



PowerhouseSite



**JP ELEKTROPRIVREDA**  
Bosna i Hercegovina d.d. Sarajevo

Babino Selo Feasibility Study  
Consultancy Contract No.: C31299/WBES-2014-06-01

**ENVIRONMENTAL AND SOCIAL SCOPING STUDY**  
**BS/EA/0/R/0040-0**

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## **Preface**

This report has been prepared by Pöyry Energy GmbH (“Pöyry”) for JP Elektroprivreda BiH d.d. Sarajevo (“JP EPBiH”) pursuant to the consultancy services agreement signed between the Parties. This report is based in part on information not within Pöyry’s control.

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## 1 INTRODUCTION

With the European Union increasing its efforts to ensure sustainable, clean and self-sufficient energy environment, Bosnia and Herzegovina (BiH) has the potential to play an important role in the future of the European energy sector. Currently less than 50% of BiH's hydro potential has been exploited.

### 1.1 Country Background

In accordance with the General Peace Agreement for BiH, signed in Dayton on 21 November 1995, Bosnia and Herzegovina (BiH) consists of two entities: Federation of BiH (FBiH) and Republika Srpska (RS). On the basis of an arbitral award passed on 5<sup>th</sup> March 1999, the Brčko District of BiH (BD) was formed as third separate administrative unit under exclusive sovereignty of the State.



Figure 1: Administrative Organisation of BiH According to the Dayton Peace Agreement

The central government at the level of BiH received limited powers in accordance with the Dayton Peace Accords of 1995, as all governmental functions and authorities that are not expressly assigned to the institutions of BiH in the Constitution, are those of the entities. The influence and authority of the state government are limited and restricted to coordination of international cooperation and similar obligations, thus currently the most significant policy-making activities, including the power sector, in BiH belong to the entities.

FBiH consists of 10 (ten) cantons and each has its own government and adopts its own laws (which are in accordance with legislation of the FBiH). Municipalities in FBiH and RS usually exercise their authorities through various municipal departments. FBiH is

divided into 79 municipalities, RS into 62 and the City of Brčko is a separate administrative unit – a District.<sup>1</sup>

## 1.2 Project Background

In its Decision, dated 15 February 2010, the Government of Federation of Bosnia and Herzegovina (Government of FBiH) identified priority power generation projects that would ensure long-term sustainability of the power sector in FBiH. Construction of hydropower plant (HPP) Babino Selo (the Project) was identified as one such project and along with other prioritised projects is expected to ensure long-term security of electricity supply to cover future deficits of electricity and power that will result from shutting down existing thermal generation units in FBiH and to ensure FBiH's position in the regional and international electricity market.

JP Elektroprivreda BiH d.d. Sarajevo (EP BiH) is a public utility responsible for generation, distribution and sale of electricity. EP BiH's strategy is centred on: (i) ensuring continuous and uninterrupted supply of electrical energy; (ii) increasing the share of renewable generation in production of electricity in BiH and (iii) improving the efficiency and reliability of thermal power units and ensuring compliance with EU emission standards. An important element of the EP BiH's strategy is efficient use of hydro resources and the development of new hydro power capacities.

The hydropower exploitation of the Vrbas River watershed was analysed in various studies. The first study was completed in 1987, prepared by Energoinvest d.d. Sarajevo and Zavod za vodoprivredu d.d. Sarajevo. The proposed technical solution for HPP Babino Selo within this study has remained relatively unchanged up to now.

In 2013 the most recent study was completed, prepared by COWI AS/Norway and financed by World Bank. This study was an update of the 1987-Study. 25 years passed by since the first study with many social, ecological, economical, legal and other changes. This screening study of COWI should evaluate various development options for water resources and hydropower development of the Vrbas River basin. One conclusion of the 2013-Study was that mean annual flow and therefore yearly generation are probably lower than assumed in the first study. Secondly a faster accumulation of sediments in the planned reservoir was highlighted as a potential problem.

As the next step in the development of HPP Babino Selo, EP BiH decided to contract a consultant to prepare a full feasibility study of the project, including an environmental and social impact assessment in line with EU standards. The feasibility study is supported by the European Bank for Reconstruction and Development (EBRD).

Following the tendering procedure, Pöyry Energy GmbH (Pöyry) has been awarded by EP BiH to carry out a Feasibility Study (FS) for the planned HPP Babino Selo Project.

The planned location for HPP Babino Selo is near the town of Donji Vakuf approximately 7 km upstream, on the Vrbas River, one of the most important tributaries of the Sava River.

The Vrbas River is entirely on the territory of BiH flowing in south-north direction. It starts near Gornji Vakuf, whereas the spring is in the Vranica region at the mountain Scit (1949 m.a.s.l.). Vrbas River has a stretch of approximately 239 km and passes the

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<sup>1</sup> State of the Environment Report of Bosnia and Herzegovina 2012, Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina

towns of Bugojno, Donji Vakuf, Jajce, Banja Luka and flows near the village Srbac into the Sava River. The catchment area is approximately 6.386 km<sup>2</sup>.<sup>2</sup>

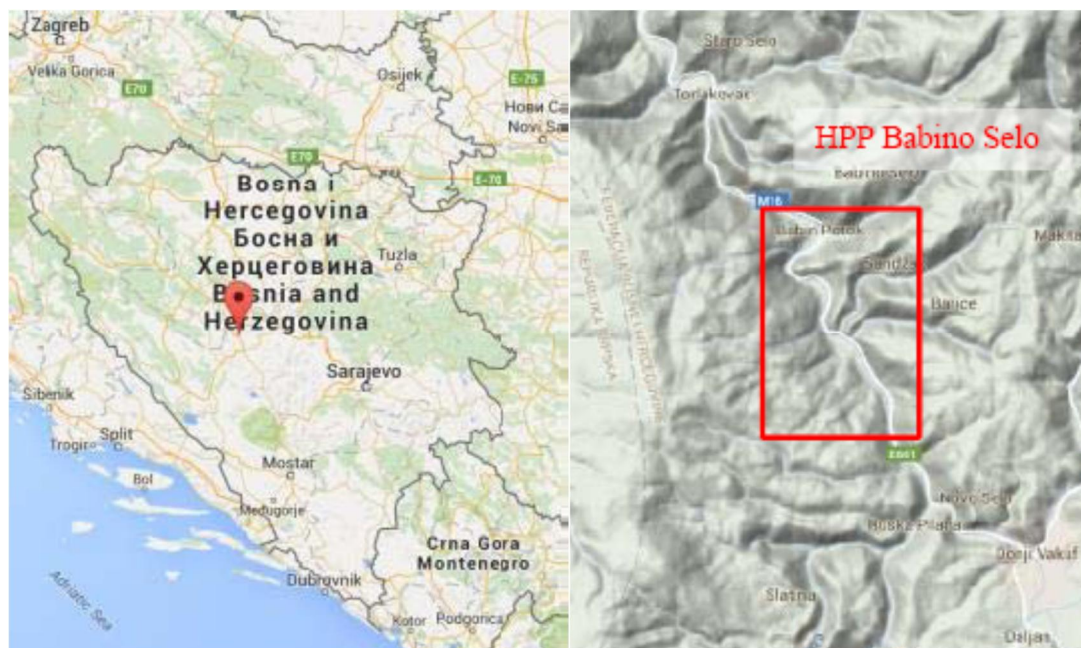


Figure 2: Location of HPP Babino Selo (Source: Inception Report, Pöyry 2015)

### 1.3 Environmental and Social Impact Assessment

Pöyry Energy GmbH (Pöyry) has been awarded by EP BiH to carry out a Feasibility Study (FS) for the planned HPP Babino Selo Project. An integral part of the FS is the environmental and social assessment of the Project undertaken by Enova, Consultants and Engineers (the Consultant), sub consultant to Pöyry.

Environmental and Social Impact Assessment (ESIA) is a systematic process of prediction and assessment of potential impacts of the project on environmental, biological and social/socioeconomic conditions. Carrying out the ESIA ensures that potential environmental impacts are appropriately addressed at the earliest stage of decision-making process taking into account economic and social considerations.

The ESIA is carried out in line with:

- the *Law on Environmental Protection* (Official Gazette of FBiH, No. 33/03 and 38/09);
- the *Regulation on plants and facilities for which an Environmental Impact Assessment is mandatory and on plants and facilities that can be built and operated only if granted Environmental Permit* (Official Gazette of FBiH, No. 19/04);
- *Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment* (EIA Directive), as amended by the Directive 2014/52/EU; and
- EBRD Environmental and Social Policy 2014 and Performance Requirements.

<sup>2</sup>Source: Water Management Strategy of the Federation of BiH 2010-2022(2010)

The specific objectives of the ESIA are as follows:

- Ensure that potential significant positive and adverse environmental and social impacts are identified;
- Capitalize on positive aspects and benefits, mitigate negative impacts and avoid serious and irreversible damage to the environment and people;
- Prepare environmental and social management and monitoring plan to be abided by the proposed project to help ensure the stated above;
- Ensure that environmental and social factors are considered in the decision-making process of construction of HPP;
- Inform the public about the proposed project and ensure effective participation and involvement by all related stakeholders.

In line with the requirements set out in the ToR, the Consultant will undertake the ESIA in two phases:

- Phase 1: Environmental and Social Scoping Study (ESSS);
- Phase 2: Environmental and Social Impact Assessment (ESIA).

The output of Phase 1 is the Environmental and Social Scoping Study (ESSS) which will include a detailed work plan for the ESIA, including timeline of activities and other necessary studies and data collection as required from the gap analysis. It will define the scope of the ESIA, including a description of required environmental and social issues to be considered, the methodology and modelling to be used, and further data collection requirements, as well as the alternatives to be considered and mitigation measures to be investigated in the ESIA.

The output of Phase 2 is the Environmental and Social Impact Assessment which will define the technical, social and environmental parameters and determine and assess the identified impacts for the proposed Project and its alternative scenarios.

This Phase is to include an Environmental and Social Management and Monitoring Plan (ESMMP), identifying the required actions needed to mitigate environmental and social impacts of concern that will be integrated into the design as well as the required monitoring measures. It will identify the responsibilities for implementation as well as oversight for the identified mitigation and monitoring measures including an estimate of investment and/or operating budget required.

A Waste Management Plan (WMP) including construction waste site, selection of dump sites and alternatives for re-use is to be prepared as part of this Phase as well.

During Phase 2 Land Acquisition and Livelihood Restoration Plan (LALRP) will be developed.

#### **1.4 Purpose of the Environmental and Social Scoping Study**

The ESSS is the first phase of the overall ESIA process. The main purpose of the ESSS is to identify potential impacts of the proposed project to be assessed in detail during Phase 2, which of these impacts are significant and most important as well as the geographical area of influence to be considered for each of the different environmental and social parameters and consultation with project affected people and other stakeholders. The ESSS will draw upon screening, scoping and identification of baseline parameters significant for the Project. The potentially significant impacts identified during Phase 1 will be subject to a full-scale appraisal in the process of the ESIA.

Scoping is a process which helps to determine the direction and focus of ESIA, whereby the range of environmental issues and the level of detail to be included in the ESIA are decided upon, in consultation with all relevant stakeholders (EBRD, EP BiH, competent ministry, etc.).

Scoping is necessary in order to establish, with objectivity, the potential impacts of HPP construction on a number of environmental elements from consultations with a range of environmental bodies.

Baseline information collected during scoping stage provides a description of the environmental, social and socio-economic conditions, including information about recipients, which are expected to be exposed to significant impacts.

The information about the baseline conditions is provided with the following purpose:

- Identification of environmental, social and socioeconomic key aspects within the zone potentially affected by the project and vulnerable conditions and objects;
- Provision of baseline data for subsequent prediction and assessment of potential impacts;
- Substantiation of conclusions related to importance, value, sensitivity/vulnerability of the natural and social environment and the recipients.

