the municipalities.

The municipalities of Stolac and Neum were identified as very important participants in this project. Requirements of the municipalities which have the best vision on how to put the road into function or serve most inhabitants of the area, must be taken into consideration to the extent permitted by the project and the planned funds for construction.

The other authority bodies which have jurisdiction in the project area. This group includes: Federal Ministry of Environment and Tourism, The Adriatic Sea Watershed Agency, Committee to preserve national Monuments. These bodies prescribe the requirements of construction and issue the permits needed to put the traffic road into function.

Non-profit organizations are groups of people organized into associations because of some kind of their own interest. Within the project area, the following associations were identified as potentially having interest in the project: Women's Association Orhideja, Association Herzegovinian Fruits of the Mediterranean, Citizens' Association Neveš, Association EcoTour, Hunting Association Kamenjarka, Fishing Association Bregava, Bee-Keepers' Association Zanovijet, Hunting Association Jadran, Bee-Keepers' Association Kadulja, Oliver-Growers' Association Maslina.

In the area of the municipalities a total of 398 companies, 200 branch offices and 582 crafts were identified. To entrepreneurs in this area, the traffic road will shorten the time of transport and cut down the cost of transport. With increased business activity during construction, it is possible that one part of the entrepreneurs from this group is affected way standstill in traffic during consecution, in a negative way.[73]

6.1. PUBLIC CONSULTATIONS AND DISCLOSURE

First public consultation was held in Hutovo on November 11, 2015. During the presentation of the project participants were informed about previous and future project activities. Representatives of PC Roads FBH informed participants about previous public consultations held in Neum for main project design. On this occasion road alignment changed to satisfy local community requirements. In addition, representatives of PC Roads FBH informed participants about land acquisition process

[73] See table 4 in Annex B.

suspension due WB requests in order to harmonize this process with Banks Operational Policies. [74]

Furthermore, consultant presented detailed road plans, maps, placement of tunnels, road intersections, etc. to the rest of the participants that were not familiar with road alignment. The Minutes of the First Public Discussion on ESIA held on November 11 2015 in Hutovo, Municipality of Neum is Annex C of this ESIA.

Second Public consultations on the ESIA draft was organized after the World Bank and PC Roads of the FBH approved draft documents. The documents were published and available to the public in a local language on the website of PC Roads FBH on February 18th 2016, and public had 14 days to submit their comments in order to identify issues of concern and possible solutions. The public consultations were held on March 2nd 2016 in Hutovo, and the Minutes of the Second Public Discussion on ESIA is in Annex C of this ESIA.

It is important to mention that second part of this public hearing included the discussion about possible positive and negative impacts of this road on environment and community, and the PAPs concerns were mainly focused on the project design, especially road alignment and junctions for settlements. During discussion, all comments were addressed and answered.

Information disclosure

During construction works the Contractors will submit monthly information to PC Roads of the FBH regarding process of work, which will be published on the websites of PC Roads of the 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 of the 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).

[74] See table 1.2.2-2 Public consultations

7. ENVIRONMENTAL IMPACTS

The assessment is to estimate the environmental impacts during pre-construction, construction and operation phase of the road section Neum-Stolac. In addition to the above mentioned three phases of the project implementation, assessment in case of emergency circumstances and risk assessment will be described, as well.

Impacts will be described in more details below, while respective mitigation measures will be described in Chapter 11. Mitigation Measures.

7.1. PRE-CONSTRUCTION PHASE

During the pre-construction phase there are no significant actions taking place on site that could lead to disruption of ecological features of the area. Therefore, there is no reason for a detailed description of each environmental component of the project area. Mandatory **geological and hydrogeological** research carried out during the designing phase is of short term and unlikely to have adverse impact on the environment.

However, design and planning decisions made in this phase may have a lasting negative impact on the area where the road will be constructed and its **landscape**[75]. The biggest threat to the harmonious landscape of Neum hinterland and south of Stolac lies in the fact that it is the relief with many open vistas and each poor intervention is exposed to observers, as well as the fact that it is a rocky terrain in which each intervention is difficult to rehabilitate. The road construction always disrupts the visual integrity of the landscape. Pre-construction phase must be carried out carefully making sure that the design decisions do not cause permanent and harmful effects to the landscape. Investing more effort now will bring less negative and permanent effects during the operation phase. As such, the final designs need to take into account the recommendations and mitigation measures that are included in this ESIA, in particular the items listed under the pre-construction phase. Infrastructural corridors always, without exception, disrupt harmony and integrity of the landscape precisely because they pass through large areas. The situation is even worse with terrains of challenging configuration, as is the case here. If this potential impact is realized, the negative effects will be significant and permanent, within the regional scope.

Another risk is likelihood of spontaneous construction along the road in the future, which is not a part of the discourse at the moment, but is very likely to occur as soon as construction works commence. This would also have negative, long term impact of major intensity.

[75] Landscape includes all physical[75] and anthropogenic[75] components as well as visual and intangible features.

But construction of this road is very likely to bring a positive, direct impact on landscape. If carefully and wisely planned, it would enable observation of most valuable vistas of karst landscape.

7.2. CONSTRUCTION PHASE

In this phase of the project implementation, only negative impacts on the environment can be expected.

7.2.1. Micro-Climate

Micro-climate of the area surrounding Neum-Stolac road has the characteristics of sub-Mediterranean climate with very hot, dry summers and mild, humid winters. The distribution of precipitation is very uneven and unfavourable, i.e. the most of the precipitation occurs during the colder part of the year and the rest of precipitation occurs during the warmer and vegetation part of the year. The winds typical in this area are cold northern wind-bura, which additionally dries out the soil thus causing dry climate, and humid south wind-sirocco.

The construction of the road is unlikely to cause impact on micro-climate of the area.

7.2.2. Geological Environment

The construction of the road is unlikely to cause impact on the geological environment. Geological environment refers to the global geology of the area, and the impacts in this phase of the project will only occur on the soil and rocks due execution of the works, especially due to construction of the tunnel. Therefore, these impacts will be described as impacts on soil.

7.2.3. Water

The following is very characteristic of the karst area: very deep karst of rocky masses with the function of hydrogeological collectors with large permeability and speeds of flowing of ground water.

In the project area there are no surface waters, but because of the karst terrain, construction of the road may cause influence on ground water. Possible impacts on ground waters may occur in the following situations:

- Contamination of solid and groundwater during uncontrolled leaks of fuels, lubricants and oils from transportation equipment and construction machinery;
- Leakage into the soil in the course of handling hazardous liquids;

- Improper waste disposal into the greenery and other surfaces during execution of works in trunk road construction;
- Discharge of wastewater generated during the phase of construction of the road and ancillary facilities if treated improperly.

These impacts can be assessed as negative and direct, but short term and moderate. The scope of these impacts, due to the hydrogeological characteristics of the area can be both – local and regional.

7.2.4. Soil and agricultural land

Negative impact on soil and agricultural land along the entire section is manifested in long term physical loss of the land which will be acquired for the purpose of the construction of the road with protective belt of 20 m from the outer edge of the belt of land, and for the construction of access roads and intersections. Road construction implies physical destruction of the ground in order to construct cuttings or embankments, tunnels and other road facilities. This impact can be assessed as direct, significant, certain and local.

Road construction implies the building of construction site, which can also cause negative impacts but of a lesser extent and of short term character.

During the construction of the road negative impacts can be caused by:

- Uncontrolled and/or accidental leak of fuels, lubricants and oils from transportation or construction machinery;
- Improper disposal of construction waste onto surrounding surfaces;
- Improper treatment and discharge of wastewater from the construction site;
- Destruction of land and creation of erosive surfaces.

Aside from the above mentioned, negative impact in any case presents restricted access to plots in the areas where the alignment intersects agricultural land and separates it from settlements, as well as negative impact due to contamination of the soil in the impact zone of 100 m from the alignment axis or even beyond. This impact can also be assessed as direct, significant, but local. According to main project, masses of excavation materials are balanced, i.e. all excavated material for tunnels and cuts will be used for road bedding and embankments, so no other borrow pits will be used[76].

7.2.5. Woodland and forestry

In previous considerations and analyses it was pointed out that degraded forest communities with elements of underbrush and plant communities of rocky ground are represented along the entire alignment of the planned project. Presumed negative impacts on these "forest" systems during realization of the project most often could be caused by disposal of used lubricants and fuel and excess construction materials in the zone of the corridor during the period of the construction of the road. Negative

[76] Information provided by PC Roads FBH.

impacts will be manifested in permanent loss of wood areas where biggest impact will be reflected in decrease of soil fertility and oxygen production.

As a result of application of heavy machinery, surface layer of the soil will be exposed to higher pressure, which will disrupt the natural balance of the soil, causing reduction of the number of plant species. This impact can be assessed as direct, significant, certain and local.

The biggest danger would be if the works were carried out during the summer months when the risk of fire is very high in this area. Due to the nature of forest communities, such potential damage in the corridor may have significant environmental consequences. The biggest environmental damage in this phase can be expected in areas of residential camps and in areas of construction and machinery bases. These impact can also be assessed as negative, direct, significant, certain and local.

7.2.6. Flora and Vegetation

During the road construction direct negative impact on flora and vegetation are expected, which will be manifested in the decrease of population as well as in the decrease of areas of certain floral communities. These impacts are direct and significant, and will cause long term damage to the vegetation.

Although vegetation is quite scarce in this area and rocks and shrubs are dominant, in that sense impact is even more so evident because scarce areas of woodlands (in different stages of decay) are of a great ecological importance for this area, because they enable survival of other types of organisms and stop erosive processes in the soil.

The construction works on tunnels, underpasses/overpasses and intersections will have significant impact on flora and vegetation.

Exhaust fumes and dust in the air will also have direct and negative impact on vegetation. The most evident impact of this type will occur during tunnelling and construction of viaducts / bridges. It is very important to point out that all the works being carried out during the construction of the road will have significant impact on certain rare and endangered species of plants. One such plant is Dalmatian Laburnum (*Petteria ramentacea*); its communities noted on these sites are very rare.

On the top of that, construction of temporary landfills and borrow pits for construction material will additionally burden the land, thus contribute to a decrease in number of species that can exist in the area. Occurrence of fire outbreaks may increase during the construction of the road, which represents additional threat to flora and vegetation.

7.2.7. Fauna

The construction of the road will have direct and negative, but short term impact on fauna, especially on fauna of reptiles and medium size game due to disruption of their natural habitat and suppression of their natural migratory routes and inability to

exchange genetic material between different individuals of the same species that remained separated by the road during the construction.

Cutting off paths to their natural watering and feeding places may have detrimental consequences for the wildlife and this has to be taken into consideration. All the above mentioned may lead to a decrease in wildlife population. These impacts can be assessed as local and minor.

Noise and vibrations that cannot be avoided during the construction period will in any case have detrimental impact on the fauna in this area.

During tunnelling and works that include drilling or cutting into the hill disruption of potential subterranean habitats may occur.

7.2.8. Wildlife and Hunting

Negative impact on wildlife and hunting will be present in terms of a decrease of hunting areas due to the construction of the road and outbuildings as permanent facilities and the building of construction site, which is of a short term character.

Execution of works will cause detrimental consequences for wildlife, as described in the previous chapter, in terms of disruption of paths to their natural watering and feeding places, and negative impacts due to noise and vibrations caused by construction and transportation machinery.

Besides the afore mentioned, negative impact on wildlife is also possible due to improperly disposed waste (remaining parts of plastic foil, bitumen waste, etc.) which represents potential danger for wildlife in terms of possible injuries. Also, improperly disposed food leftovers may induce gathering of predators, which then may be dangerous for the nearby settlements in terms of transmission of disease (rabies).

7.2.9. Protected Parts of Nature

In the project area there are no protected areas of nature that would be directly endangered by the project. The only area with protected status that might be endangered during the construction of the road is the area of Nature Park Hutovo Blato, but the possible endangerment is indirect, minor but regional. This is an important area for migratory birds, so this fact was taken into account in the process of defining protective measures.

7.2.10. Landscape

The impact on the landscape during the construction of the road is of a short term character, provided that the terrain is properly rehabilitated after the completion of works. This particularly goes for the sections of the alignment intended for the construction of the tunnel and intersection, where the scope of works is to an extent broader than the construction of the road itself requires, and for the access paths, borrow pits, cuttings, embankments etc.

This occurrence has a direct adverse impact and is of short-term character. Major intensity of this occurrence is expected and it is certain that it will occur. The occurrence is on the local level.

7.2.11. Air Quality

Air pollution due to circulation of transportation and construction vehicles, operation of asphalt plant and dusting due to handling raw materials is expected during the construction of the road. This occurrence has direct adverse impact and is of short-term character. Moderate intensity of this occurrence is expected and is very likely that it will occur. The occurrence is on the local level.

The emission of smoke, particulate matter and exhaust gases as a result of fuel combustion processes may occur. The operation of asphalt base as well as placement of asphalt on the alignment of the road often leads to the emission of volatile organic compounds, which are composed of a significant percentage of polycyclic aromatic hydrocarbons (PAH) the impact of which on the incidence of cancers in the population is confirmed.

Dust emission will occur due to circulation of the construction and transportation vehicles on the unpaved surface. Due to the excavation of land during extremely dry weather the occurrence of airborne dust may result in air pollution of the area under the influence of winds. Blasting as well as activation of large earth masses during the construction of the road (cutting, embankment) will further contribute to an increase in dust concentration in the air, which can also cause negative effects on population and vegetation.

These occurences are unavoidable, of temporary duration and cause short term impact which is dominant on site of the execution of works. The direct and biggest impact on deterioration of the air quality is on the construction site and on the surrounding vegetation in the area of the planned project.

Due to the limited execution time, listed impacts are limited and will eventually decrease.

7.2.12. Noise

One of the direct negative impacts during the construction is the increase in the noise level in the surrounding area. Construction machinery, excavation and possible blasting cause noise, and its impact can be assessed as short term and in most cases limited to the time period of several months. The occurrence is on the local level.

The road does not pass near sensitive receptors, such as schools and hospitals.