## 2 PROJECT DESCRIPTION: ALTERNATIVE PROJECT SOLUTIONS AND DESCRIPTION OF THE SELECTED OPTION

The proposed location for construction of the HPP Babino Selo is near the town of Donji Vakuf, on the River Vrbas, one of the tributaries of the River Sava. The River Vrbas is entirely on the territory of BiH and is about 239 km long and its watershed covers an area of 6,386km<sup>2</sup>.<sup>3</sup>

The hydropower exploitation of the River Vrbas watershed was analysed through various studies. The most recent one was financed by the World Bank and completed in 2013 by COWI AS<sup>4</sup> (Norway). This study “*Integrated Water-Energy Development Study Vrbas River Basin*” (COWI, 2013) was effectively an update to the study “*Water Resource Management Basis of the Vrbas River Basin*”, completed in 1987 by “Energoinvest” JSC Sarajevo (“Energoinvest” d.d. Sarajevo) and Institute for Water Management JSC Sarajevo (Zavod za vodoprivredu d.d. Sarajevo). Those studies<sup>5</sup> envisaged construction of a big dam (gravity concrete type of the dam, with a 155 m long and 5 m wide crest, and estimated total height of 36 m) upstream of Babin Potok village, with a large reservoir (storage volume of 8.1 hm<sup>3</sup>).

However, the HPP layout as proposed in the *Integrated Water-Energy Development Study Vrbas River Basin* (COWI AS, 2013) and the *Water Resource Management Basis of the Vrbas River Basin* (Energoinvest JSC Sarajevo and Institute for Water Management JSC Sarajevo, 1987) would lead to the submersion of a substantial amount of residential and agricultural land in the River Vrbas valley, which was considered as a major negative impact and a potential no-go for the project. For this reason, the Feasibility Study for the planned HPP Babino Selo<sup>6</sup> identifies and evaluates several alternative solutions, as well as the “Do-nothing” option, which does not entail the construction and operation of the HPP Babino Selo.

### 2.1 Selection of the Project Solution

Several alternatives have been considered, analysed in detail and described in the Interim Report 1, submitted to EP BiH in November, 2015 (available upon request to any interested parties).

Alternatives were considered on the basis of technical, economic, environmental and social criteria, as described below.

For evaluation of the alternatives from the technical and economical aspect the multi criteria matrix has been used, taking into account the following:

1. Highest energy production,
2. Lowest investment costs,
3. Lowest specific costs,
4. Flexibility in power generation,
5. Construction risks, etc.

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<sup>3</sup> Source: Water Management Strategy of the Federation of BiH 2010-2022 (2010)

<sup>4</sup> COWI AS, Norway, *Integrated Water-Energy Development Study of the Vrbas River Basin*, 2013

<sup>5</sup> Refers to studies: *Integrated Water-Energy Development Study of the Vrbas River Basin*, (COWI AS, 2013) and *Water Resource Management Basis of the Vrbas River Basin* (Energoinvest JSC Sarajevo and Institute for Water Management JSC Sarajevo, 1987)

<sup>6</sup> This Environmental and Social Scoping Study document is the first part of the Environmental and Social Impact Assessment document which is being developed as part of the Feasibility Study for the planned HPP Babino Selo

In order to evaluate environmental and social impacts/benefits of considered alternatives, the multi criteria analysis was also used and the following aspects were analysed:

1. Physical environment: (climate, air quality and micro climate, water quality/sediments, landscape);
2. Biotic environment (aquatic life, terrestrial fauna/flora, vulnerable habitats, protected areas);
3. Human environment (resettlement, loss of land, water use (water supply, irrigation, recreation, fish farming), cultural issues, ethnic issues);
4. Aspects related to construction (health and safety (including population health and water related diseases, OHS and community health and safety, flood protection), labour and employment, noise and vibration, air quality, traffic and infrastructure, community acceptance).

In general, the construction of HPP Babino Selo, especially dam, inevitably leads to changes in the ecosystem of the River Vrbas (fragmentation of habitats).

Part of the natural watercourses will be transformed into a reservoir (or artificial lake), which will lead to changes in hydrological and ecological characteristics in this part of the River Vrbas. From environmental and social viewpoint, the main factor influencing the impact of the given alternatives is the reservoir level and thus the size of the reservoir and inundated area.

Based on the evaluation of the alternatives against the technical, financial, environmental and social criteria, as presented in detail in the Interim Report 1, EP BiH has decided that the Alternative “1Aa” will be further developed according to the Terms of Reference.

Therefore, the following chapters: Chapter 4 – Identification of Potential Environmental and Social Impacts and Chapter 5– Detailed Work plan for ESIA are developed with regard to the selected Alternative “1Aa”.

## **2.2 Description of the Selected Alternative “1Aa”**

Dam location remains unchanged within the canyon compared to the original solution from 1987, but with substantially lower dam height in order to avoid flooding of the existing main road M5 (E661) (FSL=487 m.a.s.l.). A vertical-slot fishpass for keeping the continuity of the water flow will be foreseen to provide the residual flow in the river stretch between weir and tailwater. The tail of the reservoir will be approximately close to the wooden bridge upstream the canyon. The powerhouse location remains unchanged compared to the original solution from 1987.

For alternative “1” a rubber weir is designed and weir with radial gates would also be possible. For flood dissipation a weir section with 35.00 m width and side piers with inclination 1.1 is foreseen. The rubber weir has a maximum height of 4.75 m. In front of the weir a concrete bottom slab with 25.00 m length is planned, with a grout curtain at the upstream end to avoid seepage underneath the weir.

Because of the low difference in height between weir crest and tailwater a stone pavement placed in concrete is sufficient instead of a stilling basin.

An inspection gallery is foreseen in the weir foundation, with connection to the right bank. From this gallery the drainage holes will be drilled. The drainage water will be measured and pumped into the tailwater.

For flushing of the reservoir a bottom outlet channel is placed on the left side, right in front of the power intake structure. The outlet channel is combined with the access to the vertical-slot fish pass.

To connect the power plant to the electrical grid, an underground cable will provide a connection to the 20 kV network at Donji Vakuf. The connection of the small unit will also be done via underground cable to the nearby 20 kV line.

For alternative “1Aa” no relocation of main road E661 would be necessary.

### **Operating regime**

HPP Babino Selo will be operated as run-of-river scheme with continuous operation. During the low flow period from July to October there will also be some discontinuity in operation with moderate fluctuations of discharge released (but no hydro-peaking) The amplitude of intra-daily fluctuations in the flow released from the reservoir will be small (with ramping up and ramping down). Minimum environmental flow will be provided permanently.

Considering the projected operation regime of the power plant, the Kaplan type of turbine (horizontal “S” or vertical) is recommended for HPP Babino Selo. A powerhouse design for 2 units of horizontal S-Turbines and vertical Kaplan-Turbines has been proposed and the final dimensions will be determined in the Feasibility Study.

## **2.2.1 Location and Description of the Dam**

The elevation of the thalweg at the dam location “A” is between 477.00 and 479.00 m.a.s.l. The alignment of the main road M5 (E661) between Donji Vakuf and Jajce on the right bank of the River Vrbas is approximately 10 m above the riverbed on el. 488.00 m.a.s.l. The uncategorized access road on the left bank is on the same elevation as the main road. The river canyon has a V-shape.

For alternative 1 the maximum reservoir level shall remain with sufficient freeboard below the elevation of main road E661 to avoid any road relocation. Therefore the full supply level is limited with full supply level (FSL) = 487.00 m.a.s.l. The stretch of reservoir will be 900 m and the backwater curve will reach onto the wooden bridge in Krivače settlement upstream the canyon. The crest elevation of this dam is 488.00 m.a.s.l thus guaranteeing sufficient freeboard of 1.00 m. The minimum operation level is limited with Minimum Operational Level (MOL) = 483.00 m.a.s.l. with respect to sufficient water overlap at the intake structure.

For this project arrangement a flexible rubber weir is fixed on a concrete sill on el. 482.25 m.a.s.l. The width of the weir section of 35 m guarantees full discharge of  $Q_{10000}$  at laid down rubber weir.

## **2.2.2 Waterway**

According the original project layout of 1987-Study a below ground waterway (type “a”) is foreseen. It comprises an intake structure on the left bank, a concrete lined pressure tunnel, a surge tank and a steel lined penstock. Preliminarily the inner and excavation diameter of 1987-Study<sup>7</sup> have been adopted.

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<sup>7</sup> Refers to Study Water Resource Management Basis of the Vrbas River Basin, Energoinvest JSC Sarajevo and Institute for Water Management JSC Sarajevo, 1987

For access to surge tank a short road has to be constructed. The surge shaft will be excavated from up to down. After each sequence of drill and blast the preliminary support has to be placed: a combination of rock bolts, steel mesh and shotcrete. Before concreting the inner lining it is recommended to place a PVC-foil in order to guarantee only minor water losses during operation period.

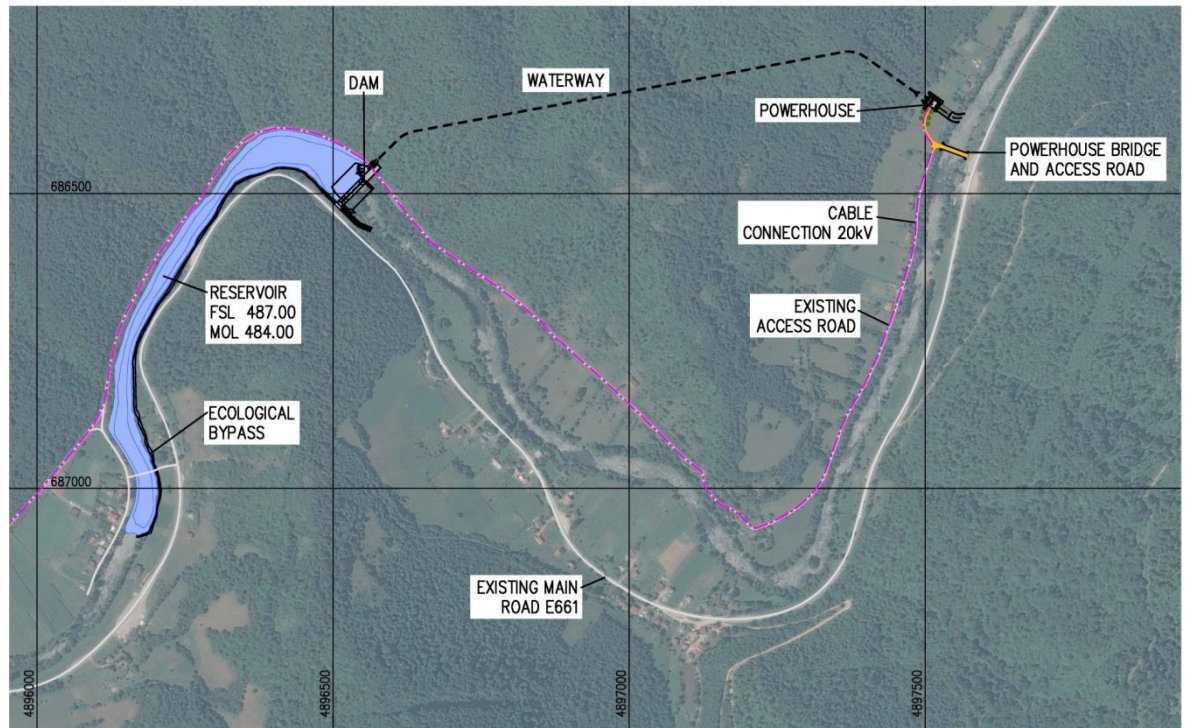


Figure 3: Project Layout of the Selected Alternative "1Aa"

## 2.3 Summary of Public Participation Process

### Pre-scoping Phase Consultations

Pre-scoping phase consultations refer to the identification of the key stakeholders affected directly or indirectly by the Project. EP BiH has organized several meetings with the Mayor of Donji Vakuf (before and during the process of collecting the tender documentation for the Project) in order to request preliminary approvals related to exploration work required for the preparation of the Feasibility Study. Additionally, the Municipal Council has been informed by the Mayor of the Project initiation and the planned activities.

With regards to this Project in the pre-scoping phase, EP BiH has not conducted any other systematic stakeholder engagement activities pertaining to local communities, NGOs or other stakeholder groups.

### **Scoping Phase Consultations**

A scoping meeting will be organized by EP BiH in March 2016 to present the draft Environmental and Social Scoping Study (ESSS) to interested parties and identified stakeholders, who will be provided with the opportunity to submit comments and recommendations to the draft ESSS during the meeting or subsequently in writing, and any such comments or recommendations will be duly considered and included in the final ESSS.

### **ESIA Phase Consultations**

The draft Environmental and Social Impact Assessment (ESIA) will be publicly disclosed on the websites of EBRD and EP BiH during a period of 120 calendar days prior to consideration of the project by the EBRD's Board of Directors (as required under EBRD's PIP). Stakeholders will be provided with the opportunity to submit comments and recommendations to the draft ESIA, and any such comments or recommendations will be considered and included in the final ESIA.

### **Public Consultative Meetings**

Public consultative meetings during Project preparation and implementation will be held on a regular basis, at least every 6 months, i.e. prior to and during the construction works. At least one public meeting will be organized prior to initiation of construction works. Such meetings will be aimed at providing regular gatherings of all stakeholders and will be open for all interested parties. During these meetings, the participants will be able to present their opinions and remarks with regards to the Project, as well as to suggest possible solutions of the issues raised, which will be documented and addressed appropriately in the Project Implementation Monitoring Reports in regards to the received grievances and follow up action taken to be prepared by EP BiH.

### 3 LEGAL AND INSTITUTIONAL FRAMEWORK

#### 3.1 Legal and Institutional Framework in BiH and FBiH

Environmental management in BiH is fragmented and is carried out at four administrative levels: state level, entity level, cantonal level and municipal level. According to the *Constitution of FBiH*<sup>8</sup>, environmental protection policy is under the joint responsibility of FBiH and the Cantons. The Federal Ministry of Environment and Tourism (FMET) is responsible for environmental management at entity level with its own authorities and jurisdictions. Cantonal ministries in charge of environment in 10 cantons of FBiH are responsible for environmental management at Cantonal level (in this case, the Ministry of Physical Planning, Construction, Environmental Protection, Return and Housing Affairs of Central Bosnia Canton).

In the field of physical planning and construction, the Federal Ministry of Physical Planning (FMOPP) is responsible for physical planning and land use at entity level, whereas the Cantonal ministries in charge of physical planning in 10 cantons of FBiH are responsible for physical planning and land use at Cantonal level.

A detailed description of the institutional and regulatory framework of FBiH pertinent to this Project is given in Annex .

#### 3.2 EBRD Environmental and Social Policy

The EBRD's Environmental and Social Policy 2014 (ESP) is a key EBRD document, which details the commitments of the Bank's Funding Agreement to promote in the full range of its activities, environmentally sound and sustainable development. EBRD-financed projects are expected to meet good international practice related to sustainable development. To help clients and/or their projects achieve this, the Bank has defined specific Performance Requirements (PR) for key areas of environmental and social issues and impacts as listed below:

- PR 1: Assessment and Management of Environmental and Social Impacts and Issues,
- PR 2: Labour and Working Conditions,
- PR 3: Resource Efficiency and Pollution Prevention and Control,
- PR 4: Health and Safety,
- PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement,
- PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources,
- PR 7: Indigenous Peoples,
- PR 8: Cultural Heritage,
- PR 9: Financial Intermediaries,
- PR 10: Information Disclosure and Stakeholder Engagement.

New facilities or business activities to be financed by EBRD are designed to meet PRs from the outset.

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<sup>8</sup> Constitution of FBiH (Official Gazette of FBiH, 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)

If a proposed business activity to be financed relates to existing facilities that do not meet PRs at the time of Board approval, the client will be required to adopt and implement an Environmental and Social Action Plan (ESAP), which is satisfactory to EBRD and delivered within the agreed timescale (European Bank for Reconstruction and Development, Environmental and Social Policy, 2014).

### **Brief gap analysis between local legislation and EBRD requirements**

A brief review of gaps between EBRD's specific Performance Requirements (PRs) and FBiH regulations is provided in the table below.

<b>Performance Requirement</b>	<b>Level of compliance of FBiH regulations with PR</b>
PR 1: Assessment and Management of Environmental and Social Impacts and Issues	<p>Legislation in FBiH, through the <i>Regulation on Facilities Subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit</i> requires that projects undergo environmental assessment to determine the resulting impacts on the components of the environment, and that adequate mitigation measures are developed.</p> <p>Specific differences with EBRD PR 1 requirements include:</p> <ul style="list-style-type: none"> <li>- no requirement for implementing an environmental and social management system</li> <li>- no requirement for specific social impact assessment</li> </ul>
PR 2: Labour and Working Conditions	<p>The legal regulations in FBiH governing labour and working conditions (in particular, the Labour Law of FBiH) are compliant to a great extent with the requirements of PR 2, such as requirements regarding child and forced labour, workers organizations, human resource policies or retrenchment. In addition, Bosnia and Herzegovina has ratified the International Labour Organization conventions and these have been accordingly transposed into domestic legislation.</p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no legal obligation to establish a formal grievance mechanism for workplace concerns</li> <li>- issue of non-employee workers (contractors and sub-contractors are required to submit proof of compliance with certain legal provisions such as payment of taxes, but not all the relevant requirements of PR2)</li> </ul>
PR 3: Resource Efficiency and Pollution Prevention and Control	<p>A broad range of legal regulations govern the issues of pollution prevention and control in FBiH, including water, air and soil by setting value limits that may not be exceeded. Local legislation contains provisions on the safe management of wastes, including hazardous waste management.</p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no legal obligation to apply resource efficiency measures</li> <li>- no specific requirement to reduce project - related GHGs</li> </ul>

<b>Performance Requirement</b>	<b>Level of compliance of FBiH regulations with PR</b>
PR 4: Health and Safety	<p>A broad range of legal regulations govern the issues of health and safety in FBiH.</p> <p>Occupational health and safety issues are regulated by the Law on Safety at Work and its bylaws. Protection against fire and hazardous materials is regulated by the Law on the Protection against Fires and Protection of Fire-fighters and its bylaws. On construction sites, H&amp;S issues are regulated by the Decree on Construction Site Organization, Mandatory Documentation on Construction Site and Construction Work Participants. This Decree, together with the Law on the Basics of Traffic Safety on Roads in BiH, contains provisions on traffic and road safety. Other issues such as natural hazards and emergency preparedness and response are regulated by FBiH legislation.</p> <p>No specific gaps related to the PR4 have been identified with regard to health and safety regulations in FBiH, as the above listed regulations are broadly compliant with PR 4 requirements.</p>
PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement	<p>In general, the provisions of the FBiH Expropriation Law are compliant to a certain extent with EBRD PR 5 requirements.</p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no requirement for development of resettlement plans</li> <li>- informal occupants or users not legally recognized</li> <li>- no requirement for specific grievance mechanism for Project Affected People</li> </ul>
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<p>As part of the environmental assessment prescribed by Regulation on Facilities Subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit, assessment of the project effect on the biodiversity is undertaken. BiH is a party of the Convention on Biological Diversity<sup>9</sup></p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no requirement for ESMS which includes measures for biodiversity conservation</li> <li>- no legal requirement for monitoring the supply chain</li> </ul>
PR 7: Indigenous Peoples	Not applicable

<sup>9</sup> Since November 24 2002

<b>Performance Requirement</b>	<b>Level of compliance of FBiH regulations with PR</b>
PR 8: Cultural Heritage	<p>The legal regulations in FBiH governing cultural heritage include: Agreement on the Commission to Preserve National Monuments - Annex 8 of the General Framework Agreement for Peace in BiH, 1985 Law on Protection and Preservation of Cultural, Historical and Natural Heritage, Law on Implementation of Decisions of the Commission to Preserve National Monuments, established pursuant to Annex 8 of the Dayton Agreement (Official Gazette of the FBiH, No. 02/02, 27/02, 6/04, 5 /07). The Central Bosnia Canton does not have cantonal laws in this field; hence, the 1985 Law on the Protection and Preservation of Cultural, Historical and Natural Heritage is applicable.</p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no requirement for consultations with affected communities where a project may affect cultural heritage</li> <li>- no requirement for development of a specific chance finds procedure</li> <li>- no specific requirement for allowing access for affected communities to the cultural site (if the site has been used by affected communities within living memory for long standing cultural purposes)</li> </ul>
PR 9: Financial Intermediaries	Not applicable
PR 10: Information Disclosure and Stakeholder Engagement	<p>The legal regulations in FBiH guarantee access to information as a basic principle: the <i>Law on Free Access to Information in FBiH</i> states that all public entities must provide access to information to all stakeholders, whereas the <i>Law on Environmental Protection</i> of FBiH states that every person and every organization must have adequate access to information regarding the environment which is at the disposal of public authorities. The latter Law also regulates the EIA procedure and the public hearing processes in FBiH, and prescribes that public hearings must be organized for projects that require an EIA.</p> <p>Specific issues/gaps include:</p> <ul style="list-style-type: none"> <li>- no requirement for development of Stakeholder Engagement Plan</li> <li>- processes are more focused on information disclosure rather than engaging and consulting stakeholders at an early stage</li> </ul>

Table 1: Brief Gap Analysis between EBRD and FBiH Requirements

### 3.2.1 Procedures for Obtaining Urban Permits, Construction Permits and Use Permits in FBiH

Issuance of Urban Permits, Construction Permits and Use Permits is regulated both at FBiH level and Cantonal level. The Federal Ministry of Physical Planning (FMPP) is responsible for physical planning and land use at entity level, while the Cantonal ministries in charge of physical planning are responsible for physical planning and land use at Cantonal level.

The *Law on Physical Planning and Land Use at the Level of FBiH* (Official Gazette of FBiH, No. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) and the *Decree on Determination of Spatial Intervention and Constructions for which the Federal Ministry of Physical Planning Issues Urban Permits and/or Location Information* (Official Gazette of FBiH, No 32/14), regulate the procedure for obtaining Urban Permit, Construction Permit and Use Permits. For this project Urban Permit, Construction Permit and Use Permit will be issued by FMPP. Detailed procedures for obtaining Urban Permit, Construction Permit and Use Permit in FBiH are described in detail in Annex .

## 4 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

### 4.1 Environmental Impacts

#### 4.1.1 Impacts on Air Quality

##### Potential Impacts

Impacts on air quality are identified during construction, operation and decommissioning phase. In general, impacts on air quality caused by construction and operation of HPP Babino Selo are expected to be local, short-term and minor.

During the *construction phase*, the following impacts on air quality are likely to occur:

- Dust generation( $PM_{10}$ )from construction works on HPP infrastructure and access roads, traffic, transport and disposal of waste material to and from construction site. Dust generated by construction activities can be mechanically transported off site by wind or re-suspended by vehicles, which can affect the ambient air quality. It can also arise from wind erosion on material stock piles and earth moving activities;
- Emissions resulting from the combustion of fossil fuels and exhaust gases from the mechanization. This refers to pollutants such as sulphur dioxide, carbon dioxide, carbon monoxide, nitrogen oxides and volatile organic compound. Low concentration of these pollutants are expected if machinery and equipment are well maintained, but if motor is not properly functioning (due to poor service or age of machinery and vehicles) these emissions might exceed the permitted values (permitting values are related to the vehicles used on site)<sup>10</sup>.

On the other hand, no significant long-term impacts during the *operation phase* are expected. Vehicular access to these sites for operational purposes will be minimal; hence emissions from such vehicles will be negligible. Additionally, back-up power for the HPP operation will be supplied from back-up generators and a mains grid connection. Since, these will only be used in emergency conditions and for limited periods of time, no further consideration within this study is required and there is no potentially significant emission sources associated with other operational elements.

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<sup>10</sup>In line with the *Regulation on technical and exploitation conditions for vehicles that perform certain types of transport* (Official Gazette of FBiH, No. 51/06,79/06) and the *Regulation on dimensions, total weight and axle load of vehicles, on obligatory vehicle devices and equipment vehicle, on basic requirements to be met and traffic equipment on roads* (Official Gazette of BiH, no. 23/07)

In the *decommissioning phase* it is likely that any potential air quality impacts would be similar to those in the *construction phase*, as similar activities would be required and therefore impacts on air quality associated with this phase are considered to be of a similar nature. Therefore, no negative long-term air quality impacts are expected during construction and operation of HPP Babino Selo.

#### **Further Studies Required in the ESIA Phase**

Within the scoping phase, the Consultant collected enough information to carry out the complete assessment of potential impacts on air quality in ESIA phase. Since no significant adverse impacts on air quality arising from the project activities are expected, no further data collection in the field of air quality during the ESIA is needed; however, mitigation measures to avoid and/or minimise potential impacts on local air quality will be proposed.

### **4.1.2 Impacts on Micro Climate**

#### **Potential Impacts**

In general, HPPs which include the formation of reservoirs may reflect on microclimatic conditions by causing:

- increase of local air humidity compared to the present state due to evaporation of water from the reservoir,
- increase of days with fog compared to the present state due to greater amount of aerated water and aero-pollution (for the project area this refers to exhaust gasses from everyday traffic on the main road M5 (E661)),
- increase in the frequency and amount of local rainfall,
- decrease of insolation compared to the present state due to greater amount of cloud cover.