In the construction phase of the road noise occurs as a result of the following activities:

- the use of mechanization during the entire process of the road construction causes excess noise and vibrations in the area of construction works. Particular problem is blasting for the purpose of excavation in rocky materials – especially in the open space (in the alignment, in quarries-borrowing pits and in tunnels),

but also in the areas of prefabrication (rock crushers, separations concrete and asphalt base);

- noise caused by circulation of trucks and construction machinery during the construction works.
  This impact can be assessed as moderate and short term, and it can be mitigated by additional technical measures.

Certain workers, machinery operators and those working in close vicinity of the machinery are especially affected by noise.

Additionally, noise resulting from the road construction works also impacts present animal species by means of scaring and scattering them and also impacts the population in the nearby settlements.

7.2.13. Infrastructure and Facilities

The construction of the road will be in collision with the existing infrastructure, as described in Chapter 4. Environmental Baseline.

During the execution of the construction works interruptions in water and electricity supply and telecommunications services are possible due to execution of works at the spots of collision between the existing lines and the planned road.

The most significant impact of the road is the one made on the existing local and field roads (uncategorized roads). In some cases the existing functional organization of the space will be disrupted, primarily in terms of access to agricultural land. The road itself will not have significant impact on functioning of local transportation systems.

All impacts on the infrastructure are direct and local, but short term and moderate.

7.3. OPERATIONAL PHASE

During the operation phase of the road fewer adverse impacts are expected, compared to the construction phase. Positive impacts in this phase are also expected, and shall be described below.

Positive impacts of Neum-Stolac road construction, as well as the projects of transport infrastructure in general, are reflected in the increase of social and economic benefits, which is result of improvement in transportation conditions and area connections.

7.3.1. Micro-Climate

During the use of the road negative impact on the micro-climate in the area of the road is not expected.

7.3.2. Geological Environment

During the use of the road no negative impacts on the geological environment of the area of the road are expected.

7.3.3. Waters

Potential negative impacts on the ground water can be expected in the following situations:

- leaking due to occurrence of incident situations in terms of fire, explosion or damage to the system of wastewater collection and leaking of polluted water into the ground;
- impact on soil and water in the event of incident leaking of hazardous liquids not covered by the system of collecting wastewater from the road.

The above described impacts can have direct negative influence and are of short-term character. Moderate intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level, but due to the hydrogeological characteristics, may appear even on the regional level.

7.3.4. Soil and agricultural land

During the operation phase, pollution of the traffic surface is possible due to circulation of faulty vehicles, which may result in physical presence of loose stray parts (metal, rubber, plastic waste), as well as in spilling of lubricants and fuel from faulty vehicles or as a result of car accidents. Spilled lubricants and fuels following traffic incidents will pose a serious threat for contamination of pavement rainwater which will interflow to recipients and pass untreated through the soil or porous geological substratum to underground aquifers.

This occurrence has direct negative impact and is of long-term character. Moderate intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

Negative impacts on soil and agricultural land are possible even from the static traffic – in the planned resting areas and parking lots next to the road. Past experiences from such locations indicate high level of negative impact of bulky waste on surrounding land.

In addition to the above stated, there is a realistic threat from exhaust gases and their deposition in the environment in the vicinity of the road.

All singled out types of negative impacts will be very important and intense at chainage marks identified in the Assessment as conflict positions with certain receptors.

Nevertheless, construction of the road will result in positive impacts on the agricultural land which can be expressed through better access to arable land, and consequently better level of its treatment and maintenance.

7.3.5. Woodland and Forestry

Direct negative impacts will be manifested through deposition of pollutants from exhaust fumes in close vicinity of the road. In addition to this type of pollution, the activities of deposition of excess construction materials and construction waste in forest zones in the area of the analysed corridor, unless penalizes, such activities pose the greatest threat to the environment during the operation of the road. This occurrence can have direct negative impact and is of long-term character. Minor intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

Negative impact can occur as a result of circulation of faulty vehicles on the road, as elaborated above, through physical presence of loose stray parts (such as: metal, plastic and rubber waste) which will remain on the road or next to the road, and due to spilling of lubricants and fuel from faulty vehicles or as a result of traffic incidents. Pollution of traffic surface poses a serious threat for contamination of pavement rainwater, which will interflow to recipients and pass untreated through the soil or porous geological substratum to underground aquifers. Also, the plants will absorb pollutants through their root systems thus decreasing resilience of forest systems.

In addition to this type of damage or negative impact, high risk will also be manifested through a possibility of starting a fire as a result of combustion or self-ignition of fuel and lubricants during summer months and as a result of inadequate behaviour of road users.

It was stated earlier that there is potential risk from static traffic, i.e. from the planned resting areas and parking lots by the road. Past experiences from such locations indicate major negative impact of bulky waste on the surrounding forest area.

7.3.6. Flora and Vegetation

During the use of the road, the greatest negative impact will be due to potentially higher volumes of pollution from exhaust gases from the vehicles, but also due to formation of subsequent landfills. This occurrence can have direct negative impact and is of long-term character. Minor intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

Frequent fires which might occur more often during the operation of the road present additional danger for flora and vegetation.

7.3.7. Fauna

In addition to negative impact of the exhaust gasses, suppression of natural migratory routes will be of a great importance, which may reflect on abundance of animal populations.

As a result of the construction of the road, separation of the individuals of the same animal species may occur, which will make interactions very difficult. There is a great possibility of an increase in the number of animals to be killed in an attempt to cross the road.

This occurrence can have direct negative impact and is of long-term character. Minor intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

7.3.8. Wildlife and Hunting

Possible impacts of the construction of the road on wildlife and hunting can be expressed through two aspects: one is the impact of the road on hunting areas as spatial units, and the other is the impact on the wildlife in the proximate and wider surrounding.

Impact of the road on hunting area will be manifested through a decrease of the hunting space of individual hunting areas to a higher or lower extent. In addition to the loss of space due to the road itself, the protective belt along the road has to be taken into consideration. Pursuant to the Roads Act protective belt of trunk roads covers the area of 20.0 m from the outer edge of the belt of land. Having also considered the belt of 200 m that represents hunting prohibition zone, the total decrease of hunting space amounts to:

- 1,246.6 ha for the municipality of Neum
- 356,6 ha for the municipality of Stolac

All the above stated means that when defining hunting areas in the municipalities of Neum and Stolac, after determining final alignment of the road, redefining of the existing borders of hunting areas will have to be done in order for them to remain a rounded and undisrupted natural entity in accordance with the Hunting Act.

This impact is negative, long term, direct and local character. Moderate intensity of this occurrence is expected and is very likely that it will occur.

Impact on Wildlife

By intersecting hunting areas by the road, especially the fenced hunting ground and game breeding sites, the problem of migrations (daily and seasonal) of wildlife, the problem of interrupting wildlife and the problem of physical endangering and theft arise. Also, there is the problem of injuries of wildlife while attempting to cross the road given the fact that roads of this category are not equipped with protective fences. Impact on the wildlife will be manifested through a decrease of living area (habitat, watering and feeding areas, arias to move and as stated, challenged interaction during daily and seasonal migrations. Seasonal migrations are expected for deer population. All the above mentioned impacts are negative, long term, direct and of local character. Moderate intensity of this occurrence is expected and is likely that it will occur.

Bus stations and resting areas do not present significant negative impacts on wildlife, although their development should be avoided in the vicinity of major forests.

7.3.9. Protected Parts of Nature

The road does not pass through protected parts of nature that could be directly endangered by the project. The only area with such status that could be endangered during the use of the road is the area of Nature Park Hutovo Blato, but endangerment

would be indirect. This is an important area for migratory birds and this fact has been taken into account while defining protective measures.

Implementation of the project will have positive impacts on Nature Park Hutovo Blato, which will be expressed by better transport connections, accessibility to this nature park and other cultural and historical assets and locations, given that accessibility is quite poor at the moment.

7.3.10. Landscape

The greatest threat to the landscape is probably spontaneous and planned construction along the road in the future which is not a part of the discourse at the moment, but is very likely to occur as soon as construction works commence. This occurrence can have direct negative impact and is of long-term character. Moderate intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

7.3.11. Air Quality

Motor vehicles obtain the energy required for the movement in traffic exclusively by means of the internal combustion engine using mainly liquid fuels. This type of drive will remain dominant in the near future but with significant technical improvements and with increased use of different kinds of gasses as fuel. Some of them, depending on concentrations in the air, may cause negative impacts on humans and other living organisms. Such gaseous substances are: carbon dioxide (CO_2), which is not harmful in the area in the vicinity of the road but it does significantly contribute to greenhouse effect; carbon monoxide (CO), nitrogen oxides, hydrocarbons, diesel soot and lead. Carbon monoxide at normal concentrations along roads is not harmful for humans and the environment, but indoors it can rapidly reach concentrations toxic for humans. Nitrogen monoxide (NO) is generated within engines which under the influence of atmosphere for the most part transforms into more toxic dioxide (NO_2), which is irritant to the respiratory system. Hydrocarbons are present in fuel and are generated by incomplete combustion in engines. Majority of hydrocarbons that get into the environment in normal concentrations are relatively rapidly decomposed and do not have harmful effect. Exceptions are the polycyclic aromatic hydrocarbons (PAH), of which benzene, formaldehyde, and some other have carcinogenic effect on humans.

Diesel soot is generated by combustion in diesel engines under high load. At higher concentrations, combined with other airborne particles (dust) it may have negative impact on photosynthesis and other functions of plants due to depositing on leaves and needles of plants.

Toxic effects of lead on people are reflected, according to current knowledge, especially in hindering synthesis of hemoglobin and its influence on the nervous system. With the increasing use of unleaded petrol, this problem is becoming less significant, and as expected, unleaded petrol will completely replace leaded petrol.

Air quality in the environment greatly depends on the distance between the source of pollution and the point where the air is observed as well as on the air streams and

ground configuration. Generally, in the areas of nearly flat ground configuration the concentration of pollutants decreases relatively quickly as moving away from the source due to the process of diffusion of pollutants in the air, which leads to dilution of the concentration. The air space along the road suffers from linear continuous source of pollution which consists of harmful gases and particles from combusted fuel and dust from deposited harmful substances.

Since the immediate area of the planned road is sparsely populated, with no major industrial pollutants and with very low frequency of vehicles, all of which reflects on the air quality, the air can be considered as relatively clear. It is estimated that average daily concentrations of harmful substances generated by the planned traffic will not exceed thresholds stipulated in the Rules on air quality limit values.

The occurrence can have direct negative impact and is of long-term character. Moderate intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

7.3.12. Noise

Noise generated on roads as a result of traffic impacts the environment, contributes to degradation of life quality and disturbs the wildlife. Due to exposure to noise the quality of life degrades both on physical and psychological level. Disturbance of wildlife reflects in fear of crossing the road while traffic is taking place, so roads become barriers to regular migrations of wildlife from one area to the other.

Traffic of the motor vehicles generates noise due to:

- engine and exhaust system operation, and to an extent operation of cooling system; and
- friction due to adhering of tires to the pavement combined with the noise due to air resistance, as well as the impact of flatness of the pavement to the existing condition of the vehicle body or its load.

Noise can have direct negative impact and is of long-term character. Minor intensity of this occurrence is expected and is likely that it will occur. The occurrence is on the local level.

7.3.13. Infrastructure and Facilities

During the use of the road negative impacts on infrastructure facilities are not expected.

There is a possibility of impact of overhead transmission towers at intersections with the new road. One is in an event of rare but possible occurrence of a natural disaster of larger proportions where cables may end up on the road surface as a result of collapse. Then, regular maintenance of the network may cause shorter traffic jams. Electromagnetic impact of transmission lines of these voltage levels, given the prescribed minimal distance between the conductors and the pavement and the brevity of stay of vehicles when passing under transmission lines, are completely negligible.

Implementation of the project will have positive impacts on infrastructure. Due to better transport infrastructure it causes fewer traffic accidents and thus fewer secondary negative impacts on the environment.

7.4. IMPACT IN CASE OF EMERGENCY CIRCUMSTANCES

Fire, explosions, earthquake and similar events of larger proportions are classified as emergency circumstances. By their origin they can be divided into natural or caused by human activities.

The impacts that occur as the result of emergency circumstances may take place during the construction of the road as well as during its operation.

Possible ecological disasters or events of emergency that may occur in the construction phase and the use of the road and which can endanger the environment, causing danger to human life and health, can be divided into four categories:

- The first group of possible risks is present in all situations when planned measures of environmental protections prove to be unsuccessful in the phase of exploitation.
- The second group of possible risks is connected with incident situations that may occur in the phase of execution of works and works on maintenance of the road during its operation.
- The third group of possible risks is connected with incident situations as a result of collision of vehicles that transport hazardous substances.
- The fourth group of possible risks occurs as a result of natural disasters.

Although the likelihood of emergency circumstances is unlikely and involves multiple factors, their consequences are significant and severe.

In incident situations during construction and operation of the road many of the listed impacts may occur as acute impacts of the much greater intensity than in normal conditions. The media of transmission of pollutants are air and rainwater. In principle, rainwater transmits solid particles and non-volatile components of the liquids deposited on the pavement. Such pollution is transmitted within the belt in the proximate vicinity of the road, at a distance of about 10 m.

Possibility of fire and explosions is emphasized by the fact that combustible, explosive and other hazardous substances will be transported along the trunk road. Explosions and self-combustion of said hazardous substances are possible in an event of such incident situations.

Possible detrimental impacts on surface and ground waters in emergency circumstances are manifested in the following situations:

- soil and water pollution by oil products and waste water from the construction site;
- penetration of contaminated waters into soil due to failure and damage to the system for collection and drainage of contaminated surface water;

- spilling of contaminated water due to insufficient capacity of the basin for the reception of polluted water;
- breakdown of vehicles that transport larger quantities of hazardous substances at the moment of impact stress, which in the event of penetration underground are transferred to much larger distances than during normal use of the road. Such breakdowns typically occur in bad weather conditions, which further complicate any intervention. Due to spatial and time unpredictability such situations impose the greatest threat for groundwater and sources;
- accidents caused by human factors (overstrain of the driver, reckless driving), which can lead to skidding and overturning of vehicles, spilling of oil and oil products and other hazardous substances into the environment, which can result in ecological accidents of greater proportions.