During the *construction phase* of the Project, no impacts on microclimatic conditions are expected.

Impacts on microclimate are likely to be expected during HPP the *operation phase*, since this phase of the Project will result in formation of the reservoir. The extent of identified impacts will directly depend on the volume of water in the reservoir.

The occurrence of intense evaporation during the warmer months of the year (May to September) will vary on amount of water in reservoir, saturation of air with water vapour and air temperature. Due to the fact that aero-pollutants act as cores/triggers for condensation of water vapour, exhaust gasses from the everyday traffic on mail road M5 (E661) may lead to increase of days with fog compared to the present state.

The formation of the reservoir with the total storage volume of 147,798 m<sup>3</sup> in Alternative 1A has no potential to affect climate in a way to cause regional or global climate changes, or climate changes in measurable extent and therefore the impact is assessed as negligible<sup>11</sup>.

No impacts on microclimatic conditions during the *decommissioning phase* of the Project are expected.

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<sup>11</sup> Compared to large HPPs (from few hundred MW to above 20GW) which form large water reservoirs, the impacts caused by construction of the HPP Babino Selo are not expected to cause measurable difference in terms of change of microclimate.

### **Further Studies Required in the ESIA Phase**

During the ESIA phase, no further collection of data related to climate and meteorological conditions will be required. Within the scoping phase, the Consultant collected enough data to carry out the complete and detailed assessment of potential impacts on climate conditions in ESIA phase.

#### **4.1.3 Noise Distribution**

##### **Potential Impacts**

Impacts caused by noise and vibrations are complex and depend on their intensity. Noise can affect psychological, physical and social state of living world and humans, and vibrations can affect aquatic and terrestrial invertebrate species, as well as fish species.

All phases of the proposed Project are expected to cause noise emission and vibration; however, these impacts will be caused by different activities. With regard to noise distribution and increase of ambient noise, it has to be noted that the planned locations of the dam, the waterway and the powerhouse are sparsely populated. The present ambient noise is represented by everyday traffic on main road M5 (E661).

In terms of noise emission and vibration disturbances related to the Project, the sources of noise and vibration are expected during:

- Construction phase,
- Operation phase (in the power generation process),
- Decommissioning phase (potential demolition of facilities).

The main sources of noise and vibration during the **construction phase** will be related to construction of HPP facilities such as dam, waterway, powerhouse, etc. Activities related to the tunnelling for construction of the waterway “a” are expected to cause higher emission of noise and vibration due to greater extent of necessary construction works, compared to other necessary construction works (construction of the dam and powerhouse).

On the construction site, due to the anticipated construction activities, the noise will arise from the transport means (trucks), machinery (loader, bulldozer, excavator, etc.). Occasional sources of noise (low intensity - varies throughout the day) will occur during operation of the heavy machinery on the site, and loading and removal/ transport of materials required for civil works. Table 2 below provides an overview of the most frequently used machines in construction activities and their noise levels at a reference distance of 15 m from the source (based on data from similar studies for infrastructure projects). In case of use of heavy machinery vehicles, vibrations have a frequency of 8 to 20 Hz and may directly affect the living world and objects through foundations.

Impacts of noise and vibration during construction phase are expected to be short-term.

Source	Noise level at a distance of 15 m from source in dB (A)	Noise level at a distance of 1 m from source dB (A)
Compressor	87	111
Bulldozer	81	105
Cement mixer	85	109
Cement pump	70	94
Cement vibrating machine	77	101
Mobile crane	81	105
Dumper	83	107

Table 2: Noise Levels of Construction Equipment<sup>12</sup>

During the *operation phase*, emission of noise and vibration will arise from the technology for power generation. The source of noise and vibrations during operation of the planned HPP Babino Selo will be the planned Kaplan-Turbine (vertical or horizontal S-Turbine), which will, however, be located inside the powerhouse. The phenomenon of cavitation, characterized by vapour generation and condensation, occurs frequently in hydraulic machines. It causes vibration, increase of hydrodynamic drag, generation of noise, and acoustic emission. Given that turbines will be located inside the powerhouse, no significant noise impacts outside the powerhouse are expected during operation.

There are no settlements near the proposed location of the powerhouse and the nearest residential objects are located along the left river bank approximately 70-300 m from the powerhouse, so the noise is not expected to affect the residents in normal operation condition of HPP. However, in immediate vicinity of the power house there is a restaurant “Bosnae” that is currently closed. There is no information whether this restaurant is planned to be opened in the following period, but this has to be taken into account and mitigation measures for the operation phase proposed.

*Decommissioning phase* will include demolition and removal of the constructed objects. Increased noise and vibration are likely to arise during the use of heavy machinery (loader, bulldozer, excavator, etc.) and from the transport means (trucks). Impacts of noise and vibration during this phase are expected to be similar to those occurring during the construction phase.

Noise distribution is likely to be related to immediate vicinity of the facilities in the project area. The identified impacts from noise and vibration do not have the potential to affect areas located upstream of the location of the dam or downstream of the location of the powerhouse (relevant for all phases of the Project).

### **Further Studies Required in the ESIA Phase**

During the ESIA phase, no additional collection of data related to noise will be required. The Consultant collected enough information during the scoping phase to carry out the complete assessment of potential impacts from noise distribution and assessment of noise levels to the nearest residential objects in ESIA phase. The adequate mitigation measures to avoid and/or minimise potential impacts will be suggested in the ESIA

<sup>12</sup>LASOY DOO, Study on Environmental Impact Assessment for Construction of Express Way A1, from the Bridge of River Raec, Interchange “Drenovo” to Gradsko (Junction with Highway A1), 2013

During the **construction** and the **operation phase**, the Operator of the proposed HPP, Public Company “JP Elektroprivreda BiH” will be obliged to carry out periodical monitoring of the ambient noise generated by the construction activities and operation of the HPP, in accordance with the provisions of the Environmental Permit that should be issued by the Federal Ministry of Environment and Tourism. Monitoring of the ambient noise should be performed by engagement of an authorized company (a third party).

#### 4.1.4 Impacts on Surface Waters

##### Potential Impacts

###### *Hydrology*

During the **construction phase** no significant impact is expected on natural flow regime of the Vrbas River and on existing HPPs downstream of Babino Selo location: HPPs Jajce I and II and HPP Bočac. Construction of the pressure tunnel may have impact on the local ground water flow regime. During this phase no water reservoir would be formed to have an impact on the natural flow hydrograph. Localized impacts will be caused by the river diversion during dam construction. These impacts will be looked in more detail at during the ESIA.

During the **operation phase**, no significant impact on the general flow regime of the Vrbas River can be expected. Locally, on the river section between the dam structure and the water tail downstream, the flow regime will be reduced to environmental flow, which may have an impact on natural process of ground water recharge, which is the potential water source for various purposes for surrounding area. During ESIA phase, the Consultant will investigate locations and possibly yield capacities of existing ground water sources used for local water supply.

**Decommissioning phase** would be similar to the construction phase, so no negative potential impacts on hydrology are expected during this phase. However, these impacts will be looked in more detail at during the ESIA.

###### *Water Quality*

During the **construction phase**, potential negative impact on the nearby downstream water quality of the Vrbas River can be connected to chemicals, oil and lubricants sourced from construction equipment, due to their inadequate handling and management. Also, potential inadequate treatment of the sanitary wastewater from the construction site facilities can have negative impact on water quality.

During the **operation phase**, by formation of the reservoir, the surface water body<sup>13</sup> at the location of planned HPP Babino Selo will be converted from natural to “heavily modified surface water body” (HMWB), which implies all consequences regarding the required water quality level, meaning that the minimum class “good” will be changed to “good potential” with less requirements.

Reservoir of the HPP has environmental impact on surface water quality and, indirectly, on corresponding ground water body.

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<sup>13</sup>River basin plan for watershed of river Sava of the Federation of BiH, with the Characterisation report, was not adopted at the time of preparation of this report (October 2015). Therefore, there is no authorized data regarding the borders of „water bodies“, types of surface waters, categories and required limits for „good status“, as minimum required according to Water Framework Directive (WFD) and the Law on Waters (Official Gazette of FBiH, No. 70/06), for each category.

Due to exploitation, various physical processes which differ from the natural condition will occur in the reservoir, of which the most important is the change of sedimentation and oxygen concentration by length and depth of the reservoir. The water quality of embankment reservoir can be deteriorated due to nutrients accumulation, produced by upstream polluters and expected eutrophication processes. Concentration of suspended solids can be higher, especially in lower layers of water body. This negative impact on the water quality in the reservoir can be transferred to the downstream watercourse, by water intake structures, especially if they are located at lower height of the reservoir.

Increased concentration of suspended solids in the reservoir will produce accumulation on bottom sediments, usually followed by organic matter decay and negative impact on water quality expressed by lower oxygen concentration or even anaerobic condition.

Downstream settlement of Babin Potok, at the river course section between the dam and the water tail, will have lower water flow, expressed as environmental flow (EF), and lower capacity for dilution of pollution from various sources.

Formation of the reservoir can also have impact on water temperature, comparing to its natural condition. Water temperature in the reservoir can increase earlier in spring, being higher and more prolonged during the summer period with all consequences on natural water related environment.

No significant negative impacts are expected during the *decommissioning phase*. There will be no water intake for pressure tunnel, so all natural flow will occur via overflow weirs on dam structure. Capacity of the reservoir volume will be reduced in time as result of sedimentation process.

### **Further Studies Required in the ESIA Phase**

#### *Hydrology*

As stated in Chapter 4.2.9.1, during ESIA phase, the Consultant will investigate locations and possibly yield capacities of existing ground water sources used for local water supply.

Downstream of the dam and the water intake structure, on the river course section up to the water tail, environmental flow (EF) will have to be ensured. According to the *Regulation on the Method for Determining Environmental Flow* (Official Gazette of FBiH, No. 4/13) which is in force in FBiH, EF “*represents the minimum flow that ensures the preservation of the natural equilibrium and water-dependent ecosystems*”.

*Regulation on the Method for Determining Environmental Flow* (Official Gazette of the FBiH, No. 4/13) states that “*EF shall be determined for water bodies as one of the measures for water protection specified in the Programme of Measures referred to in Article 26 of the Law on Waters*”, and “*EF shall be determined for all watercourse profiles where water abstraction activities require water permits according to the provisions of the Water Law<sup>14</sup>*”, therefore, the study on EF determination during needs to be carried out during the ESIA phase by the Consultant. Determination of EF will be part of hydrological investigations for Interim Report III and will be included in ESIA.

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<sup>1414</sup> Article 4 of the Regulation on the Method for Determining Environmental Flow (Official Gazette of the Federation of BiH, No. 4/13)

### *Water Quality*

Second campaign of the Vrbas River water quality analyses (including sampling on two locations, upstream and downstream of HPP Babino Selo profile), is planned to be carried out in March of 2016, during the spring's high water. The results of the analysis will be presented in ESIA. In addition, some additional data on change of water temperature and related consequences will be collected during ESIA stage.

During ESIA stage, the Consultant will carry out a detailed assessment of potential impacts, both, to hydrology and water quality, and will propose adequate mitigation measures to avoid and/or minimise identified negative impacts.

## **4.1.5 Impacts on Ground Waters**

### **Potential Impacts**

During the *construction phase* some local ground water level will have to be decreased in order to construct the structure foundations. This depression will be related to local construction area, and therefore, no impacts on existing ground water resources can be expected.

During the *operation phase*, ground water levels in the area downstream of the dam and the water intake profile are not expected to have significant changes. Some minor changes can be periodically expected in alluvium of the Vrbas River at the section between the water intake and the water tail downstream, as a result of the lower discharge.

At the dam upstream area, around the water reservoir embankments, ground water levels would rise, due to the water surface rising in relation to the natural condition. However, this will also be limited to the local area.

No significant negative impact can be expected during the *decommissioning phase*. There will be no water intake for pressure tunnel, so the natural flow will occur via overflow weirs on dam structure. Capacity of the reservoir volume, which will be reduced in time as result of sedimentation process, will have a certain surface water level which is higher than natural, with impact on surrounding groundwater level.