Other possible emergency situations that may occur are:

- technical breakdowns of the system for collection and drainage of contaminated surface water;
- irregular and inadequate maintenance of the road and the system for drainage of rainwater;
- accidents caused by force majeure (thunder stroke, extremely severe weather).

All the above mentioned impacts are negative, long term and can cause very severe consequences of regional character.

7.5. SUMMARY OF ENVIRONMENTAL IMPACTS

Phase	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity						Scope of impact		Additional research
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	None	Local	Regional	
Pre-Construction	Micro-climate										●						●			
	Geological environment		●			●				●						●		●		
	Waters						●													
	Soil and agricultural land						●													
	Woodland and forestry						●													●
	Flora and vegetation						●													●
	Fauna						●													
	Wildlife and hunting						●													
	Protected parts of nature						●													
	Landscape		●		●		●		●			●							●	
	Air quality						●													
	Noise						●													
	Infrastructure and facilities						●													
Construction	Micro-climate										●						●			
	Geological environment										●						●			
	Waters		●	●		●			●					●				●	●	
	Soil and agricultural land		●	●	●	●		●				●						●		

Phase	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity						Scope of impact		Additional research
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	None	Local	Regional	
	Woodland and forestry		●		●	●		●				●						●		●
	Flora and vegetation		●		●	●		●						●				●		●
	Fauna		●	●		●		●							●			●		
	Wildlife and hunting		●	●				●							●			●		
	Protected parts of nature		●				●			●					●				●	
	Landscape		●	●		●							●					●		
	Air quality		●	●		●			●					●				●		
	Noise		●	●		●		●						●				●		
	Infrastructure and facilities		●	●		●				●				●				●		
Operational	Micro-climate																●			
	Geological environment																●			
	Waters		●	●		●				●				●				●	●	
	Soil and agricultural land		●		●		●			●				●				●		
	Woodland and forestry		●		●		●			●					●			●		●
	Flora and vegetation		●		●	●				●					●			●		●
	Fauna		●		●	●				●					●			●		
	Wildlife and hunting		●		●	●				●					●			●		
	Protected parts of nature		●	●			●			●					●				●	
	Landscape		●		●	●				●					●			●		

Phase	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity						Scope of impact		Additional research
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	None	Local	Regional	
	Air quality		●		●	●				●				●				●		
	Noise		●		●	●				●					●			●		
	Infrastructure and facilities		●								●					●		●		

8. IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

The Assessment should estimate the social and economic impacts on the planning, construction and operation phase of the route of the section Stolac-Neum, which should enable sustainable development and public welfare of the area. Road should ensure the traffic connection on the state level, connection to the sea, inter-municipal and intra-municipal connectivity. Only areas with expected impacts per project phase are described below.

8.1. PRE- CONSTRUCTION PHASE

8.1.1. Local overview and community support

During the pre-construction phase general state of mind in the community should be optimistic. This road should bring prosperity in community. Because of numerous previous road construction promises, local community does not believe that road will be ever built. This negative impact (lack of trust) should be short-term and should not have any influence on project dynamics.

8.1.2. Gender

Considering that only 27% landowners are women, it is likely that during expropriation phase compensation for assets will be unequally distributed among men and women. Furthermore as families in BH are patriarchal even in case of women compensation, men will probably inside families make decisions about the compensation use. This impact is considered to be negative, long term, direct, very likely, moderate and local.

8.1.3. Access to water, sanitation, electricity, telecommunication services

During the pre-construction phase of the project, there will be no direct impacts on the provision of services as water supply, sewage system, electrical energy and telecommunications. These services will still be provided in the same way as at the moment.

Considering the potential indirect impacts in the pre-construction phase, it is necessary to create separate documents which will forecast all possible conflicts of the road M17.3 with the existing infrastructural system: electric energy, water supply and telecommunication systems; as well as to resolve these conflicts. This impact should be considered as negative, short term, direct, certain to happen, major and local.

8.1.4. Dominant sectors

Direct impacts are likely to occur during pre-construction phase of the project. Based on field data information, some local construction companies are preparing for

the big project in their municipality. This can be seen through procurement of new construction equipment expected to be used on construction site directly or as a part of contractor lease. These are relatively small investments, equipment that can used in various construction context. As economy boosting is already happening on very small scale, this impact should be considered positive, short term, indirect, likely to happen, minor in intensity and local.

8.1.5. Tourism

It is expected that tourism sector should be indirectly impacted during pre-construction phase. This impact should be noticed through minor capital investments in sector. It is considered for this impact to happen likely, have minor intensity and be local.

8.1.6. Land acquisition and involuntary resettlement

During the pre-construction phase expropriation of the land plots will be done. Land types that will be expropriated are mainly agricultural and woodland which are most abundant. As expropriated land is 0,68 km^2 out of almost 500 km^2 of the surface of both municipalities, it is not expected that this will considerably change availability of any type of lands.

Expropriation phase is considered as most negative impact of the pre-construction phase in this project. As expropriated land is not irreplaceable and low valued agricultural and woodlands, people who will be compensated are going to move their agricultural operations elsewhere. In case of expropriated woodland, as they are not exploited, compensated people will probably use compensation for other purposes. This impact is considered to be negative, long term, direct, certain, significant and local.

8.1.7. Land use patterns

During pre-construction phase, it is expected that demand for the land will rise, thus to rising prices of the land. This should be seen as a positive long term effect that will directly impact land owners.

As the construction lands are scarcer than other types of lands, rise in construction lands prices should be considerably more pronounced than other types of land.

8.1.8. Cultural heritage

Some historical discoveries could be found along the alignment of the road during preliminary construction works. This impact should be positive, short term if finding is insignificant and long term if significant, likely to happen, minor intensity and local.

8.2. CONSTRUCTION PHASE

8.2.1. Local overview and community support

Community support to the project should be boosted in construction phase[77]. During construction it is expected that community characteristics will start to change in terms of economy activity, sector transition, change in land use. Also influx of the labour force in municipalities should be noticed at this stage of the project. People living far from municipalities and which were employed as result of the construction activities will move closer to their work place. Community support is considered to be direct, positive, certain, significant and local.

8.2.2. Temporary worker in-migration and population change

Construction of the road will have positive short term impact on immigration, it is expected that work force needed to build the road need to be settled locally. This could be identified as certain, and temporary impact.

8.2.3. Gender

During the road works mostly man will be employed on construction site, thus, the gender job distribution is likely to be unequally distributed.

However, women employed in service sector will see indirect benefit from construction works as they are mainly employed in trade, catering and accommodation industry. Growth in business volume will benefit women and their opportunity to find employment in these industries. This part of gender impact could be considered as positive and short term during the construction works timeframe, direct regarding construction works, but indirect regarding other parts of economy and local.

8.2.4. Displaced persons

As there is only a small group of people registered as IDP in Stolac, which are not directly impacted by construction works or land acquisition, there is no impact on them.

8.2.5. Education and skills

Workers included in construction works, especially those gone through vocational training will gain experience in this kind of construction works. This impact is considered to be positive, long term, certain, minor and local.

8.2.6. Employment

Since the project area offers little economic activities, construction works are likely to give the opportunity for new employment. It is likely that, backstopping staff and skilled, semi skilled and unskilled labour workers will be in demand. Practice shows that not all will be part of the contractors team initially (key staff excluded) but will be

[77] See section 8.1.1.

employed amongst the local population. This impact is considered to be positive, short term, direct, very likely to happen, minor and local.

8.2.7. Access to water, sanitation, electricity, telecommunication services

During the construction phase one can expect that due to higher consumption of electrical energy, water etc. by the contractor, it will come to decreased quality of these services and amounts for other citizens in the surroundings. During the construction phase damages and interruptions to electrical energy, water or telecommunication supply can be expected.

The labour force that will be accommodated in municipalities is expected to have minor impact on capacity of public services.

This impact is considered to be negative, direct, short term, very likely to happen, moderate and local.

8.2.8. Construction site health and safety risk

Works on the reconstruction may pose health and safety risks for construction workers and visitors to the construction site, which may cause severe injuries or fatalities. Construction workers will be exposed to a large number of: biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc.), and road accidents from construction traffic.

Measures must be in place in the proposed project to avoid or minimize these risks. Construction site health and safety risk is considered to be negative, short term, direct, very likely, moderate and local.

8.2.9. Community health and safety risk

Population near the construction site will be exposed to a large number of: biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc.), and road accidents from construction traffic.

The realization of the Project could affect the health and safety of the communities along the road as a result of worker- community interactions. Any community concerns or perceptions with regard to reduced health and physical safety by the community need to be addressed. Specific risks identified on this project are:

- Dust borne communicable diseases, respiratory infections and minor throat and eye irritations during summer months as a result of vehicular pollutants and dust
- HIV and other sexually transmitted diseases (STD-s) can be linked to the workers which are known to be high risk population.
- Injuries resulting from falling from heights and misuse of equipment and tools are likely to occur during the implementation of the projects.
- Traffic accidents risks due increased traffic flow could impose risk on people and wildlife

- Possibility of contamination of local water supplies due to accidents on worksite.

The potential impacts on Community Health, Safety & Security (CHSS) are likely to relate to traffic risks, public health, safety and security concerns from a construction workforce as well as potential impacts from unplanned events and unauthorized (trespassing) access to work areas.

8.2.10. Health services

During the construction phase, emergency medical services will have to organize additional on-call shifts and plan additional activities for the needs of possible accidents on construction sites.

This occurrence has a direct adverse impact and is of short-term character. Moderate to high intensity of this occurrence during tourist season is expected and it will certainly occur. The occurrence is on the local level.

During the construction phase the existing traffic road M17.3 will be loaded with presence of mechanization and vehicles of the contractor. This will deteriorate traffic flow on the road, and by that, slow down driving of emergency vehicles, visits to specialist doctors in Mostar or visits to the hospital in Mostar, as well as work of medical staff in the field.

This potential has a direct adverse impact and short-term character. Its intensity is high and it will surely happen. The occurrence is on the local level.

8.2.11. Local Transportation system

On the occasion of traffic road construction, disturbance of the local transport system is likely to occur.

This impact is direct, adverse and of short-term character. It will surely happen and will have very strong intensity. The occurrence is on the local level.

Due to the construction of the new major road, one can expect damages to the exiting road, landslides and material on the road. Due to this, cars risk being damaged, and occurrences faster wear and tear of consumable parts, such as tires and the like can be expected.

This impact is direct, adverse and of short-term character. It is highly likely to occur and will have strong intensity. The occurrence is on the local level.

8.2.12. Schools

In the course of construction, due to higher traffic load on the existing major road by trucks and machinery in function of construction, pupils' arrival to local elementary schools, as well as to the elementary and secondary school in Neum will be aggravated. Arrival to secondary schools and faculties in other towns will also be more difficult.

The impact should be considered as negative, short term, direct, certain to happen, major and local.

8.2.13. Facilities for staff and labour and working condition

Depending on the Contractor the construction workers may be hired locally or internationally and should be provided with good working condition environment, including proper accommodation facilities when needed. According to MDBH condition of contract except as otherwise stated, the contractor shall ensure all necessary accommodation and welfare facilities for contractor non-local personnel.

This impact is likely to be positive for the local economy if workers will accommodate in existing premises and short term, direct, local, moderate, very likely to happen.

8.2.14. Sectors

It is expected that during the construction work, three sectors in the municipalities of Neum and Stolac will experience growth, namely, construction, tourism and trade sector. These three sectors should induce series of business activities in other sectors. It is assumed that construction works will partially be done by local construction companies. Trade sector will start to grow due increased demand for all kinds of goods (food and drink, household items, building material etc.) This impact could be considered as positive, short term, direct and indirect based on the sector, certain and significant.

8.2.15. Income level

It is expected that local trade, accommodation and service businesses will benefit from road construction. Accommodation and catering for workers, equipment repair and services, locally employed persons are some of identified parts of local economy that will be impacted. This impact is considered to be positive and short term considering construction works timeframe, likely to happen, minor to moderate in intensity and local.

8.2.16. Poverty

Part of a local population that is below relative poverty line should see opening opportunities in job opportunities. As construction works start, unemployed people should have opportunity to find job on construction site or one of the economy sectors that will indirectly benefit from road construction. New jobs are expected in accommodation, trade, catering, mechanical services, etc. This impact is considered to be positive, direct and indirect, likely to happen, minor and local.

8.2.17. Agriculture and Farming

It is expected that dirt and dust from construction site and limited access to their farming lands will impact the quality and yield of farming products. Also dust and noise will impact the quality and quantity of livestock products as pastures get dusted. Also it is worth noting that this impact is strictly local and determined by place and dynamics of the construction works. This impact should be considered negative, direct, certain to happen, moderate in intensity and local.

8.2.18. Tourism

It is expected that during the summers tourism and trade industry of Neum should see negative impacts. Goods delivery to Neum is possible through current road, and there is no other ways to deliver the goods. Also, part of tourists that need to have a visa to cross Croatian borders are likely to have difficulties getting to Neum. One day visitors from interior of the country are likely to cancel their trips, as border crossing can take up to two hours in each way. This impact is expected to be negative, short term, direct, certain to happen, major and local and regional depending on persons affected.

8.2.19. Land acquisition and involuntary resettlement

Land lease to contractor for purposes of parking construction mechanization, borrowing pits, and worker facilities is expected. Based on the principle of demand and supply, contractor will lease land from the most economically advantageous bid. This said, contractor is obliged by the RAP to offer PAP market price of lease (the land must be returned to original condition) + replacement costs for affected crops, orchards, etc. + compensation for any damages on the property). The land lease for the above stated purposes shall be on voluntary bases with the liberty of the owner to negotiate the lease and refuse if he disagrees with the terms. As this is just temporary loss of land it could be considered as positive, likely, short term, minor and local impact.

8.2.20. Cultural heritage

Detailed research[78] has shown that there shall be no direct influence on some of the protected cultural and historical heritage during the construction of the road. The influence shall occur during the construction of the access roads, storing the materials and machines and indirect influence due to vibration and chemical influence. The area of the Municipality of Stolac and Neum hinterland was not the constructional target in the last 50 years therefore the sites and cultural and historical heritage structures remained preserved, but they decay due to weather conditions, vegetation and lack of maintenance.

Positive results brought by the construction of the trunk road to the cultural heritage landmarks include possibility of discovering new sites. It is the area of alignment that was excluded from the scope of impacts of the construction of

[78] Research for development of Physical plans of Municipalities of Neum and Stolac.

significant infrastructure, and the data on the existing sites imply the possibility of discovering new sites. If new site discovery does not imperil construction dynamics this could be considered as short term, indirect positive impact. This impact should have minor intensity and be local.

Another consequence of the project is the fact that attention will be paid to endangered objects and sites, as well as constant monitoring during the construction will be conducted. The fact is that the very objects near the alignment have been neglected by the competent authorities due to the fact that those objects have not been significant tourist destinations so far. This impact could be considered as positive, long term and indirect. Likelihood of impact is likely and extent Significant.

Having analysed all conflicting positions, the following detrimental impacts on physical cultural heritage are possible due to the execution of works and will be mitigated:

- Possible physical damage to the existing structures above and below the terrain level in existing locations and potential new findings (tumuli in the corridor).
- Possible physical damage to the structures of the objects near the alignment due to the execution of works (vibrations, materials depositions, construction of access paths etc.).
- Execution of works may lead to disruption of natural ambiance and environment.

This impact is indirect, should have minor intensity, it is likely to happen and is local.

8.3. OPERATIONAL PHASE

8.3.1. Migration and population change

It is expected that the road construction will have positive impacts on Neum and Stolac, especially their hinterland, in terms of population increase. Areas deserted during economic stagnation (1976 – 2014) are expected to be gradually repopulated in the years following the completion of the road construction. Increased traffic on M17.3 is expected to increase economic activity and decrease unemployment. Provided that jobs are scarce in the neighbouring municipalities, both in the Federation and RS, the two Municipalities Neum and Stolac are expected to become growth poles attracting populations form other neighbouring municipalities to this area.

Much like the outmigration from this area, the process of revitalization is expected to take place over a period of decades.

It is expected for this impact to be positive, long term, direct, certain, significant and local and regional.

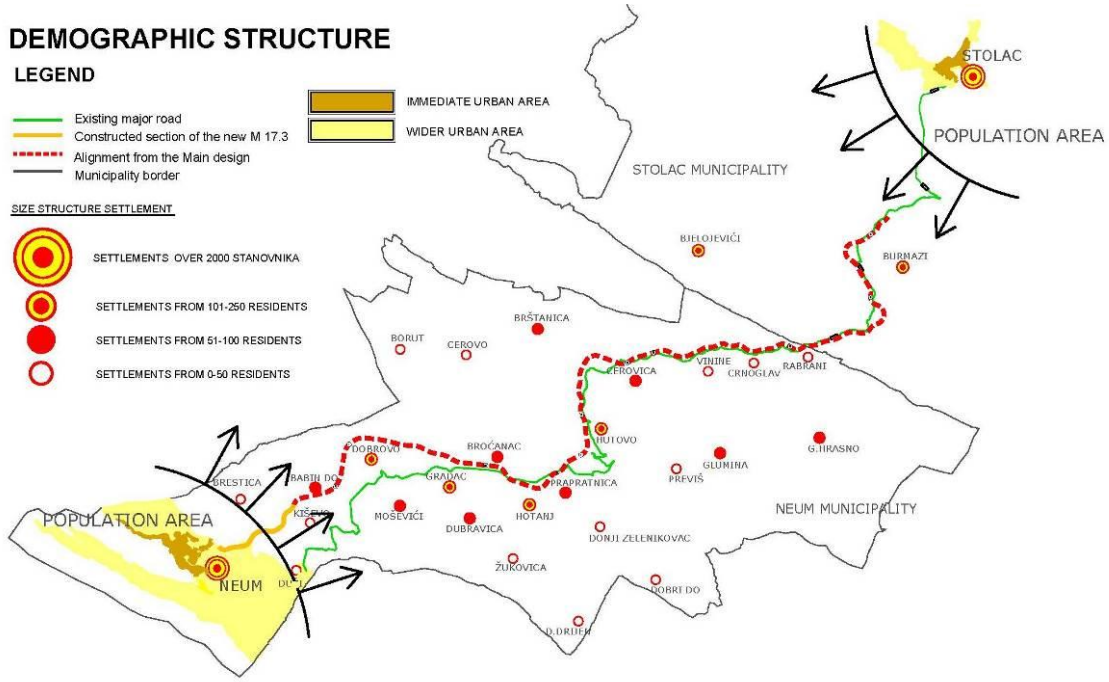
8.3.2. Age

Demographic change requires strategic and localised solutions. This stated, there are four main policies for demographic change that need to be addressed and tailored

for specific local community needs: resilient and inclusive communities, inter-generational solidarity, dynamic and responsive labour market and skill ecosystems.[79] Some of these policies include measures such as: improving and promoting transport accessibility, supporting entrepreneurship (especially SMEs), stronger local job creation, gender equality improvement, poverty reduction, raise of birth rates, immigration encouragement, youth, adult and elderly skills development, etc. If these measures are implemented, local community should experience demographic change in form of population regeneration or controlled down-sizing.[80]

It is expected that newly constructed road will greatly improve traffic accessibility of area which will induce economy development, job creation and poverty reduction thus leading to population regeneration. It is important to notice that road construction only will not induce demographic change, but it is the main prerequisite for it. This impact will be positive, long term, indirect, likely to happen, minor and local.

Image 8.3.2-1. Impact on demographic structure



Source: Ecoplan

8.3.3. Gender

It is expected that due the development of economy, women will have better opportunity for employment. Accommodation, trade and other services are sectors of economy that are expected to grow. These sectors are predominantly women

[79] Fostering resilient Economies – Demographic Transition in Local labout Markets;pg. 45;OECD, 2014.

[80] Population regeneration is refering to population pyramid expansive, stable or stationary shape through population regeneration or controlled down-sizing.

employed. This impact is expected to be positive, long term, indirect, likely to happen, significant and local.

8.3.4. Employment

Even when decommissioned within DNP the contractor is likely to maintain such staff personnel (few of them) to allow completion of any outstanding works and remedying any defects This will continue to require employment or maintain employment arrangements already made. In addition the maintenance of the newly constructed road will require most likely to create new positions and thus allow new employment. This employment opportunities should seen as positive, long term and direct impact, likely to happen and moderate in intensity and local.

8.3.5. Access to water, sanitation, electricity, telecommunication services

The new road will become the backbone for development. By construction of this road all infrastructural systems will become more accessible and their maintenance will be facilitated. These services will have better quality and will be more certain for the citizens this way.

The road will facilitate the possibility of water supply network construction along its route to the villages of Vinine, Crnoglav, Rabrane and Burmazi. This way the road will become available to inhabitants of these settlements. Construction of the road will have a positive long-term impact on water accessibility. Length of transport for water supply of other settlements Gornje Hrasno and Bjelojevići from tank trucks is reduced and water becomes more accessible. These impacts are considered to be positive, long term, direct, certain to happen, major and local.

8.3.6. Health services

Construction of this traffic road will facilitate faster arrival to the Health Centres in Neum and Stolac. Primary health care will be more accessible to the population of these municipalities, including more remotes settlements. It will reduce travelling time to Mostar, and the services of secondary health care (specialist) will be more accessible.

This is a direct positive impact with long-term consequences. The transformations will happen inevitably and will have a moderate impact of local character.

Number of medical services in Mostar are likely to increase due to improved accessibility, and those in Metković and Dubrovnik will decrease. This way the costs of medical services to citizens will be reduced, as will the costs to the insurance system, because the services will be performed within national insurance scheme.

This occurrence has an indirect positive impact with long-term character. The occurrence is highly likely and will have moderate impact on the regional level.

Road construction will also increase the quality of emergency medical interventions, because help will arrive faster to injured persons.

This impact is direct positive impact and is of long-term character. The occurrence will happen very likely and will have moderate impact on the local and regional level.

Number of visiting nurses' house calls will be increased due to improved accessibility to remote homes.

This impact is positive and long-term. The occurrence is highly likely and will have a moderate impact on the local level.

8.3.7. Local Transportation system

Redirecting transit traffic from the Adriatic major road to the major road M17.3 through the interior of the municipalities of Stolac and Neum will take place. This will certainly happen for all bus lines Dubrovnik – Sarajevo and Dubrovnik – Zagreb, as well as for Neum – Mostar. By doing so, the local transport system will become denser and the level of service to population of Neum and Stolac will be higher, both in Neum and in the interior of the municipality.

This fact has a direct positive impact of long-term character. It will certainly occur due to shorter travelling time. Very strong impact of the road on this occurrence is visible and is of local and regional character.

An increase in number of lines in local transport is possible, due to shorter travelling time.

Traveling distances and time are presented in table below.

Table 8.3.7-1. Traveling time and distances between Mostar and Neum

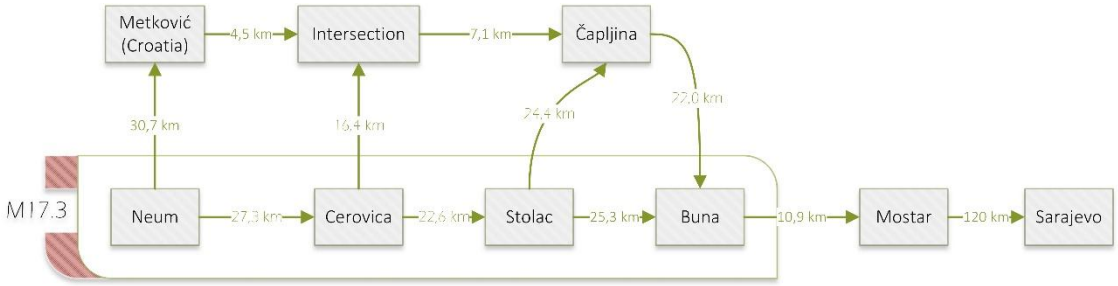
REMARK: the values for the existing roads are taken as mean values read from travel calculation tools (Here maps, Google maps and ViaMichelin).

CONCLUSION: The M17.3 alignment is by its distance and time needed the longest connection of Neum with Stolac/Mostar, whereas after the reconstruction it becomes the quickest.

	MOSTAR - NEUM TRAFFIC CONNECTION	current distance (km)	projected distance (km)	**distance difference (km)**	**current distance (h)**	**projected distance (h)**	**distance difference (h)**
		Lpost	Lproj	**ΔL**	**Tpost**	**Tproj**	**ΔT**
1.	by M17.3 road (Mostar-Stolac-Neum)	85	73	**12**	**1h and 45 min**	**1h and 12min**	**29min**
2.	via Svitava E73-M17.3 (Mostar-Čapljina-Svitava-Neum)	84	80.6	**3.4**	**1h and 40min**	**1h and 31min**	**9min**
3.	by E73 road (Mostar-Čapljina-Metković-Neum)	70		**70**	**1h and 25min**		

Source: Ecoplan

Image 8.3.7.-1. Traveling distances and relationships between Sarajevo, Mostar, Buna, Stolac, Čapljina and Neum



Source: Ecoplan

This fact has an indirect positive impact of long-term character and will probably happen. The impact is well-founded and has local character.

8.3.8. Schools

After construction of this traffic road, pupils and students will travel for shorter time, which will provide them with more time for studying and other activities.

This impact is considered to be positive, direct, long-term, very likely , major and local.

One part of pupils today attend high schools in Metković, but in future could attend secondary school in Stolac.

This impact is considered to be positive, direct, long-term, very likely, moderate and local.

A part of migrations of students and high school pupils will turn into daily commuters. Costs of schooling will be reduced this way.

This impact is considered to be positive, direct, long-term, very likely, moderate and local.

Kindergarten service for pre-school children will be more available.

This impact is considered to be positive, direct, long-term, very likely, moderate and local.

Number of university students and high school pupils will increase due to improved accessibility to relevant institutions

This impact is considered to be positive, indirect, long-term, very likely, moderate and local.

8.3.9. Economy and Livelihoods

It is expected that during the operational phase of the road households will see benefits from lots of aspects. Better accessibility to social infrastructure like schools, hospitals, administrative services, recreation and culture will be more convenient to get to, making this area more attractive for living.

It is expected that momentum of economy development gained during the construction phase shall be maintained and increased during operational phase. Traffic volume and better connectivity with the rest of the country is likely to create better conditions for development. Tourism, trade and service sectors will gain most benefit. Enhanced volume of traffic brought by the new road will provide indirect economic benefits to the population of the municipalities.

It is usual that construction of the new road will attract new economic activities, especially restaurants, gas stations, rest areas in detailed defined by the physical plan.

This impact should be considered as positive, long term and indirect, very likely to happen and significant in intensity.

8.3.9.1. Income level

It is expected that in a long run, average wage in municipalities start to show higher rates of growth. This impact should be considered as positive, long term and indirect, very likely to happen and significant in intensity.

8.3.9.2. Poverty

Due to economic development of the region, it is expected that number of people living under the relative poverty line to drop. New demand in labour force will give prosperity not only to those employed but to their families also. This impact could be considered as positive, long term, direct, very likely to happen with major intensity.