### **Further Studies Required in the ESIA Phase**

No significant impact of the Project can be expected on the groundwater level in the surrounding area. The upstream or downstream areas are populated, with some agriculture activities, however, no alluvium ground water abstraction is recognized, and therefore, no further hydrogeological investigation studies will be required in the ESIA Phase. However, during ESIA phase, the Consultant will use the results of the HPP Feasibility Study – part Meteorological and Hydrological Basis for detail assessment of potential negative impacts to groundwater.

## **4.1.6 The Risk of Geodynamic Processes Development**

### **Potential Impacts**

Based on the relief conditions significant geo-hazardous processes have not been identified in the project area. However, activation of those processes may be associated with the construction activities (vehicle movement, construction of dam, temporary and operational roads arrangement and implementation of other construction works).

Implementation of the proposed Project may pose risk of development of the geodynamic processes, including:

- landslides (in cases of inadequate performance of earth works during the **construction phase** which may lead to decrease in terrain stability and consequently to occurrence of landslides; impact is estimated as long-term),
- rockfall (in cases of inadequate performance of earth works such as excavation and creation of notches during the **construction phase** which may lead to decrease in rock stability and consequently to occurrence of rockfall; impact is directly related to duration of earth works),
- karst formations (in cases of inadequate performance of earth works such as excavation, borrow pits and creation of notches during the **construction phase** which may lead to decrease in rock stability and consequently to occurrence of cracks; impact is directly related to duration of earth works; however, is estimated as long-term),
- subsidence/sinking of the terrain (possible in cases when heavy facilities are constructed upon terrain with low bearing capacity, the sinking of the terrain is possible; impact is estimated as long-term impact that may arise during the **operation phase**).
- disturbances of groundwater flow due to pressure of the constructed objects to the ground (in cases when heavy facilities are constructed upon terrain with low bearing capacity; indirectly, the constant pressure may lead to disturbances of the groundwater flow); impact is estimated as long-term impact that may arise during the **operation phase**).

Seismic danger risks are represented by the present seismic and tectonic features and may pose risk during the **operation phase** of the Project. It should be noted that settlement Krivače and several legal entities in the project area are built on the route of Vrbas fault (or Vrbasko-voljevački fault). Although Vrbas fault (or Vrbasko-voljevački fault) does not belong to seismotectonic active fault<sup>15</sup>, the settlement Krivače and legal entities in the project area are in imminent danger at possible seismic earthquake due to seismic earthquake potential. This should be taken into account in the design and construction of Babino Selo HPP.

With regard to development of the geodynamic processes, identified impacts are expected during the construction and operation phase of the Project. During the **decommissioning phase**, no potential risks are envisaged.

The above identified impacts are not likely to have potential to affect areas located upstream of the location of the dam or downstream of the location of the powerhouse, with the exception for possible seismic earthquake (relevant for construction phase and for operation phase of the Project).

### **Further Studies Required in the ESIA Phase**

Within the development of the HPP Babino Selo Feasibility Study, a detailed program of geological and geotechnical investigations is planned to be carried out by the sub-contractor engaged by Pöyry, in accordance with the scope of work agreed with the Client.

After the comprehensive geological-geotechnical report is completed, the potential impacts related to development of geodynamic processes will be revised and elaborated in more detail.

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<sup>15</sup>Hrvatović, H., Identification And Evaluation Of Geological Hazard-Earthquake, 2010

#### 4.1.7 Impacts on Soil

The baseline information has shown that a considerable portion of the project area is covered by automorphic soil (*cambisol* on rich silicate rocks). It is used for forestry (broad-leaved forest and mixed forest) and agriculture purposes (agriculture and nature vegetation). Hence, it belongs to agro-zones I, II and IV and to land capability classes V, VI and VII which means that the land is characterized by the mixture of all three types of soil texture, steep slopes up to 45% and more, and the soil is poorly drained and exposed to long-lasting flooding. Therefore, the project area falls within the surface area of land affected by very low to very strong intensity of soil erosion.

##### **Potential Impacts**

During the *construction phase*, the following impacts are likely to occur:

- Soil compaction caused by construction machinery (vehicles and equipment for construction) moving around the location. The presence of soil compaction may harm the soil's structure, reduces porosity, limits air and water infiltration, increases resistance to root penetration and often results in reduced yield crop and increased risk of flooding;
- Fertile soil layer destruction/damage by equipment movement, ground works and arrangement of temporary and permanent infrastructure. This fertile soil layer has the highest biological activity, organic matter, and plant nutrients. The loss of this upper layer of soil nearly eliminates the soil's natural ability to provide nutrients, regulate water flow, and combat pests and disease;
- Soil erosion - topsoil stripping may bring risks of erosion of exposed ground and increased water runoff and siltation of watercourses. The use of heavy machinery and equipment especially on steep slopes to clear construction corridors can also result in serious compaction and erosion problems;
- Soil contamination due to improper waste management (solid and liquid), violation of rules for lubricants, fuel and construction material storage, as well as accidental oil spill from construction equipment and machinery.

These impacts on soil are expected to be local and moderate.

The only impact on soil during the *operation phase* can occur due to repairing operations (maintenance works). In operation phase, few potential impacts on soil have been identified:

- Soil pollution – accidental fuel and oil spills from vehicle, maintenance machinery and powerhouse;
- Violation of soil integrity and soil stability - movement of vehicles and machinery for maintenance/ repairs and transportation operations.

During the *decommissioning phase*, it is likely that any potential soil impact would be similar to those during construction phase.

##### **Further Studies Required in the ESIA Phase**

There will be no significant adverse impacts on soil within the project area; therefore no further studies in the field of soil protection during the ESIA are needed; however, the Consultant will propose mitigation measures to avoid and/or minimise potential impacts for all phases of the project implementation.

#### 4.1.8 Impacts on (semi)terrestrial flora, fauna and habitats

##### Potential Impacts

One of the essential features of river ecosystem is water flow. Life cycles of a large number of aquatic organisms are adjusted to periods of high waters and low water flow rate, which marks new stage in their life cycle. Therefore, even small fluctuations in both amount and period of certain rate of the flow could have significant impact not only to aquatic organisms, but also on the organisms living in riparian zone, which as final consequence could lead to the disturbance of the structure and function of food webs. Besides the direct contact, there are also impacts on the organisms in the reservoir and downstream of the facility. Water in reservoir is usually standing water and therefore it has higher than normal amount of nutrients which could stimulate growth of algae and other aquatic macrophytes.

During the construction of the hydro power plant it would be necessary to clean vegetation in the riparian zone, since it has key importance in avoiding decomposition and oxygen loss in the future reservoir.

Amphibians and reptiles are organisms which cover small habitats in relation to other taxa. The larger part of individuals remains within the zone of only few hundred meters from the mating place, while distribution of young individuals is limited to area smaller than 1 km for most of the species. Some species are philopatric, which means that most of individuals come back to the place of birth for reproduction.

Since Alternative 1A entails small reservoir size, no significant habitat loss for the identified plant and animal species are expected. However, the Environmental and Social Policy (2014) of the European Bank for Reconstruction and Development (EBRD), in Article 12 of Performance Requirement (PR) 6 defines priority biodiversity features which here include vulnerable herpetofauna species European green lizard – *Lacerta viridis* (Laurenti, 1768) and Dice snake – *Natrix tessellata* (Laurenti, 1768), which are listed in Annex II of the Bern Convention. Dice snake appears also in Annex IV of the Habitat Directive of the European Union (92/43/ECC), while European green lizard – *Lacerta viridis* (Laurenti, 1768) is on Annex IV of the European Union Habitats Directive.

Construction of the dam could have negative impact on habitats necessary for their survival, such as sheltered sites (large rocks and shady places) which enable stable thermoregulation and survival of these species. Biodiversity conservation requirements demand that appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, which include preservation of habitats necessary for their survival, such as sheltered sites (large rocks and shady places) which enable stable thermoregulation and survival of these species. If these species would be found during the construction, they should be removed to either natural or artificial microhabitats in the wider area where they could live without disruption. This activity should be carried out by the experts in the field and funded by the contractor.

Invasive plant species which are typical for riparian belt of waterways, that is for soils with high level of groundwater, have most frequently dispersal routes by water. Therefore, it would be necessary to ensure monitoring of their dispersal by regular field visits (at annual level). Particular attention should be paid to Japanese knotweed, which spreads when rhizome fragments are broken off and often form dense, monotypic stands which could have negative impacts on the native species and vegetation. The IUCN recently included Japanese knotweed in the list of "100 of the World's Worst Alien Invasive Species".

This species spreads very fast in the summer, where it can grow up to 10 cm a day. Since just one piece of rhizome or plant can produce a new plant it is difficult to eradicate it. Therefore, it is crucial that all stages of removal of this species are completed properly, and fragments of the plants, roots and soil should be transported and disposed of at the authorised landfill.

Since Alternative “1Aa” entails small reservoir size and on the basis of all the above mentioned facts it could be concluded that no significant habitat loss for the identified plant and animal species is expected. Therefore, the project-related activities to go ahead can be met under condition that appropriate mitigation measures during construction and operation phase are fully implemented.

#### **Further Work during the ESIA Phase**

During the ESIA phase, no additional collection of data will be required. The Consultant collected enough information during the scoping phase to carry out the complete assessment of potential impacts on flora and semiterrestrial/terrestrial fauna. During the ESIA phase the Consultant will propose detailed mitigation measures which will include biological quality elements, potential impacts, action/measures, indicators of success/monitoring and timing/deadlines. Also, based on data collected during the scoping phase, the Consultant will prepare maps of the distribution of flora and fauna.

### **4.1.9 Impacts on Ichthyofauna and Aquatic Habitats**

#### **Potential Impacts**

The construction of hydropower plants, especially dams and related infrastructure which dams the waterways and disrupts their natural continuum has impact on the entire ecosystem, and particularly on migratory fish species.

During the *construction phase*, the river ecosystem might be impacted both directly and indirectly due to waste disposal, soil and rocky materials, inadequate disposal of construction material, turbidity of the water as a result of earthworks in the vicinity of water stream, disturbed natural structure of the river bed due to excavation works, etc.

During construction, negative impacts on fish are expected to be temporary and to affect mainly the population downstream from the construction site, except in case of migration when the impacts can be much higher.

During HPP *operation*, impacts on water ecosystem and its fauna, especially ichthyofauna, can be expected which is described in more detail in the following text.

Having in mind the impact on the ecosystem as a whole, damming of the river flow and formation of the reservoir leads to changes in ecosystems and living communities in them. Hydrological, biological and ecological characteristics are changed from those characteristic for rivers to those who correspond to stagnant water. The living organisms that inhabit the water are adapted to the conditions of their habitat and such sudden changes in their environment show a negative effect.

In case of ichthyofauna, species such as huchen, brown trout and Danube barbel migrate upstream during the spawning period (and vice versa upon completion of spawning) and such migration is essential to their survival. Artificial barriers in rivers often cause reduction in number or even complete disappearance of migratory fish species.

According to their migratory behaviour, fish can be divided into two basic groups:

- potamodromous - fishes whose migrations occur wholly within fresh water (throughout their life cycle they stay in fresh water) and
- diadromous - refers to all fishes that migrate between the sea and fresh water (in one period of their life cycle, mostly due to reproductions, those species migrate to sea or inland waters).

All the fish that inhabit this part of the river Vrbas fall into potamodromous group of fish species which, depending on the length distance travelled, can be classified into those characterized by:

- short migration - migrate only within a specific part of the river course;
- medium distance migration - migrate between different parts of the river flow (brown trout, huchen).

Consequently, in order to allow fish migration, it is essential that infrastructure of hydropower plants contains functional fish ladders (fish ways or fish passes)<sup>16</sup>.

The reduction in river flow speed with the modified hydroclimatic characteristics leads to negative effects on the fish species both upstream (reducing the flow rate, the increase in water depth, water temperature stratification, the uneven water level in the reservoir) and downstream of the dam. In the second case, periodically draining results in impermanent flow and the amount of water, and there is a temperature difference of water discharged and the water of the recipient, depending on the time of year.

With regards to water temperature, formation of the reservoir (as it is the still water) can cause the increase of the water temperature. The higher temperature may cause the decrease of oxygen, disturbance of cycle of matter (release of high amounts of P, N, and C from the organic substrate, which might further cause hyperproduction of phytoplankton and speed up the process of eutrophication) and some other effects that directly or indirectly negatively affect ichthyofauna<sup>17</sup>.