8.3.10. Agriculture and Farming

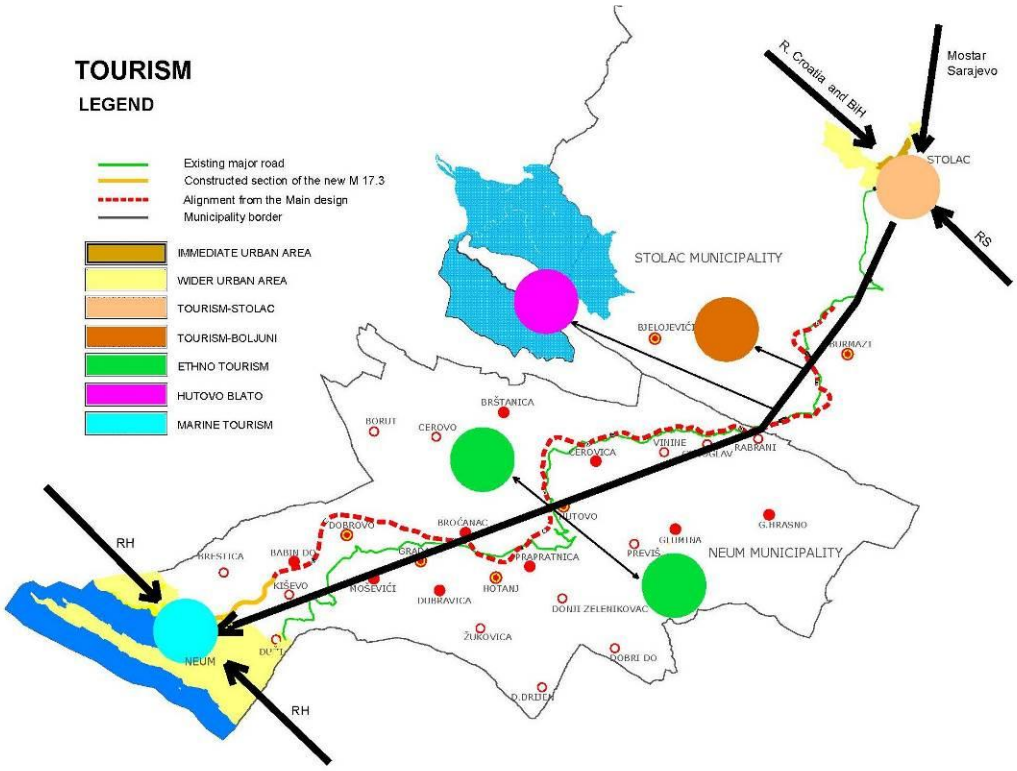
Development in agriculture is expected due to positive impacts on access to water, sanitation, electricity and telecommunication services as stated above. Also access to local and regional markets will facilitate agricultural goods travel from farms to dining tables. This impact could be considered as direct positive and long term. Likelihood of this to happen is dependent on other factors and not only the road.

8.3.11. Tourism

It is expected for this road to connect these two major tourist capitals in these two municipalities. Neum and Hutovo blato as natural tourism capitals and Stolac as cultural heritage capital. Along road alignment agro-rural tourism development is expected. Everything stated above is expected to lengthen tourist season and days per arrival in both destinations. Impact on tourism during road use is expected to be positive, long term, direct, certain, significant, local and regional.

These two municipalities must work on the expansion of their tourist offer as well as cooperate in the field of tourism in order to succeed in prolonging tourist season and in attracting higher number of guests without increase of pressure on the peak season.

Image 8.3.14.-1. Impact on tourism



Source: Ecoplan

8.3.12. Cultural heritage

As the road constructs and cultural tourism develops, community will realize the economic value of rich cultural heritage localities in Stolac and Neum as cultural heritage capital, thus leading to better heritage conservation and tourism utilization. This impact is considered to be positive, long term and indirect, very likely to happen, moderate in intensity, primarily local but possible regional scope. The road should induce tourism as one of the main segments of the economy in this area.

8.4. SUMMARY OF SOCIAL IMPACTS[81]

Stage	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity					Scope of impact	
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	Local	Regional
Pre-construction phase	Local overview		●	●													●	
	Gender		●	●		●			●					●			●	
		●		●		●			●						●		●	
	Access to water, sanitation, electricity, telecommunication services		●	●		●		●					●				●	
	Dominant sectors	●		●			●		●						●		●	
	Tourism	●					●			●					●		●	
	Land acquisition and involuntary resettlement		●		●	●		●				●					●	
	Land use patterns	●			●												●	
	Cultural heritage	●		●	●					●					●		●	
	Local overview	●				●		●				●					●	
Construction phase	Temporary worker in-migration and population change	●		●				●								●	●	
	Gender	●		●		●	●	●					●				●	
	Displaced persons																	
	Education and skills	●			●			●							●		●	
	Employment	●		●		●			●						●		●	
	Access to water, sanitation, electricity, telecommunication services		●	●		●			●					●			●	

[81] The impacts were assessed by exploring the component which have been considered as essential. These factors include the breadth of impact, the wellbeing of community, the depth of impact, quality of project implementation.

Stage	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity					Scope of impact	
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	Local	Regional
	Construction site health and safety risk		●	●		●			●					●			●	
	Community health and safety risk		●	●		●			●					●			●	
	Health services		●	●		●		●				●					●	
	Local transportation system		●	●		●			●			●					●	
	Schools		●	●		●		●					●				●	
	Facilities for staff and labour	●		●		●			●					●			●	
	Sectors	●		●		●	●	●				●					●	
	Income level	●		●		●				●				●	●		●	
	Poverty	●		●		●	●			●					●		●	
	Agriculture and Farming		●	●		●		●						●			●	
	Tourism		●	●		●		●					●				●	●
	Land acquisition and involuntary resettlement	●		●						●					●		●	
	Cultural heritage	●			●		●			●		●					●	●
	Migration and population change	●			●	●		●				●					●	●
Operational phase	Age	●			●		●			●					●		●	
	Gender	●			●		●			●		●					●	
	Employment	●			●	●				●				●			●	
	Access to water, sanitation, electricity, telecommunication services	●			●	●		●					●				●	
	Health services	●			●				●					●			●	
	Local transportation system	●			●		●		●			●					●	
	Schools	●			●		●			●				●			●	
	Economy and livelihoods	●			●	●	●	●					●				●	
	Income level	●			●		●		●			●					●	

Stage	Impacts	Nature of impact						Likelihood of impact				Extent of impact intensity					Scope of impact	
		Positive	Negative	Short term	Long term	Direct	Indirect	Certain	Very likely	Likely	Unlikely	Significant	Major	Moderate	Minor	Negligible	Local	Regional
	Poverty	●			●	●			●				●				●	
	Agriculture and Farming	●			●	●			●									
	Tourism	●			●	●		●				●					●	●
	Cultural heritage	●			●		●		●					●			●	●

9. MITIGATION MEASURES

This chapter provides a description of measures for avoiding, mitigating or compensating negative ecological impacts of the project. The described measures must be implemented continuously throughout all the phases of the project – from the design and construction to maintenance of the road in order to reduce negative impacts of the project on the observed environmental aspects of the area of the future road.

9.1. MITIGATION MEASURES FOR NEGATIVE ENVIRONMENTAL IMPACTS

The measures for mitigation of negative impacts on the environment can be general and specific. General mitigation measures of negative impacts on the environment imply compliance with all relevant legal provisions regarding the protection of water, air, soil, landscape, species of plants and animals during all phases of realization of a certain intervention in the environment – from the design, construction to operation and maintenance of the road. These measures are legal obligations and the compliance therewith is proved in the process of obtaining various permits, hence the final result (i.e. environmental, water permit and certificate of occupancy) implies full compliance with national legal provisions.

The compliance of these measures shall be checked by the Federal Department for Inspection Affairs, i.e. Inspectorate for urban and ecological manners.

Specific mitigation measures of negative impacts, as well as enhancement measures for positive impacts on the environment are described below for all phases. For sections where additional information or specific monitoring is required, a site-specific ESMP shall supplement the information and requirements given below, that shall be prepared under the guidance and responsibility of PC Roads FBIH, with an independent consultant or select contractor. The site specific ESMP is a condition to the start of works.

Table 9.1.-1. Environmental impact mitigation/ enhancement measures plan

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
Pre-construction	Risks for all environmental components	▪ Considering the indirect impacts in the pre-construction phase, project documents need to be devised in accordance with legal regulations, environmental permit and prior water approval, geological, hydrogeological, agricultural, and woodland and other features of the area.	Included in price project design	-	PC Roads FBH	Project designer	
Pre-construction	Negative impacts on landscape due to poor design decisions	▪ Include landscape architect into design and audit teams. ▪ Once more compare different design strategies in terms of landscape protection and reduction of permanent impacts. If the route is being laid by the edges of morphological units, respecting ground layers, negative effects could not only be mitigated but sometimes the road can add a whole new positive dimension to the landscape. ▪ Preserve agricultural area as one of the most important anthropogenic factors. ▪ Provide landscape protection through implementation of all mitigation measures described in Environmental Permit and Urban Consent. ▪ Ensure that relationship between traditional elements of life in karst areas remains intact, i.e. be careful not to intercept the path between fields/pastures and	Included in price project design	-	PC Roads FBH	Project designer	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		settlements.					
Pre-construction	Potential spontaneous construction along the road	▪ Through physical – planning documents, provide the ban on building along the road and direct connection to it.	-	-	Municipalities of Stolac and Neum	Municipalities of Stolac and Neum	
Pre-construction	Disruption of harmony and integrity of the landscape	▪ Landscape Design Project, as included in the main designs,implies greening of all surfaces disrupted by the construction and setting up a buffer zone towards the settlements and the agricultural areas. Furthermore, the project should contain selection of the type and quantity of plants, substrates for planting, dynamics as well as costs of planting and annual maintenance.	25.000	5$/m^2 [82]	PC Roads FBH Consultant	Project designer	
Pre-construction	Enabling observation of the landscape, opening vistas	▪ Record all the best vistas and design viewpoints along the road.	Included in price project design	-	PC Roads FBH	Project designer	
Pre-construction	Conflict of utilities with road alignment	▪ Considering the indirect impacts, separate documents which will forecast all conflicts of the road M17.3 with the existing infrastructural system: local roads, electric energy, water supply and telecommunication systems; as well as to resolve these conflicts, are to be included	Included in price project design	-	PC Roads FBH	Project designer	

[82] This price refers to the area of 10 m on both sides of the planned road, in total amount of 200.000 m^2

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		in frames of the main project design.					
Pre-construction	Compliance with national legislations regarding Construction site	▪ Obtaining all necessary certificates and equipment for execution of planned works. ▪ Preparation of Construction Site Organization Plan (CSOP), technological scheme, Management plan on Safety at Work and Management Plan on Fire Fighting and Explosion and Management Plan on Environmental Protection pursuant to the Decree on Construction Site Organization, Mandatory Documentation on Construction Site and Construction Work Participants, (Official Gazette of FBH, No. *48/09, 75/09 and 93/12)* and Waste Management Plan in accordance with the Waste Management Act (*Official Gazette of FBH No. 33/03 and 32/09*).	Included in price project design	-	PC Roads FBH	Project designer	
Construction	Groundwater and soil pollution due to uncontrolled discharge of wastewater from road, as well as uncontrolled/accidental leakage of oil and lubricants from means of transport	▪ Implementation of water protection measures as determined in ESIA and ESMP. ▪ Performing works in accordance with Main Project, WMP and CSOP. ▪ Ensure appropriate supervision of works. ▪ Ensure areas with impermeable base for siting and repair of mechanization and prohibit repair of machinery and change of oil in the zone of inacceptable risk for groundwater. ▪ On the occasion of decanting and pouring oil special	Included in price of construction	-	Contractor	Supervisory body	Included in price of construction

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
	or construction machines, fuelling on construction site	measures must be implemented to prevent incidental situations; If it comes to pollution by oil leakage or in some other way, that layer of soil should be removed and taken to landfill; ▪ Control waste storage and secondary raw materials storage. ▪ All waste from construction site must be disposed of in organized way by means of an authorized company; ▪ Change of vehicle and machinery batteries is to be performed in those parts of construction site which are ensured from possible leakage of hazardous substances into soil; ▪ Prevent leakage of polluted and uncontrolled discharge of wastewater from the area of construction site into soil; ▪ In stretches of road passing near sensitive zones of groundwater, blasting works need to be adopted to this special situation in order not to disrupt groundwater flows, i.e. apply the technique of millisecond activation of blasting charge with directed blasting action ▪ All materials from excavation which will not be used immediately must be disposed of in planned location in accordance with CSOP (excess material depot), as well as outside of defined sensitive zones.					

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
Construction	Impact on soil and land	▪ The land determined for use by the Project, including storage of building material, parking of the heavy machinery etc., can only be used for the construction activities and no other land is available for these activities in terms of preventing land disturbance. ▪ Proper waste disposal; separation of hazardous waste; engagement of authorized companies for final waste disposal; ▪ Oil and fuel collection systems to be fitted to prevent leakage. ▪ All excavated humus material shall be disposed of on planned sites, so it could be used later for the purpose of planting greenery. ▪ Set physical barriers and protective belts in zones of agricultural land areas to protect them from mechanical pollution and contamination	Included in price of construction	-	Contractor	Supervisory body	
Construction	Pollution of air and surrounding soil from emission of dust and soil particles due to work of construction machinery and means of transport	▪ Wetting the site to prevent dust occurrence during dry and warm weather conditions and particularly during high winds; ▪ When blasting the excavations in rock massif choosing the type of explosive which makes least harmful environmental impacts; ▪ For the use of blasting boreholes use boring-machines with dust collection in plastic bags;	Included in price of construction	-	Contractor	Supervisory body	Supervisory body appointed by investor (PC Roads FBH)

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		▪ When transporting construction material and other small material cover it to prevent dissipation on the surrounding area; ▪ Regular maintenance of construction machinery: ensure maximum functionality of motor fuel combustions system; use and regular control of fuel with guaranteed quality standard.					
Construction	Pollution of surrounding soil due to work of construction machines , improper use of solid and liquid waste or due to dissipation of hazardous material waste	▪ Perform all manipulations with petroleum and petroleum products with maximum protection measures to prevent spill; ▪ Collect and storage lubricants and worn-out parts, as well as packaging for oils and other products in organized way; ▪ Use only technically functional vehicles, engines with catalytic converters, unleaded fuel; ▪ Park the machinery only in places intended for machinery park, and take measures of protection from soil pollution by oil, petroleum and petroleum products. If it comes to pollution by oil leakage or in some other way, that layer of soil should be removed and taken to landfill; ▪ All surfaces damaged by construction works should be reinstated or landscaped after completion of works; ▪ Perform regular repair and washing of mechanization in	Included in price of construction	-	Contractor	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		areas planned for that purpose.					
Construction	Loss of vegetation and potential habitats due to performance of construction works	▪ During organization and siting of construction site disrupt vegetation to the least possible extent, i.e. preserve vegetation cover to the highest possible extent; ▪ Fence the construction site to limit the area of adverse impact; ▪ Limit movement of heavy machinery in order to preserve vegetation to the highest extent possible. Parking areas for mechanization must be planned and repair of vehicles in this area must be prohibited; ▪ Take account of waste storage, particularly waste from the category of hazardous waste (lubricants, fuel) in order to minimize damages to surfaces. Waste disposal to be performed in legal landfills; ▪ Prior the commencement of the construction works, a site specific ESMP shall include a review and record any rare and endangered species, such as Dalmatian Laburnum (*Petteria ramentacea*) and provide precautionary measures to preserve them in line with expert guidance, if any rare registered. ▪ Excess construction material should not be flattened into soil because large areas with autochthonous vegetation are destructed this way;	To be carried out prior to any works, costs should be handled separately.	-	Contractor	Supervisory body	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		▪ Protect surfaces sensitive to erosion with stabilization means and plants that prevent erosion. ▪ CSOP is to plan temporary protection measures from erosion by water (constructing peripheral canals, covering artificial slopes with water impermeable foils etc.)					
Construction	Increased noise and vibrations due to work of construction machinery and work processes including blasting/excavation	▪ Implementing all measures from CSOP in order to reduce noise; ▪ Place noisy equipment further from sensitive recipients; ▪ Plan construction activities so as to avoid parallel activities of several devices close to receptor; ▪ Maintain mechanization (construction machinery and vehicles) in proper condition and use them when necessary. Equipment which is not used at the moment should be switched off; ▪ Using engineering techniques of noise control where practical (using mufflers, silencers etc.); ▪ Limit the activities that potentially produce much noise (for example, Pile driving drills, blasting and other activities,) only to working hours during day (from 7.00 to 19.00, Monday-Friday and from 7.00 to 13.00 Saturday) and avoid Sundays; exceptions can be applied for individual facilities such as tunnels; ▪ In case of blasting of excavations in rock massif choose	Included in price of construction	-	Contractor	Supervisory body, Environmental protection inspector	-

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		the type of explosive which makes least harmful environmental impacts; apply the technique of millisecond activation of blasting charge with directed blasting action, to reduce the impact of superposition of dynamic impacts (vibration), noise and dust emission. Alternatively, use the technique of excavation by applying hydraulic hammer or mechanical switching by milling machines, "moles" and the similar; ▪ The drilling and blasting works shall be minimized as far as possible. ▪ Drilling in cracks shall be avoided. ▪ The drill-hole grid has to be adapted to the individual geotechnical situation. ▪ In case of exceeding the permitted values, ensure protective equipment during work to workers and apply regulation on protection at work.					
Construction	Disturbing landscape features	▪ Reinstate landscape after completion of works, where possible; in parts of road where that is not possible, re-cultivate the environment in the way defined in Landscape design project.	To be determined based on the Landscape Design Project	-	Contractor	Supervisory body	
Construction	Damages to the present	▪ Minimize interruptions of local infrastructure as much as possible; where it is unavoidable, these works shall	Included in price of	-	Contractor	Supervisory body,	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
	Infrastructure and facilities (local roads, water supply, electric energy and telecommunication network)	be organized in collaboration with municipalities and responsible institutions. ▪ Implementation of the provisions on providing timely information to citizens about upcoming interruptions; ▪ If there are damages done to the local infrastructure the Contractor shall restore the object to the original or better state.	construction				
Construction	Loss of wild game and prevention of natural migration routes	▪ Construct passages for animals; underpasses and culvers in line with the design documents. ▪ In collaboration with hunting associations, remove the existing hunting facilities and dislocate (feeding and watering points, observation points) to other locations or replace them with new ones, at a safe distance from the road.	Included in price of construction	-	Contractor, Investor	Supervisory body	
Construction	Danger from mines	▪ Performing works with additional attention and safety measures in case of accident. ▪ Although the area near the road is proclaimed safe, a special attention is needed during the earth moving works and blasting works. In case of any doubt, works must be stopped and MAC BH has to be notified and contacted for consultations and further instructions.	Included in of construction works	-	Contractor	PC Roads FBH	
Operation	Wind impact on participants in traffic	▪ Setting wind-barriers at places of potential gusts of wind, pursuant to received complaints	On the basis of assessme	-	Contractor (third entity)	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
			nt of state in the field				
Operation	Pollution of groundwater and the surrounding land	▪ In the zone of sanitary protection of water source Blace wastewater stormwater from the road shall be collected in a controlled manner (drainage canals and pipes) and treated in appropriate water treatment system (oil-water separators). ▪ If monitoring of water show an increased level of pollution additional measures of protection are to be implemented; ▪ Regular maintenance of the system and facilities of wastewater from the road shall be implemented.	Included in price of road maintenance	-	Corporation responsible for road maintenance	Supervisory body	
Operation	Incidental soil and water pollution due to collision, leakage of hazardous liquids into soil	▪ Traffic road is to be equipped with appropriate horizontal and vertical signalization, which includes necessary prohibitions and notifications in zones of possible water pollution. ▪ Traffic signals to be used to affect traffic participants, who transport hazardous substances in a way to reduce travel speed, increase the level of attention, prohibit stopping vehicles on the road and similar. ▪ Establish good cooperation with all public services. ▪ In case of pollution, urgent rehabilitation shall be implemented in line with Regulation on procedures and	Part of regular road maintenance	-	Corporation responsible for road maintenance	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		measures in cases of accidents on water and coastal water terrain, Official Gazette of FBH no. 71/09. ▪ In case of leakage of hazardous substances they must be diluted, neutralized and absorbed. Cleaning must be performed by an expert using all necessary prescribed protection resources.					
Operation	Pollution of agricultural and forest land due to waste created on the road and at resting places along the road	▪ Take care of communal waste which can be created on bus stops or in resting places; and dispose it in proper manner (provide impermeable containers for waste so that wild animals would not come for feeding) and take it away on a regular basis .	Part of regular road maintenance	-	Corporation responsible for road maintenance	PC Roads FBH	
Operation	▪ Better access to arable land	▪ Better level of its treatment and maintenance.	-	-	-	PC Roads FBH	
Operation	Pollution of agricultural and forest land by disposing exhaust gasses from vehicles	▪ Maintenance of green protective belts and physical barriers in zones of agricultural and forest land.	Part of regular road maintenance	-	Corporation responsible for road maintenance	PC Roads FBH	
Operation	Increased danger from fire and destruction of	▪ Warning signs must be placed next to the road, regarding prohibition of throwing cigarette buds and glass packaging, which is the most common cause of	Part of regular road	-	Corporation responsi	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
	forest land and vegetation along the road	fire in summer months. ▪ Setting up a good and active fire protection system	maintenance		ble for road maintenance		
Operation	Animals injured in the attempt to cross the traffic road; Cutting migration routes of wild game	▪ Implementing periodic monitoring at points of conflict; ▪ Take record of animals getting injured with an aim of taking additional measures of protection, such as marking the places where wild game crosses the road, by means of appropriate signs; ▪ Take care of communal waste which might be left behind at bus stops or resting places, and dispose of it in the prescribed manner i.e. provide impermeable containers for waste so that animals would not come for feeding	Part of regular road maintenance	-	Corporation responsible for road maintenance	PC Roads FBH	
Operation	Disrupting landscape features of the area along the road by constructing facilities	▪ Ensure continuous implementation of prohibition of construction along the road and on direct connection to the road; all possible attempts of construction must be penalized in timely manner.	-	-	Municipalities Stolac and Neum	Municipalities Stolac and Neum	
Operation	Nature park Hutovo Blato	▪ Better transport connections and accessibility to this nature park and other cultural and historical assets and locations	Included in construction works	Included in supervision	Contractor	PC Roads FBH	

LEGEND:	
	Negative impact
	Positive impact

9.2. KEY SOCIAL IMPACTS AND MITIGATION/ENHANCEMENT MEASURES

The table below presents the social impacts, their mitigation / enhancement measures and the responsible entity for their implementation. Only impacts where measure to enhance and mitigate the impact can be implemented by direct control of PC Roads FBH, the Contractor and Municipality have been included in the list.

Table 9.2.-1. Social impact mitigation/enhancement measures plan

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
Pre-construction	Local overview and community support	▪ In order to consult the communities and enhance stakeholder support, due consideration should be taken when choosing the concept of the public consultations and presentation of the project. The presentation should contain the design, the financing method, the land acquisition phase and similar details which shall account to the readiness of government and PC Roads to complete this infrastructure project.	-	Included in price project design	PC Roads FBH	PC Roads FBH	
Pre-construction	Access to water and sanitation electricity and telecommunications	▪ Considering the indirect impacts in the pre-construction phase, it is necessary to create separate documents which will forecast all conflicts of the road M17.3 with the existing infrastructural system: electric energy, water supply and telecommunication systems; as well as to resolve these conflicts. The documents are to be created in frames of the main project design. ▪ Use adequate and up to date utility mapping standards including but not limited to Existing records Surface features Electromagnetic/Radio Frequency Locators Ground Penetrating Radar Vacuum Excavations. ▪ Develop a Utility Conflict Matrix to provide management tool to deal with conflicts, organize relevant information on conflicts and alternatives and allow tracking of conflict resolution progress.	-	Included in price project design	PC Roads FBH	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
Pre-construction	Dominant sectors	▪ During pre-Bid meetings, details on the bill of quantity and specific items of works shall be briefly discussed with PC Road of FBH and potential bidders to highlight type of works and related equipment and machinery likely to be engaged in these activities. This will continue to boost economy in construction sector. ▪ Inform potential investors about opportunities and potential of this area regarding road construction and its impact on tourism.	-	Included in price project design	PC Roads FBH	PC Roads FBH	
Pre-construction	Land acquisition / involuntary resettlement	▪ Development and implementation of resettlement action plan (RAP) as resettlement instrument guiding the resettlement and compensation process in compliance with national Law and OP 4.12. ▪ Compensation at replacement cost of damage/loss according to the RAP. ▪ Timely compensation. ▪ Under this Project PC Roads FBH shall establish Grievance mechanisms prior to commencement of works and expropriation. The grievance mechanism shall serve as a forum to address complaints of PAPs and all other persons affected or impacted by the Project.	Included in RAP	Included in RAP	PC Roads FBH	PC Roads FBH	
Pre-construction	Cultural Heritage	▪ Implementation of detailed archaeological research and conservatory inspection of recorded sites along the route; recording the present state of objects and sites	60.000	20.000	PC Roads FBH	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		(stone walls, tombstones, etc.).Mitigation measure only comes into effect if supervisory body for Cultural Heritage (XXX) determines that there's a need to conduct on-site archaeological surveys. The decision is made during the construction permitting process.					
Construction	Temporary worker in- migration and population change	▪ The contractor is obliged to arrange suitable worker accommodation for non-local workers. Provide that the road will be built between two urban settlements (one of which is a tourist town with high lodging availability), it is envisioned that the contractor will lease worker accommodation from the local, private market. In advance of the civil works, the affected ▪ Municipalities should communicate to the local community the upcoming demand for worker lodging and encourage private owners to early advertise vacancies thus promoting leasing arrangements for vacancies that can accommodate construction workers. ▪ In addition any contractor shall ask for advice and recommendations of specific area of his interest most likely from Municipalities as forums most informed and involved in community activities. ▪ Managing Public Expectations by regular dissemination of information.	Included in the construction works	-	PC Roads FBH with municipalities/Contractor	PC Roads FBH with municipalities	
Construction	Gender	▪ Contractor shall prepare a staff engagement plan to allow where and when possible engagement of man and	Included in the	-	Contractor	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		women equally depending on the specific position. The contractor will whenever possible employ women, depending on available trained and skilled labour.	construction works				
Construction	Education and skills	▪ Workers included in construction works, especially those gone through vocational training will gain experience in this kind of construction works. ▪ Contractors to be encouraged to increase skill improvements at local level.	Included in the construction works	-	Contractor	PC Roads FBH	
Construction	Employment	▪ Hiring guidelines for recruitment will be in place to promote transparency of the recruitment process. ▪ Equal opportunities and non-discrimination will be guaranteed in the recruiting process. ▪ There will be no distinction, exclusion or preference in the recruitment made on the basis of "race, colour, gender, religion, political opinion, marital status, national extraction or social origin, disability, age, sexual orientation, and/or HIV status." ▪ Selection criteria will include minimum age and skills requirements. ▪ All job vacancies will be listed clearly with skills and experience required to fill the position, as well as the duration of the employment contract. ▪ Clear information on the recruiting process and the selection criteria will be publically available and easy to	Included in the construction works	-	Contractor	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		access to promote transparency of the process. ▪ All contractors will be required to implement the hiring guidelines.					
Construction	Access to water and sanitation electricity and telecommunications [83]	▪ During construction comply with major road designs with special care to unchartered utilities. ▪ Emergency and prompt reaction in case of disruption. ▪ Use adequate and up to date utility mapping standards including but not limited to Existing records Surface features Electromagnetic/Radio Frequency Locators Ground Penetrating Radar Vacuum Excavations. ▪ Develop a Utility Conflict Matrix to provide management tool to deal with conflicts, organize relevant information on conflicts and alternatives and allow tracking of conflict resolution progress.	2.000$ / disruption	-	Contractor	Supervisory body	
Construction	Construction site health and safety risk	▪ Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc. ▪ Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe	Included in the construction works	-	Contractor	Supervisory body	

[83] *Also see table 1 Environmental mitigation table section Infrastructure and facilities*

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration. ▪ Regarding the blasting works/works with explosives, the contractor must have certificates that prove the competence or qualifications for these activities, according to the Mining Act of the Federation of Bosnia and Herzegovina (Official Gazette of the FBH 27/10). Specific measures are: ▪ The Contractor is obliged to deliver drilling and blasting parameters with a blasting field sketch at minimum one week prior to the implementation of these works. ▪ Blasting field and the distance to the endangered objects and mechanization needs to be presented in a blasting field sketch. ▪ During the blasting ignition it is not permitted for anyone to be present in the area of the stone scattering zone. ▪ Before the blasting works a security needs to be placed at all possible access points to contain people and vehicles outside of the endangered zone. ▪ The beginning and the end of the blasting works needs to be announced with audio signals. ▪ In case of any losses of cleaning air by drilling no further drilling or blasting works shall be carried out at that point.					