In the section of the river downstream from the dam, the negative effects on fish are expressed through:

- different levels of water due to water retention and emptying of the reservoir in line with the mode of the power plant operation;
- differences in the temperature of water discharged and the water of the recipient;
- the speed and the amount of water discharged into the recipient, especially during spawning period;
- blocking of transmission of sedimentary material along the river flow (the type of substrate is changing, and as a result there is a disruption of habitats in terms of benefits for fish spawning and feeding).

All these factors that lead to changes in the ecological conditions of river ecosystems have negative impact on the living community of the river as a whole, by impoverishing it. Many representatives of these organisms are food fish.

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<sup>16</sup>Downstream of the planned HPP Babino Selo, there is an existing HPP (Bočac) which does not have fish passes. Also, some new HPPs are planned on the Vrbas River. It is important to emphasise that the necessity of construction of fish passes depends on the distance between the planned HPPs. If the distance between two or more HPPs is such that it enables the functioning of fish populations (and provided that connection with the tributaries is also enabled), then the survival of a given species of fish is possible even though one HPP (upstream or downstream) has no installed fish passes.

<sup>17</sup>Update the Basis of the Water Resources Management of the Vrbas River Basin, Module 1 – Water Resources Management – Final report, 2013

It should be noted that the changed conditions in the habitat, such as water level, flow velocity and the amount of food, could also have a negative impact on ichthyofauna (e.g. reduced water levels and altered hydrological regime could result in a reduction of the density of organisms that fish use for feeding).

In order to preserve the aquatic ecosystems it is therefore necessary to maintain adequate quantity and quality of water in watercourses (especially part from dam to power plant outlet), which can be ensured by providing ecologically acceptable flow (EF)<sup>18</sup>. According to the *Regulation on the Method for Determining Environmental Flow* (Official Gazette of FBiH, No, 4/13), the ecologically acceptable flow or environmental flow is the minimum flow that ensures the preservation of natural balance and ecosystems with reference to water.

According to Environmental and Social Policy (2014) of the European Bank for Reconstruction and Development (EBRD), the part of the Vrbas River where HPP Babino Selo is planned can be classified as habitat of significant importance to endangered or critically endangered species. The main reason for such determination is that it represents the habitat for endangered (EN) fish species, *Hucho hucho* (Huchen) which is endangered on global<sup>19</sup> and national<sup>20</sup> level (PR 6, Article 14).

Besides that, as mentioned above, the planned Babino Selo HPP could cause:

- habitat loss (part of river habitat will be transformed into reservoir),
- degradation and fragmentation of habitat (interruption of the river flow because of HPP dam)
- hydrological changes (reduction of the flow rate, the increase in water depth, water temperature stratification, the uneven water level in the reservoir and impermanent flow and the amount of water downstream of the dam),
- nutrient loading (reservoir), and
- interruption of fish migratory corridors (power plant dam) (PR 6, article 7).

However, there is a set of measures and solutions, which need to be applied in order to prevent or minimize the mentioned negative effects of construction of Babino Selo HPP:

- in comparison with others, the chosen Alternative 1A has a small size reservoir (total volume of 147,798 m<sup>3</sup> and length of 900 m) which implies the least possible conversion of the natural river ecosystem into an ecosystem with stagnant water (also, it can mitigate nutrient accumulation in reservoir);
- interruption of fish migratory corridors caused by HPP dam can be partially avoided by implementing structures as fish passes, system that directs the fish to fish passes, system that discourages them from entering the pipeline and fish friendly turbines;
- hydrological changes can be mitigated by providing ecologically acceptable flow (or environmental flow).

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<sup>18</sup> Prior to changes of the relevant legal procedures (pending in RS, in force in BiH Federation), EPP (or EF) was defined as the minimum average monthly flow of 95% availability (Source: Update the Basis of the Water Resources Management of the Vrbas River Basin, Module 3 – Integrated Water Resources Management Report – Final report, COWI AS, 2013)

<sup>19</sup> IUCN Red list, available at: <http://www.iucnredlist.org/details/10264/0>

<sup>20</sup> Projekat Šumskih i planinskih zaštićenih područja Broj: BA-FMPAP-TF091919-CQ-21-S-12/FBIH, Izrada crvene liste ugroženih biljaka, životinja i gljiva u Federaciji Bosne i Hercegovine; Knjiga 3 CRVENA LISTA FAUNE FEDERACIJE BOSNE I HERCEGOVINE, Nacrt izvještaja – Prijedlog, Sarajevo, 2013.

### **Further Studies Required in the ESIA Phase**

The field research of ichthyofauna was carried out in November 2015 within preparation of this report. During this field research one individual of huchen (*Hucho hucho*) was found, which represents an endemic species of the Danube basin and according to the International Union for Conservation of Nature (IUCN) Red List and The Red List of Fauna FBiH it has the status of endangered species (EN). Therefore, additional field survey (in late May or early June – to cover the spawning season) would be necessary in order to collect additional data on ichthyofauna of the project area.

The presence of the huchen was identified by literature review where for the Upper Vrbas a self-sustaining and stable huchen population was shown by Freyhof et al. (2015), spanning a river length of about 20 km. The hydropower project is situated right in the middle of this local huchen population. The presence of this species triggers a Critical Habitat related to Critical Habitat Assessment (CHA, sensu EBRD Performance Requirement PR6, IFC Performance Standard PS6, IFC Guidance Note GN6, USFWS).

Therefore the project area is considered a priority biodiversity feature, thus requiring a detailed assessment of the potential adverse impacts on this critical habitat.

The questions to be answered are thus:

- Is the local population a self-maintaining or a stocked population?
- Is there a habitat net-loss for the local huchen population?
- Is the local huchen population threatened by the project?

To assess the habitat loss or gain mesohabitat modelling is a state of the art approach for a large fish like the *Hucho hucho*. The modelling will establish the habitat situation of the project area under various conditions before and after the project implementation.

In order to assess the changes to the habitats with particular respect to the huchen, a set of analysis steps are proposed for the current state and the project state:

- a. On-site investigation and mapping of habitat types and sediment structure (hydromorphological units, i.e. areas with consistent hydraulic patterns such as riffles, fast runs, runs, pools, shallow waters, backwaters etc.; detailed specification for survey; water line etc.)
- b. Detailed cross-sectional and topographic survey
- c. Measurement of water depth and discharge
- d. 2D hydrodynamic modelling for current and project state, resulting in spatially distributed depths, velocities and bed shear stresses for typical low- and mean flow scenarios.
- e. Available abiotic habitat modelling of the habitat based on hydraulic modelling results: Spatially distributed mesohabitat analysis (Synergis ArcGIS, Mesohabitat Evaluation Model MEM, e.g. Wipplinger, 2014) for current and project state (including ecological bypass).
- f. Analysis of sediment structure
- g. Food source analysis
- h. Population size and structure assessment

As a result of this analysis a corresponding biodiversity action plan and accordingly a biodiversity monitoring plan will be developed and agreed upon.

As the study of alternatives for the project did verify the current location of the project as the best alternative in the region, a detailed study of the project area with respect to the impact is required in order to establish the conformity with international requirements.

Further, in order to cover details on the ecological and biological characteristics of all the detected fish species with a special focus on endemic species, the Consultant planned additional desk study research during ESIA phase. In addition, as part of the hydrological study during ESIA phase, environmental flow will be determined in line with the *Regulation on the Method for Determining Environmental Flow* (Official Gazette of FBiH, No, 4/13). A set of detailed mitigation measures to avoid, prevent or minimize potential impacts on fish, with focus on endangered species, will be prepared during ESIA stage.

Due to the size very small size of all structures and the small area affected, assessment of other species, including amphibians, invertebrates, etc. will be undertaken based on existing information. During the ESIA phase, the Consultant will confirm this decision.

#### **4.1.10 Impacts on Landscape and Visual Sensitivity**

##### **Potential Impacts**

The Project will affect the landscape and scenery by causing:

- changes in landscape during the construction phase (and during decommissioning), which may result in decrease of the current natural and esthetical values due to necessary earth works and civil works, temporary storages of building material and construction of necessary facilities, presence of personnel and machinery, and constructing structures; identified impacts are estimated as short-term,
- changes in landscape during construction and operation phase due to formation of reservoir and construction of necessary facilities (dam, powerhouse, relocation of the road, tunnels etc.); impact is estimated as long-term.

Activities during the *construction phase* will cause temporary changes on landscape and scenery during construction activities. Necessary earth works will lead to formation of quarries and borrow sites, as well as to destruction of vegetation and land cover due to earth works. Necessary civil works, temporary storages of building material and construction of facilities will lead to disharmony of natural relief and the morphology of the landscape, and this will impact the structure and pattern of the landscape. After finishing the construction, all the personnel, machinery, building materials and waste will be moved out of construction sites. Temporary structures will also be dismantled and removed, and the construction site will need to be recultivated. Therefore, the identified impacts are expected to be short-term and related to construction activities. Expected visual and landscape changes during construction phase will be slightly perceptible for local population since the area is sparsely populated. However, some infrastructure (i.e. access roads to HPP facilities) will be left and some terrain profiles will be changed. All these changes will cause the alteration of the landscape which is unavoidable for any such project.

The main landscape/visual impact in the *operation phase* will be associated with the permanent HPP structures and facilities. The formation of reservoir during HPP operation may lead to potential submersion of agricultural area. The extent of impacts on landscape and scenery during this phase will be directly related to the potential submersion of surfaces upstream of the dam location due to formation of reservoir and volume of water in the reservoir. Formation of the reservoir will lead to permanent changes in landscape and scenery and potential submersion of agricultural areas.

Similar to construction phase, activities during the *decommissioning phase* will cause temporary changes on landscape and scenery during demolition activities and removal of constructed facilities. Necessary demolition works, temporary storages of building material and engagement of heavy machinery involved in demolition activities will lead to disharmony of natural relief and morphology of the landscape. Identified impact will be short-term and related to demolition activities. During decommissioning phase of the project, removal of constructed facilities and revegetation of the area must be performed, which will cause benefits to values of the landscape.

The abovementioned impacts will not be perceptible in areas upstream of the tail of the reservoir or downstream of the location of the powerhouse (relevant for all phases of the Project).

#### **Further Studies Required in the ESIA Phase**

During the ESIA phase, no further collection of data related to landscape and scenery will be required. Within the scoping phase, the Consultant collected enough information to carry out the complete assessment of potential impacts on landscape and scenery in ESIA phase. The adequate mitigation measures will be suggested.

## **4.2 Socio-economic Impacts**

### **4.2.1 Land Acquisition and Physical Displacement**

#### **Potential Impacts**

The Project is expected to involve the complete acquisition<sup>21</sup> or incomplete acquisition<sup>22</sup> of privately owned land for the purpose of construction of permanent structures such as a waterway and powerhouse. The details on the specific impacts for each structure will be provided in the subsequent stages of the Project, i.e. in the ESIA phase.

In total, parts of 16 cadastral plots (in 2 cadastral municipalities) will be affected by the Project (specifically for the purpose of construction of: powerhouse, powerhouse bridge and access road, waterway, dam and reservoir, and ecological bypass). Detailed data on the affected land plots will be provided in the LALRP.

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<sup>21</sup>According to the Law on Expropriation of FBiH ("Official Gazette of FBiH", No. 70/07, 36/10 and 25/12), complete expropriation allows the expropriation beneficiary to obtain legal title over the expropriated property, while the rights of the previous owner over the real property as well as other rights over that real property cease to exist.

<sup>22</sup>According to the Law on Expropriation of FBiH, incomplete expropriation provides the beneficiary with usufruct rights on the land and structures, as well as the lease of the land for a definite period of time. At the end of the lease, usufruct rights over land are returned to the previous owner.

For the purpose of powerhouse construction, it may be necessary to carry out complete expropriation (as defined by the Law on Expropriation of FBiH) of privately owned land plots positioned in the location of planned structures before the **construction phase**. The impact is estimated as long-term.

For the purpose of instalment of the waterway, it will be necessary to carry out incomplete expropriation (as defined by the Law on Expropriation of FBiH) of privately owned land plots that are located within the waterway route during the construction phase. This area is categorized as forest. The impact is estimated as both short-term (due to the short duration of construction works) and long-term (due to establishment of right of way).

It may also be expected that several land plots will be temporarily occupied for the purpose of construction of access roads and placement of staff, machines and material during the construction phase. The impact is estimated as short-term.

#### **Further Studies Required in the ESIA Phase**

Secondary cadastral data (data on: land plots type, land plots position, land plots ownership and structures on land plots) have been obtained from the Municipality of Donji Vakuf.

A Socio-economic Survey and Census will be carried out in the ESIA phase. The Survey and Census will provide detailed data on land acquisition in the project area, and will provide a basis for the development of LALRP.

### **4.2.2 Economic Displacement**

#### **Potential Impacts**

Economic displacement is mostly related to the construction of a powerhouse. Impacts will vary during the different phases of the Project.

Powerhouse construction could affect the currently closed Hotel “Bosnae” near the powerhouse location during the **construction phase** (in the event the hotel is put into operation again). The impact is estimated as long-term.

#### **Further Studies Required in the ESIA Phase**

A Socio-economic Survey will be carried out in the ESIA Phase. Additional data on businesses in the Project area will be collected through the survey using a questionnaire for local businesses. During the ESIA phase, adequate mitigation measures related to economy will be developed.

### **4.2.3 Restrictions on Land Use and Damage to Private Properties**

#### **Potential Impacts**

The Project is expected to affect current land use practices in surrounding areas of the dam, waterway and powerhouse. The impacts related to land use restrictions will depend on the issue of ownership of land, which will be precisely defined when the exact positions of the permanent structures and the waterway route are determined.

The areas surrounding the waterway and powerhouse locations could be affected during the **construction phase**.

It is expected that it will be necessary to temporarily occupy several privately owned land plots for the purpose of construction of access roads and placement of staff, machines and material at powerhouse location and along waterway route. Construction activities may cause damage to land plots, fences and railings due to disposal of construction waste and heavy machinery parks. The impacts are estimated as short-term.

During the *operation phase*, land use will be restricted within the working corridor of the waterway and surrounding area of powerhouse. The impact is estimated as long-term.

The areas surrounding the waterway and powerhouse locations could be affected by land use restrictions during the *decommissioning phase*. The impacts are estimated as short-term.

#### **Further Studies Required in the ESIA Phase**

Secondary cadastral data (data on: land plots type, land plots position, land plots ownership and structures on land plots) have been obtained from the Municipality of Donji Vakuf.

A Socio-economic Survey will be required in the ESIA Phase. The Survey should provide detailed data on land use and private properties in the project area.

### **4.2.4 Impacts on Cultural Heritage**

#### **Potential Impacts**

Based on the available official data in the *List of Proclaimed National Monuments in BiH* adopted by the Commission for Preserving National Monuments of BiH, the Project is not expected to have any impacts on cultural heritage and archaeology sites.

#### **Further Studies Required in the ESIA Phase**

No further studies related to cultural heritage will be required in the ESIA Phase.

### **4.2.5 Access Restrictions**

#### **Potential Impacts**

The Project is expected to lead to access restrictions in the locations of the dam, waterway and powerhouse. Impacts in terms of access restrictions vary in the different phases of the Project.

The construction of the dam could affect the local macadam road and lead to access restrictions to app. 6 houses near the powerhouse location during the *construction phase*.

The construction of waterway could affect local macadam road and could lead to access restrictions to app. 6 houses near the powerhouse location during the *construction phase*. The impact is short-term.

In addition, removal of dam and waterway could limit access to app. 6 houses near to the powerhouse location in the *decommissioning phase*.

#### **Further Studies Required in the ESIA Phase**

A Census and Socio-economic Survey will be conducted in the ESIA phase and access restrictions will be addressed. Adequate mitigation measures related to access restrictions will be developed.

## 4.2.6 Impacts on Living Conditions of Local Communities

### Potential Impacts

Impacts on living conditions of local communities vary in different phases of the Project. Some impacts that refer to the living conditions of local communities are discussed in other chapters in detail i.e. traffic, loss of natural resources, access restrictions, impacts on resource accessibility etc.

Impacts that are expected in the *construction* and *decommissioning phases* refer to disturbances to surrounding communities related to: (i) increased noise, (ii) disposal of construction waste, (iii) disruptions to water and electricity supply, telephone and Internet connections, waste collection and regular public transport, delivery of mail to households and businesses. For vulnerable groups, such as elderly and ill, and people with special needs in emergency situations, medical and other assistance may be delayed due to traffic congestions. Transportation of children to school may be affected as well.

In the *operation phase*, the Project is expected to have negative impacts in terms of increased noise around the powerhouse, relevant for app. 5 households.

### Further Studies Required in the ESIA Phase

Additional data on living conditions (Project specific) will be collected through the Socio-economic Survey of PAPs in the ESIA phase. During the ESIA phase downstream impacts (e.g. impacts on recreation, flooding, sanitation or agriculture) will be analysed as well. During the ESIA phase, adequate mitigation measures related to impacts on living conditions will be developed.

## 4.2.7 Road Damage and Impacts on Traffic

### Potential Impacts

The Project is expected to have impacts on roads and traffic, with varying scopes in the different phases of the Project.

The construction site of dam is in the close proximity to the local road, and the construction of the dam may lead to road damage (particularly during heavy machinery accessing the construction site) during the *construction phase*.

Increased traffic flow in the area leading to congestion and obstruction is likely to be experienced on main and local roads during the *construction* and *decommissioning phases*. This is mainly linked to the delivery of construction material to site and collection of resulting waste from construction work in *construction phase* and removal of material in *decommissioning phase*.

### Further Studies Required in the ESIA Phase

No further studies related to roads and traffic will be required in the ESIA phase. In the ESIA phase, the entire scope of impacts on traffic will be developed, as well as adequate mitigation measures related to road damage and traffic.

## 4.2.8 Loss of Natural Resources

### Potential Impacts

Loss of natural resources referring to several plots of agricultural land (fields and pastures) is linked to powerhouse and waterway construction during the *construction phase*. For the purposes of powerhouse construction, loss of natural resources is expected to a small extent (app. 800 square meters). This impact is long term. Construction of access roads and placement of staff, machines and material around the powerhouse location will also impact pastures in the area in the short-term.

Waterway construction would imply forest clearance in the same places on the waterway route. This impact is permanent and long-term.

### Further Studies Required in the ESIA Phase

No further studies related to loss of natural resources will be required in the ESIA Phase.

## 4.2.9 Impacts on Resource Accessibility

### 4.2.9.1 Water Supply

#### Potential Impacts

During the *construction phase*, the water supply for the purpose of construction works, technology or sanitary needs, will have to be ensured, most probably using ground water source. No local ground water source, already used for local water supply, can be used for this purpose. However, construction of the pressure tunnel together with the dam structure foundations, in hard karst rock, using explosive, can have negative impact on the surrounding ground water – springs. Two settlements near upstream and downstream of the HPP location could be affected due construction phase of the project: Babin Potok and Krivače.

During the *operation phase*, no significant impact of the HPP structures on the existing water supply systems in the surrounding area is expected. The nearest organized public water supply systems are for towns of Donji Vakuf and Jajce, upstream and downstream of the location of HPP Babino Selo. Donji Vakuf is supplied by water from the two ground water sources which are not in direct connection to the Vrbas River, while Jajce is dominantly supplied from an open water intake on the Pliva River.

The surrounding settlements are oriented to the ground water sources from springs, via small local water supply systems. In the project area, there are no ground water sources from the alluvium of the Vrbas River currently in use.

During the *decommissioning phase* it is not expected that the water reservoir, formed by the HPP dam, will be used as source of water supply, therefore, no negative impact due to decommissioning are expected.

### Further Studies Required in the ESIA Phase

During ESIA phase, the Consultant will investigate locations and possibly yield capacities of existing water sources used for local water supply.

#### 4.2.9.2 Irrigation

##### Potential Impacts

Upstream and downstream of the construction sites of the dam, water intake and the pressure tunnel, there is limited agriculture area. Currently, there are no organized irrigation activities. Therefore, no significant impact can be expected during the *construction phase*.

Also, negative impact of the HPP structures on existing irrigation needs or activities downstream of the HPP Babino Selo is not expected during the *operation phase*. The nearest agriculture areas are located at Babino Selo, downstream of the dam location, and currently there are no organized irrigation infrastructures. However, controlled discharge, with counted agriculture needs for downstream area (water management minimum discharge) can have positive impact regarding the water needs for this purpose.

It can be expected that the water reservoir, formed by the HPP dam, would be used as source for irrigation purpose. In case of *decommissioning* such water source would have to be replaced.

##### Further Studies Required in the ESIA Phase

There is no need for additional data collection during ESIA phase.

#### 4.2.9.3 Sport, Recreation and Tourism

##### Potential Impacts

Impacts on resource accessibility are related to recreation, specifically to rafting activities at the Vrbas River. The dam construction and reservoir formation will restrict rafting activities in this part of the Vrbas River. This impact is expected during the *construction and operation phases* and is considered as long term.

In case the water reservoir, formed by the HPP dam, will be used for recreation and sport's purposes, during *decommissioning* such source would have to be replaced.

##### Further Studies Required in the ESIA Phase

There is no need for additional data collection during ESIA phase.

#### 4.2.9.4 Aquaculture – Fish Farming

##### Potential Impacts

During the *construction phase* impacts on the surface water quality are expected, which can have negative impact on natural fish population, downstream of the construction site. As the local economy is not oriented to use of natural fish sources, and as there are no aquaculture structures nearby the planned HPP location, no impact during construction works can be expected.

During the *operation phase*, no impacts on existing aquaculture structures on the Vrbas River sub-basin are expected. Reservoir formed by HPP structures, can be used for cage fish farming, in capacities which will be in relation to required water quality level (“good potential”). Cage fish production can have negative impact on water quality and sediment, due to organic matters degradation (fish food, fish decay), or chemicals used for fish health treating.

Based on the abovementioned, there are possibilities that reservoir, formed by the HPP dam, will be used for aquaculture purposes. In case of *decommissioning* such source would have to be replaced.

#### **Further Studies Required in the ESIA Phase**

As no significant potential impacts of the Project on existing fish farming infrastructures are expected, there is no need for further data collection during ESIA phase. The Consultant has enough information collected during scoping stage to assess the potential impacts and propose adequate mitigation measures.

### **4.2.10 Employment and Contribution to Economy**

#### **Potential Impacts**

During the *construction phase*, an influx of mainly male workers, both skilled and unskilled labourers, is expected in the local communities near construction sites. Since construction sites are a major source of employment, and new business opportunities are expected to be created for local businesses such as transporters, suppliers and other service providers, the Project is expected to have positive impacts on the local labour market, increase employment rates and possibly the average income for the local population.

Since construction works are expected to trigger the “multiplier effect” of the industry - employment of cooks, waiters and waitresses etc. in nearby services oriented business (restaurants and supplies industry), there is a possibility of involvement of female workforce as well. The time scale of this impact is short-term and it follows the duration of the construction phase.

Positive impacts on labour and employment may be related to establishment of small businesses and employment of new employees in the businesses related to tourism and recreation at reservoir location during the *operation phase*. This impact is long term.

Negative impacts have not been identified.

#### **Further Studies Required in the ESIA Phase**

Additional data on employment and educational levels among local population will be collected through the Socio-economic Survey of PAPs. During the ESIA phase, potential community impacts, worker influx, contractor management etc. will be analysed. A set of guidelines and a full scope of mitigation measures on employment and economy will be developed in the ESIA phase.

### **4.2.11 Impacts on Community Health, Safety and Security**

#### **4.2.11.1 Community Health**

##### **Potential Impacts**

The present quality of water for the part of the River Vrba flow within the project area is classified as category II (the water in its natural state and may be used for bathing and recreation, water sports, for growing cyprinid fish species, or which, with usual methods of water treatment may be used for drinking and food industry).

Impacts on community health are possible during:

- Construction phase,
- Operation phase,
- Decommissioning phase.

Impacts on community health during the ***construction phase*** (and in case of potential ***decommissioning***) are possible in case of accidents, such as leakage of hazardous substances, which may have impact on the community downstream of the project area via soil or water irrigation systems that use water from River Vrbas. The extent of this impact depends on the amount of accidentally released hazardous substance.