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		▪ Drilling and blasting works need to be coordinated with seismical measurements in nearby settlements according to the law. ▪ The blasting works need to be announced in advance to: Ministry of Internal Affairs of the HNC, police stations in Neum and/or Stolac, and local population (one day in advance and at the day of the blasting works via local media, especially local radio stations). ▪ The contractor is obliged to carry out all the necessary safety measures in line with the legislative for its part of the work; in case of non-performance thereof it is liable to the investor and competent inspection authorities. ▪ Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE. ▪ Evaluate contractor performance on worker welfare and implement penalties for non-compliance. ▪ OHS Training. ▪ Maintenance all mitigation measures proposed during the DNP. ▪ The Contractor shall at all times maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities. ▪ The Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at					

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. ▪ The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. ▪ The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider, and shall undertake such other measures to reduce the risk of the transfer of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals. ▪ The Contractor shall throughout the contract (including the Defects NotificationPeriod): ▪ (i) conduct Information, Education and Communication (IEC) campaigns on the workers' code of conduct vis-a-vis the local communit, at least every other month, addressed to all the Site staff and labour (including all the Contractor's employees, all Subcontractors and any other Contractor's or Employer's personnel, and all truck drivers and crew making deliveries to Site for construction activities)					

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		▪ (ii) provide male or female condoms for all Site staff and labour as appropriate; and ▪ (iii) provide education/awareness raising activities in form of online presentation and brochure for STI and HIV/AIDS on screening, diagnosis, counselling and referral to a dedicated national STI and HIV/AIDS programme, (unless otherwise agreed) of all Site staff and labour.					
Construction	Community health and safety risk	▪ Public dissemination of day-to-day traffic disruption ▪ Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions. ▪ Prepare an emergency response plan in case of emergency transportation to allow transport without delay to the intended destination. ▪ Maintenance all mitigation measures proposed during the DNP. ▪ The contractor shall immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behaviour with respect to, of Sexually Transmitted Diseases (STD) - or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular	Included in the construction works	-	Contractor	Supervisory body	
Constructio	Local transport	▪ Develop the traffic safety management plan.	Included	-	Contracto	Superviso	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
n	system		in the construction works		r	ry body	
Construction	Schools	▪ The transportation of construction material will be aligned to the school timeline. ▪ Timely information of work sequencing. ▪ Develop Traffic Management Plan in conjunction with road authorities to manage all temporary accesses, delivery of material and machinery. ▪ Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions.		-	Contractor Schools	Supervisory body	
Construction	Facilities for staff and labour / working conditions	▪ According to MDBH condition of contract except as otherwise stated, the contractor shall ensure all necessary accommodation and welfare facilities for contractor personnel. ▪ Promote compliance with national labour and employment laws and the fundamental principles and key regulatory standards embodied in the ILO conventions. ▪ Contractor shall comply with all relevant labour laws applicable, including lost related to their welfare, accommodation, daily fees, etc.		-	Contractor	Supervisory body	
Constructio	Income level	▪ Contractors should be encouraged to source local crops,	-	-	Contracto	Superviso	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
n		meat and fish locally produced to feed themselves and their staff, use local services such as food preparation, cleaning of facilities and laundry from local sources. ▪ The contractor should liaison with local suppliers to identify and quantify their potential and increase of capacity balanced with his demands. Activities required from contractor include, but not limited to publishing types of goods and services (food, beverage, cleaning services, repair shop services, etc) which contractor will procure in local media.			r	ry body	
Construction	Poverty	▪ Advertise job opportunities related to the construction works well in advance. ▪ Contractors should be encouraged to procure locally equipment and vehicles, goods services and etc that will be required during construction phase.	-	-	Contractor	Supervisory body	
Construction	Agriculture and Farming[84]	▪ Farmers and cattlemen should be allowed to pass with their mechanization and livestock to their farming lands twice a day, when going and returning back to home. ▪ Cattleman to be encouraged to go to pasture away from construction site as far as possible. ▪ To sprinkle water on construction site to limit dust		-	Contractor	Supervisory body	

[84] *See table 1 Environmental impacts; better access to arable land.*

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		expansion on agriculture land.					
Construction	Tourism	▪ Tourist agencies that offer arrangements to Neum should be noticed about traffic disruptions in order to avoid their customers inconveniences during their vacations.		-	Contractor	Supervisory body	
Construction	Land acquisition[85]/ Involuntary resettlement	▪ The condition precedent to commencement of any construction works is that compensation must be paid at replacement cost according to RPF and RAP ▪ Continuation of raising awareness about Grievance mechanisms.	-	-	Contractor	PC Roads FBH	
Construction	Cultural heritage	▪ Mandatory suspension of all works and informing the competent heritage protection service in case of discovery of cultural / archaeological findings. ▪ The Contractor is obligated to inform the Supervisory body for cultural heritage in case that construction works might have influence on any of 13 tumuli that are recorded to be in direct area of influence. ▪ Periodic monitoring of objects in the indirect area of influence is required in order to determine possible physical damage to the structures. This monitoring will be in the line to the work dynamic.	20.000	-	Contractor	Supervisory body	
Operation	Migration and	▪ Municipality to promote all positive aspects of the newly	-	-	Municipali		

[85] *See table 1 Environmental Impacts; Impact on agricultural land*

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
	population change	constructed road by presentation of improved access to public services and the coast for the revitalization of this area on an ongoing base.			ties of Neum and Stolac		
Operation	Age	▪ The municipalities should develop different policies for positive demographic change. This measures should include improving and promoting transport accessibility, supporting entrepreneurship (especially SMEs), stronger local job creation, gender equality improvement, poverty reduction, immigration encouragement, youth, adult and elderly skills development, etc.	-	-	Municipalities of Neum and Stolac		
Operation	Employment	▪ Hiring guidelines for recruitment of construction site personnel will be in place to promote transparency of the recruitment process. ▪ Equal opportunities and non-discrimination will be guaranteed in the recruiting process. ▪ There will be no distinction, exclusion or preference in the recruitment made on the basis of "race, colour, gender, religion, political opinion, marital status, national extraction or social origin, disability, age, sexual orientation, and/or HIV status." ▪ Selection criteria will include minimum age and skills requirements. ▪ All contractors will be required to implement the hiring	Included in construction works	-	Contractor	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	
		guidelines. ▪ All job vacancies will be listed clearly with skills and experience required to fill the position, as well as the duration of the employment contract. ▪ Clear information on the recruiting process and the selection criteria will be publically available and easy to access to promote transparency of the process. ▪ Prior to civil works, the PC Roads FBH shall release an announcement to indicate commencement of the Project indicating what vocations and skills shall most likely be required during construction and backstopping activities and encourage vocational training.					
Operation	Health services	▪ Publicly announce completion of construction and reduced time for travel. This would promote a constitution of habit to use easily accessible now medical centres in BH especially those in Mostar and Sarajevo.	-	-	PC Roads FBH	PC Roads FBH	
Operation	Schools	▪ Publicly announce completion of construction and reduced time for travel. This would promote the option of choosing the most accessible school to attend.	-	-	PC Roads FBH	PC Roads FBH	
Operation	Dominant sectors	▪ To encourage municipalities to implement physical plans in respect of rest areas along the road and related services.	-	-	Municipalities of Neum and Stolac	PC Roads FBH	

Phase	Impact	mitigation/enhancement measures	Cost Assessment (US$)		Institutional responsibility		Comments
			Operative	Implementation	Operative	Implementation	

LEGEND:	
	Negative impact
	Positive impact

9.3. RESIDUAL IMPACTS

Based on the assessment that all mitigation measures shall be applied with the highest standards by any person responsible for implementation of these measures no significant residual impacts remain and no further reassessment should be made. Although only a few minor residual impacts are identified, they are brought to the attention to warrant careful consideration of conditions regarding mitigation and monitoring. Mitigation measures and monitoring activities are expected to be carried out in conformity to good national and international practice and standards so that any impact residual or otherwise will remain at acceptable level. Analysis of residual impacts and their adequate compensation and offset measures are presented in the table below.

Table 9.3.-1. Residual environmental and social impacts

Impact	Pre-construction phase	Construction phase	Operational phase	Compensate / Offset measures	Responsibility
Environmental impacts					
Landscape				Landscape design project implies greening of all surfaces disrupted by construction and setting up a buffer zone towards the settlements and the agricultural areas.	PC Roads FBH
Waters					
Soil and agricultural land					
Woodland and forestry					
Flora and vegetation					
Fauna					
Wildlife and hunting					
Protected parts of nature					
Air quality				If monitoring proves that the level of air quality is lower than permitted take additional mitigation measures to obtain adequate level of air quality.	PC Roads FBH Contractor
Noise				If monitoring proves that the level of noise is higher than permitted take additional mitigation measures (table 4.14.-1.)	PC Roads FBH Contractor
Infrastructure and facilities					
Social impact					
Loss of land, harvest and damages to property					

Impact	Pre-construction phase	Construction phase	Operational phase	Compensate / Offset measures	Responsibility
Physical/economic displacement					
Conflict/ disruption of utilities with and alignment				Provide adequate access to respective utilities for which supply has been disrupted	PC Roads FBH Contractor Utility Company
Tourism Capital investments					
Slight increase of accommodation demand due to influx.					
Disruption in access to schools					
Creation of jobs					
Direct employment by subcontractors and suppliers					
Increase in service demands (restaurants, shops, hotels, catering, laundry, food supply)					
Increase in craft service demands especially skilled mechanics due to increase of vehicles and equipment					
Disruption in access to medical facilities				In emergency cases allow passage through construction site with adequate signalization and road safety measure	
Possible loss or damage to cultural resources in case of chance finds					
Farmers accessibility to land					
Farmland dust risk				If residual impact remains any damage to farmland shall be compensated according the national law, best practice and respective safeguards	Contractor

Impact	Pre-construction phase	Construction phase	Operational phase	Compensate / Offset measures	Responsibility
Potential traffic safety risks for all road users from increased traffic and the presence of heavy vehicles on roads degraded by increased heavy vehicles traffic					
Tourism activities in the municipality directly and indirectly affected by the Project					
Tourism business related activities					

IMPACTS - LEGEND	
	Not Applicable
	Not Significant Impact
	Minor Impact
	Medium Impact
	Significant Impact
POSITIVE IMPACTS	
	Minor Impact
	Medium impact

10. PROGRAMME FOR MONITORING THE ENVIRONMENT CONDITION

Table 10.-1. Environmental Impacts Monitoring Plan

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
INITIAL STATE								
Groundwater quality: - Chemical analysis (PH, temperature, suspended particles, KPK, BPK5, ingredients with nitrogen) and standard bacteriological analyses	Water source Blace	The necessary parameters to be collected from user of the source.	Prior to the beginning of construction	Defined zero state prior to the beginning of construction of the road in order to be able to monitor any possible changes that might appear during construction and operation of the road.	-	1000 $/ Measuring/ source	To be included in site specific ESMP and supervised by Supervisory body	Authorized laboratory for samples taking and processing
Air quality: SO_2, smoke, NO_2, PM 10, according to legal	Along road route near settlements	Standard testing	Prior to the	As above	-	500 $/	To be	Consultant/compet

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
regulations	and agricultural land	methods	beginning of construction			Measuring/sample	included in site specific ESMP and supervised by Supervisory body	ent institution for measuring air quality
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to instruction and collaboration with specialized institutions for monitoring soil quality, define organization of monitoring and a network of monitoring points	Taking samples by a laboratory and creation of report	Prior to the beginning of construction/ putting road into operation	As above	-	1500 $/ Measuring/sample	PC Roads FBH	Consultant / competent institution for taking and processing soil samples
Forest and forest land: frequency and type of forest systems, character of forest communities and their	In zones of corridors of direct and indirect impacts, according	Field recording and creation of report	Prior to the beginning of construction	As above	-	10.000	PC Roads FBH	Consultant / competent institutio

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
commercial categories, zones of sensitivity to harmful impacts from mechanical damage and damage caused by contamination, soil analysis for agricultural land	to instruction and collaboration with specialized institutions for monitoring soil quality, define organization of monitoring and a network of monitoring points							n for taking and processing soil samples
Physical distribution of Dalmatian Laburnum (*Petteria ramentacea*); Population size of other rare, endangered and endemic species	In zone of corridors of direct and indirect impacts	Field recording and creation of reports	Prior to the beginning of construction	As above	-	5.000	PC Roads FBH	Consultant / competent institution
Migration routes of large and small wild game	In zone of corridors of direct and indirect impacts	Field recording creation of reports	Prior to the beginning of construction	As above	-	15.000	PC Roads FBH	Consultant hired by PC Roads of the FBH
CONSTRUCTION PHASE								

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
Air quality: SO_2, smoke, NO_2, PM 10, according to legal regulations	On construction site, in accordance with air quality monitoring program	Standard methods of testing, air quality meter	When needed and upon complaints by population	Monitoring impact of construction on air quality	-	500 $/ Measuring/sample	To be included in site specific ESMP and supervised by Supervisory body	Consultant/competent institution for measuring air quality
Level of noise	Construction site	Movable device	In accordance with dynamics of performance of works near settlements, upon complaints by population	Monitoring impact of construction on air quality	-	500 $/ measuring	To be included in site specific ESMP and supervised by Supervisory body	Consultant/competent institution for measuring air quality
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to the defined network of measuring places and dynamics of	Taking samples by laboratory and creating report	In accordance with dynamics of performance	Monitoring impact of construction on agricultural soil quality	-	1500 $/ Measuring/sample	To be included in site specific ESMP and	Consultant /competent institutio

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
	performance of works		of works				supervised by Supervisory body	n for taking and processing soil samples
Forests and forest land	According to the defined network of measuring places and dynamics of performance of works	Taking samples by laboratory and creating report	In accordance with dynamics of performance of works	Monitoring impact of construction on quality of forests and forest soil	-	1500 $/ Measuring/sample	To be included in site specific ESMP and supervised by Supervisory body	Consultant / competent institution for taking and processing soil samples
Cultural-historical heritage	In zone of corridors of direct and indirect impacts	Visual inspection	In accordance with dynamics of performance of works	Monitoring impact of construction on facilities of cultural-historic heritage	-	30.000 $	Supervisory body for cultural-historic heritage	Supervisory body for cultural-historic heritage

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
Fauna	In zone of corridors of direct and indirect impacts	Visual inspection	In accordance with dynamics of performance of works	Monitoring impact of construction on facilities of fauna	-	500 $/ Measuring	Consultant appointed by PC Roads FBH	Consultant hired by Investor
Landscape	In zone of corridors of direct and indirect impacts	Visual inspection	In accordance with dynamics of performance of works	Monitoring landscape protection measures implementation	-	Included in price of supervision	Supervisory body	Supervisory body
OPERATIONAL PHASE								
Groundwater quality: - Chemical analysis (PH, temperature, suspended particles, KPK, BPK5, ingredients with nitrogen) and standard bacteriological analyses	Collect data on quality of groundwater at water source Blace	Taking samples and creation of the above mentioned analyses to be performed by competent institutions, in accordance with the Water Act	Once a year and more often upon notice	Monitoring impact of road operation on facilities of groundwater quality	-	1000 $/ Measuring/source	PC Roads FBH	Authorized laboratory for taking and processing samples

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
Air quality: SO_2, smoke, NO_2, PM 10, according to legal regulations	In inhabited places along the road	Standard methods of testing, air quality meters	After putting into operation, every two years/ upon complaints by population	Monitoring impact of road operation on air quality	-	500 $/ Measuring/sample	Contractor and Supervisory body	Consultant/ competent institution for air quality measuring
Level of noise	For inhabited places and groups of houses along the road	Movable devices	After putting into operation, every five years/ upon complaints by population	Monitoring impact of road operation on increase of noise	-	500 $/ measuring	Contractor and Supervisory body	Consultant/ competent institution for noise measuring
Physical-chemical and biological features of agricultural soil, according to legal regulations	According to the defined network of measuring places	Taking samples by laboratory and creating report	When needed	Monitoring impact of road operation on agricultural soil quality	-	1500 $/ Measuring/sample	PC Roads FBH	Consultant / competent institution for taking

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
								and processing soil samples
Forest and forest land	According to the defined network of measuring places	Taking samples by laboratory and creating report	When needed	Monitoring impact of road operation on forest soil quality	-	1500 $/ Measuring/sample	Contractor and Supervisory body	Consultant / competent institution for taking and processing soil samples
Landscape	Implementing prohibition of construction along the road and direct connection to the road	Visual inspection	Periodically	Monitoring landscape protection measures implementation	-	-	Municipalities of Neum and Stolac	Municipalities of Neum and Stolac

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, as well as creation of project documents and additional controls, solely as information for assessment of overall costs of construction.

11. MONITORING OF THE ECONOMIC AND SOCIAL INDICATORS

Monitoring program will be conducted by PC Roads FBH. This will include monitoring the indicators to give a clear picture over positive impacts or negative and allow for corrective actions.[86]

Social indicators baseline data (2014)

- Beneficiaries that report satisfaction in the responses given by the Beneficiary Feedback Commissions to their grievances/comments (%, gender-disaggregated
  - None (0)
- Grievances and comments registered by Central Feedback Desk related to project activities that are addressed within the announced time-frame (%)
  - None (0)
- Number of jobs created for men and women during project planning and construction (to measure direct job opportunities)
  - None (0)
- Access to education
  - Number of pupils

Neum
Elementary school Neum (326)
School Gradac (12)
School Hutovo (9)
Secondary school Neum(75)
Stolac
Elementary school Stolac (297)
1st Elementary school Stolac (389)
Music school Stolac (29)
Secondary school Stolac (464)

Average time needed from home to school and vice versa
25 min

- Access to technical training and vocational education of the adults as the component in reduction of poverty
  - People unemployed in municipalities

Unemployment in Stolac	**Unemployment in Neum**

[86] Indicators measuring resettlement activities shall be monitored within site specific RAP

Education	Male	Female	**Total**	Male	Female	**Total**
Unskilled	204	291	**495**	40	27	**67**
Semi-skilled	8	17	**25**	1	2	**3**
Skilled	497	332	**829**	88	77	**165**
Highly skilled	4	0	**4**	1	0	**1**
Elementary school	0	0	**0**	0	0	**0**
Secondary school education	245	328	**573**	56	54	**110**
Higher education	13	41	**54**	10	10	**20**
University	54	93	**147**	11	13	**24**
Total	**1025**	**1102**	**2127**	**207**	**183**	**390**

- Access to Health services

  Average travel time (min) from Neum hinterland –Neum

  15-50 min

  Time needed the ambulance to arrive from Mostar to Neum

  -Time of commute OCT/MAY – 4 hours
  -Time of commute MAY/OCT - 6 hours

- Road safety
  - Between 2009 and 2013 there were 103 traffic accidents with 2 fatal injuries, 4severe s and 14 light injuries
- Prices of fuel in Neum
  - Diesel:1.96KM/l
  - Petrol:1.96KM/l

Table 11.-1. Social Impacts Monitoring Plan

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
CONSTRUCTION PHASE								
# of grievances submitted and % of Grievance and comments addressed within the announce time-frame	Central Feedback Desk	CFD Log	Monthly	Monitoring construction impacts on local community	-	-	PC Roads FBH	PC Roads
Number of jobs created for men and women during project planning and construction Number of men-months	Contractor employment report and Municipality Economics Department	Data collected by contractors and municipality	Quarterly	Monitoring project influence on local economy	-	-	PC Roads FBH	Municipalities and Contractor
MAINTENANCE AND OPERATION PHASE								
Number of traffic accidents per AADT The number of killed in accidents per AADT The number of severely injured per AADT The number of slightly injured per AADT	At PC Roads FBH offices	Annual bulletin of the Ministry of the Interior on traffic accidents on the roads in Bosnia and Herzegovina	Quarterly during the operational phase Annually during operation phase	The new road shall enhance safety	-	-	PC Roads FBH	PC Roads FBH

Which parameter is to be monitored?	Where will the monitoring be performed?	How will the monitoring be performed – frequency or constant measuring?	When will the monitoring be performed?	Why will the monitoring be performed?	Cost assessment (US$)		Responsibility	
					Implementation	Operative	Implementation	Operative
The price of fuel at gas stations in Neum and comparable gas stations in the region	At Neum gas stations	Field verification	Once within two years after commissioning	Energy sources equalization with rest of the country	-	-	PC Roads FBH	PC Roads FBH

12. INDICATION FOR DIFFICULTIES IN CREATION OF THE ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT

Due to unavailable data which are not up to date and /or due to small samples available for the for this report, especially those data were restriction for collection are imposed by the law [87] results may have been generalized more or less beyond the specific topic and sample from which they have been drawn.

In addition, lack of availability of data in general for the specific area of influence, for some categories from the baseline data, and the time allotted to this report it was not possible to complement all gaps with the method of primary data collection.

Notwithstanding the above said, within the guidance of available data and constraints, the team was still able to assess all the impacts and the outcome of the study was not compromised.

[87] Law on Statistics in F BH; Sarajevo; July, 2003.

13. CONCLUSION

The data from physical planning, characteristics of the environment and social and economic aspects of the area under the influence of the project are analysed as a part of the Environment Impact assessment for the road M-17.3 Buna – Neum, section Neum – Stolac. The new road consists of construction of 38,2 km of the dual carriageway, with the total of 1,5 km long line for slow vehicles, with 2 tunnels, 3 bridges, 18 passages and 8 deviations. The road passes through no protected natural heritage areas and goes nearby 13 settlements with total of 1108 population and another 15 settlements that are in the project area and are affected by it. There are no major industrial facilities along the route. In the vicinity of the project area there are main infrastructure objects such as, water pipes, electric systems and telecommunication lines.

The construction of the road Neum-Stolac will result in direct and indirect positive and negative impacts on environment, with a different likelihood and impact intensity. Most important adverse impacts of Project are expected in construction phase. Considering the land take as a result of Project activities, permanent changes on land use will occur. These impacts will be addressed through mitigation measures in line with relevant international standards, i.e. RAP will be prepared. The land in project area is mostly agricultural land and woodland, which has important environmental function i.e. land protection and prevention of its erosion, filtration of precipitation waters, absorption of carbon dioxide and oxygen releasing, air purification, preservation of biological diversity, biological and environmental balance of eco-system, aesthetic and landscape colours of karst zones, etc., so these impacts are referring to karst soil, landscape, flora and fauna, as well. Impacts on soil, agricultural land and woodland are assessed as adverse, long term and significant in construction phase, but can be mitigated by use of specific measures, as listed in section mitigation measures of this ESIA, and application of good engineering practices. In the project area, there are no surface waters, but because of the karst terrain, construction of the road may cause influence on ground water. Possible impacts on ground waters may occur in accidental situations, and these can be avoid by implementing all measures listed in this ESIA and ESMP. Of particular importance is material management, landfill locations (which are yet to be determined) and protection of the water source Blace. By the implementation of all relevant management plans and other measures, overall significance of the residual impacts are expected to be **Low** (Adverse). The minor residual impact on landscape will be compensate by Landscape design project implying greening of all surfaces disrupted by construction and setting up a buffer zone towards the settlements and agricultural areas. During the construction phase, the Project activities could affect the lifestyle including noise and air quality. Impacts from air pollution and noise emissions in this phase will be effectively managed through the implementation of the mitigation measures, so the residual impacts are expected to be **Low** (Adverse).

In the operational phase, major impacts on environment are not expected. Minor and moderate impacts can be mitigated by listed mitigation measures. If monitoring proves that, some of the environmental components (i.e. ground water at water source spring, air quality and noise) have higher values than permitted, additional mitigation

measures will be taken. In the operational phase, positive impacts are expected due better transport connections and accessibility to Nature Park Hutovo Blato and other cultural and historical assets and locations.

Analysing the impacts of the planned road construction and operation, all negative environmental impacts of the Neum – Stolac road will be removed or minimized to the extent possible, provided strict compliance with proposed protective measures and ensuring monitoring the state of the environment, so in this sense it can be said that the planned project will not have significant negative impact on the environment in the project area.

From the study findings, it has been concluded that the social impacts of the proposed project are minor and easily mitigated. In fact, overall attitude of the communities in the affected area are positive towards the Project. Any disruption shall be temporary and offset by economic benefits. Within the scope of the engagement activities, stakeholders will be informed about the Project and their suggestions and opinions will also be recorded. In addition, a grievance mechanism will be used.

There will be a number of positive impacts. These include:

- A limited number of direct employment opportunities on the project, primarily short term jobs during construction, with few long term, opportunities during operation,
- Skills developed and training gained during employment under this project is increasing peoples employment chances, after the construction period for employment in other projects or specialised industries,
- Better connectivity,
- Better access to education,
- Improved access to health care centres,
- Decrease of travelling time,
- Promotion of cultural heritage,
- Easier and more comfortable access to the coast,
- Tourist sector boost through increased traffic and trafficked access.

The ESIA revealed that the majority of negative impacts are associated with the construction phase and that most of them can be mitigated through the implementation of good construction practice and the proposed mitigation measures, the implementation will be monitored and measures taken to reinforce, adapt or change if needed. There are no residual negative social impacts and their rating is assessed as not significant for negative and medium and minor for positive impacts. It is generally anticipated that the construction will bring short and long term benefits.

Due to the lack of existing data, a site specific Environmental and Social Management Plan (ESMP) will be prepared prior to the start ofworks. The ESMP shall include a detailed environmental baseline, and findings of relevant surveys to reflect the specific conditions of the project site and development. The ESMP shall build on the provisions of the environmental permit, this ESIA, the EIS from 2009 but will be developed based on the principles and requirements of the World Bank policies for such documents.

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15. A N N E X E S

A. DISTANCES FROM NEAREST SETTLEMENTS TO THE FUTURE ROAD:

1. Distance from settlement Babin Do to the future road
2. Distance from settlement Broćanac to the future road
3. Distance from settlement Cerovica to the future road
1. Distance from settlement Crnoglav to the future road
2. Distance from settlement Dobrovo to the future road
3. Distance from settlement Gradac to the future road
4. Distance from settlement Prapratnica to the future road
5. Distance from settlement Hutovo to the future road
6. Distance from settlement Rabrani to the future road
7. Distance from settlement Vinine to the future road
8. Distance from settlement Bjelojevići and Burmazi to the future road

B. SOCIECONOMIC DATA

Table1. FBH, Stolac and Neum population estimate compared with 1991 and 2013. available census data
Table2: Population by settlements
Table 3. Structure of pupils in schools and commuting trends
Table 4. Number of Businesses in Stolac and Neum municipalities per business type
Table 5. Sown areas in ha and yield of agricultural crops in tons for the municipality of Neum 2009-2014
Table 6. Sown areas in ha and yield of agricultural crops in tons for the municipality of Stolac 2009-2014
Table 7. Employment and unemployment in the Municipality of Stolac 2009-2014
Table 8. Employment and unemployment in the Municipality of Neum 2009-2014
Table 9. Total persons unemployed per professional qualification in Neum
Table 10. Total women unemployed per professional qualification in Neum
Table 11. Total persons unemployed per professional qualification in Stolac
Table 12. Total persons unemployed per professional qualification in Stolac
Table 13. The list of cultural and historical heritage assets which are influenced by the project

C. MINUTES OF PUBLIC DISCUSSIONS

1. Minutes of the First Public Discussion held on November 11th 2015 in Hutovo
2. List of invitations for second Public Discussion
3. Minutes of the Second Public Discussion held on March 2nd 2016 in Hutovo

D. PROCEDURE OF OBTAINING AN ENVIRONMENTAL PERMIT