During the ***operation phase***, formation of the reservoir and normal functioning of the planned HPP may lead to degradation of the water quality and thus indirectly increase the occurrence of the water related diseases. Indirect impacts are possible if the planned reservoir is used for bathing activities, in case of poor water quality (categories III and IV). No direct impacts on population health as a result of water related diseases are expected, since the water from the River Vrbas is not used for water supply. The formation of the reservoir and slowing down the water flow are likely to change the microbiological and physical and chemical characteristics of water, cause eutrophication of the aquatic ecosystem and lead to changes in present purpose of this part of the River Vrbas. Degradation of the water quality may lead to increase of the water borne diseases in the project area. Enterocolitis acuta is water borne disease and may indirectly affect the population health in the Project area after formation of the reservoir during the ***operation phase***.

No impacts on community health are expected in the area upstream of the planned HPP location.

#### **Further Studies Required in the ESIA Phase**

No further studies in the ESIA Phase related to impacts on community health will be required.

During the ***construction*** and ***operation phase***, the Operator of the proposed HPP, Public Company “JP Elektroprivreda BiH” will be obliged to carry out periodical monitoring of the water quality in accordance with the provisions of the Environmental Permit that should be issued by the Federal Ministry of Environment and Tourism. Monitoring of water quality should be performed by engagement of an authorized company (a third party).

#### **4.2.11.2 Public Safety Risks**

##### **Potential Impacts**

During construction, operation and decommissioning phases, public safety can be exposed to risks due to the operations on the Project area. These risks are especially connected to the construction and decommissioning phases.

During the ***construction phase***, local communities face increased heavy-duty traffic and other occurrences affiliated with construction which can have on traffic safety. During this phase construction works can cause delays and traffic congestion due to the additional traffic volume of construction traffic and safety hazards associated with moving heavy equipment and oversized loads.

Another risk for the public safety is the possibility of fire that can involve and damage the local community. The fire can be caused by inappropriate use of some flammable and combustible liquids and materials on the construction site. In case of bigger fires there is the possibility of people injuries, property damages and negative psychological impacts.

During the construction phase there is the risk of explosion which can be caused by the use of solvents and ignition by sparks, static electricity, explosive atmospheres, damage of pipes containing explosive gases and unexploded ordinance in the ground. In this case there is no possibility of big explosions and small explosions can have psychological impact related to memories of the explosion itself.

Other possible risks and negative impacts to public safety can be caused by injuries in case of entrance of unauthorised persons on the construction site. This situation is possible when the construction site is not enclosed by a fence and when there are no panels with relevant information about the construction works and construction works participants.

On the construction site there will be an increased pollution caused by the construction vehicles. Public safety can be negatively affected by risks caused by soil and water contaminations, dust and noise emissions and vibration. Water and soil contamination can have harmful consequences to local communities in case the contaminated groundwater reaches water sources used by local communities (i.e. for irrigation in agriculture). Exhaust gases and dust emission will be caused by the mechanisation and with increased wind velocities particularly in dry season dust can, however, move to an extent of even disturbing local communities and cause some disease on people that have allergies and are already vulnerable.

During the *operation phase* some negative impact on public safety can still occur like the possibility of damages due to fire or explosions at the powerhouse site. These accidents can be caused by inappropriate equipment handling or its poor maintenance. These activities can lead also to water pollution due to leakage of lubricants.

As it is already explained, during the *decommissioning phase* impacts on public safety will be similar to those during the construction phase without negative long-term health and safety impacts.

#### **Further Studies Required in the ESIA Phase**

No further collection of data in the field of public safety during the ESIA is needed. The Consultant will propose adequate mitigation measures both, during construction and during operation, to avoid and/or minimise potential impacts.

### **4.2.11.3 Protection against Water**

#### **Potential Impacts**

It is expected that the main construction works on the dam structure will be carried out in the periods of low natural discharge with water level. Therefore, no significant impacts on situation regarding the flood protection of the nearest population areas are expected during the *construction phase*.

In case the dam structure will be constructed using temporary embankments in period of high water level, nearly upstream area can be negatively impacted, as a result of reduced flow profile.

During the *operation phase*, HPP structures are expected to have limited positive effect on flood protection of neighbouring urban and agriculture areas, having in mind relatively low volume capacity of reservoir. No impact relating to floods on existing structures in the urban area of Donji Vakuf, upstream of HPP location, is expected.

Reservoir could be used as a water source for various purposes regarding the draught impact reduction.

During the *decommissioning phase*, no significant impact on the situation regarding the protection against flood impact can be expected, as the formed reservoir will have limited benefits on flood protection level.

#### **Further Studies Required in the ESIA Phase**

As the dam height and the volume capacity of the reservoir can have limited impact on situation regarding the flood protection, there is no need for further studies during ESIA phase.

### **4.2.12 Impacts on Occupational Health and Safety**

#### **Potential Impacts**

During construction, operation and decommissioning phases, occupational health and safety (OHS) risks can be expected. The impacts can be:

- Direct (possibilities of injuries caused by activities performed during construction phase or by accidents that may occur both during construction and operation phase (these accidents can have a wider extension, involve local community and cause possible dangers and disease));
- Indirect (emissions, soil and water contamination, etc.).

During the *construction phase* workers will be exposed to many risks that are directly related to activities performed on construction site. Potential impacts are identified as follows:

- **Falling from heights:** The risks related to work at heights are associated to falling of workers and falling of objects onto those working below. Falls from heights are the main causes of fatal accidents in the construction industries and the consequences are generally more severe the greater the falling height. Falls can occur from unguarded edges or openings at height, through fragile materials, into excavations, from ladders, from temporary platforms, from places of work on an existing facility and on stairways. Among these risks there are also risks related to scaffolding that may occur during the assembly, alteration and dismantling of the scaffolding or during the use of the scaffolding.
- **Traffic accident:** Risks related to working near or on roads with live traffic depend on the type of work that will be performed. They may include collisions between vehicles operating inside the site, collisions of passing vehicles with site machinery, equipment (e.g. scaffolds) and workers (in case the site is not adequately signed and physically protected).
- **Power stroke:** Working near high voltage power lines can cause serious and fatal injuries due to direct contact with live lines or arcing from those lines to nearby equipment. The major risks related to electricity are electrocutions and burns and they can be caused by the use of poorly maintained electrical equipment, work near overhead power lines, contact with underground power

cables during excavation work or horizontal boring or drilling, fires started by poor electrical installations and faulty electrical appliances.

- **Injuries from construction machinery:** These risks depend on the type of equipment used during construction and the construction activities. Risks like roll-over of the equipment and objects falling onto the equipment are related to earthmoving equipment (e.g. backhoes, loader shovel excavators, etc., including their accessories), while risks which imply workers falling from height, collapse of the equipment in use due to overloading, and failures due to poor slinging techniques are related to lifting equipment (e.g. tower cranes, mobile cranes, etc., including accessories such as slings).
- **Accidents:** Accidents can be related to injuries from explosion and fires. Explosion risks usually occur from the use of solvents and ignition by sparks, static electricity, explosive atmospheres, damage of pipes containing explosive gases and unexploded ordinance in the ground. Fire risks can be caused by the use of flammable liquids, welding or abrasive cutting techniques used in places not specially prepared for such works, liquid gases used with an open flame, flammable and combustible materials.

Negative impacts to workers can also derive from risks related to manual handling which involves lifting and moving loads by hand or other bodily force.

Other impacts that can affect both workers and local communities are indirect and they are related to risks caused by air pollution (dust), noise emissions and vibration, and soil and water contaminations, as described below:

- **Dust emissions** are generated by the site construction activities and operations that involve excavations, movement of vehicles and cut and fill activities, and can have impact on air quality in the vicinity of the construction site. During site clearing and land preparation activities, dust can cause dangers to workers and cause diseases such as pneumoconiosis, asthma, chronic bronchitis and/or emphysema.. In addition to dust emissions other emissions into air are likely to occur as a result of the combustion of fossil fuels and exhaust gases from the mechanization.
- **Noise emissions and vibration** can cause nuisance to workers and local community. Workers on construction sites can be exposed to loud sources of noise which can permanently damage a person's hearing. The main sources of vibration from powered hand-held tools are demolition hammers, drills, hammer drills, angle grinders, chain saws and hand-held circular saws. Vibration from work with powered hand-held tools, equipment or processes can damage the hands and arms of users.
- **Soil and water contaminations** are impacts that can have consequences both on workers and local communities. Even if this impact is caused by construction related activities it can have a long-term impact if not properly mitigated and/or remediated. Water pollution (both surface and ground water) and soil pollution on construction sites and during maintenance of powerhouse can be caused by inadequate handling of hazardous substances (i.e. diesel and oil, paint, solvents, cleaners and other harmful chemicals), inadequate waste handling (construction debris and dirt), equipment damage which may lead to leakage of lubricants and fuel (increased input of oils into water, soil and consequently into groundwater).

During the *operation phase* some of the above described impacts can occur. During this phase there will also be the risk of falling from heights but in this case it could be caused by other circumstances like the entrance of non-authorized people on the dam location. In addition, there is the possibility of accidents caused by fire and/or explosion due to poor maintenance of the equipment at the powerhouse which can endanger workers during maintenance works.

In addition indirect impacts will also persist during the operation phase but with a lower intensity than during the construction phase. Dust emissions are possible in case of maintenance works but their negative impact on workers and local communities will be reduced to minimum by implementing the adequate protective measures. Noise emission and vibration during this phase will be caused by the equipment located in the powerhouse and they may have negative impact on workers authorized to be on the location of powerhouse. These noise emissions will not affect the local community.

During the *decommissioning phase* health and safety impacts will be similar to those during the construction phase, as similar activities would be required. Therefore, no negative long-term health and safety impacts both on workers and local community will occur during this phase.

#### **Further Studies Required in the ESIA Phase**

No further collection of data in the field of occupational health and safety during the ESIA are needed. The Consultant will propose adequate mitigation measures both, during construction and during operation, to avoid and/or minimise potential impacts, and protect the health of workers.

### **4.3 Cumulative Impacts**

Up to now, three large HPPs in the Vrbas River sub-basin, with corresponding reservoirs, have been constructed: HPPs Jajce I and Jajce II, which are actually using the water from the upstream Pliva River, and downstream HPP Bočac. Capacities of these existing large HPPs<sup>23</sup> are the following:

- HPP Jajce I, built on Pliva River in 1957, with installed capacity of 60 MW,
- HPP Jajce II, built on Vrbas River in 1954, with installed capacity of 30 MW, and
- HPP Bočac, built on Vrbas River in 1981, with installed capacity of 110 MW.

Several small HPPs<sup>24</sup> have been constructed on the upper part of the Vrbas River sub-basin in the recent period.

Since the Vrbas River sub-basin is very attractive from the point of hydropower production, 60 HPPs in total, together with existing plants, are planned in this sub-basin. The total installed capacity would be 580 MW. Out of the planned 60, 45 HPPs are planned to be derivation type, while the remaining 15 are planned as close-to-dam types. The main data regarding the total impact on the natural water regime is given in Table 3.

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<sup>23</sup> „Large HPP“ refers to HPP with more than 10MW of installed capacity

<sup>24</sup> „Small HPP“ refers to HPP with less than 10 MW of installed capacity

River	Number of HPPs	Installed capacity (MW)	Gross reservoir storage (Mm <sup>3</sup> )	Useful reservoir storage (Mm <sup>3</sup> )
Vrbas	29	377.5	414	339
Pliva	4	62.6	22	2
Sokočica	1	0.7	0	0
Janj	2	31	83	73
Ugar	4	47.8	120	98
Crna Rijeka	2	4.4	15	11
Vrbanja	18	56.4	167	133
<b>Total</b>	<b>60</b>	<b>580</b>	<b>821</b>	<b>655</b>

Table 3: Main Parameters of HPPs in the Vrbas River Sub-basin, Existing and Planned<sup>25</sup>

With regards to water management, the most important connection to HPPs is the reservoir's volume capacity. 16 reservoirs are planned to form in total 655 Mm<sup>3</sup> of useful volume capacity in the Vrbas River sub-basin, as presented in Table 4.

No.	Reservoir title	Useful volume capacity (Mm <sup>3</sup> )
1	Šiprage	54
2	VrletnaKosa	95
3	GornjiVakuf	52.5
4	Han SkelaVisoka	218
5	JanjskeOtoke	72,5
6	Grabovica	35
7	Staro Selo	11.4
8	Čelinac	43
9	Bočac, (built in 1981)	42.9
10	Ugarušće	3.2
11	Babino Selo	6.5
12	Banja Luka	7.6
13	Krupa	5.75
14	Jajce II (built in 1954)	3.3
15	Novoselija	2.14
16	Jajce I (built in 1957)	1.7
	<b>Total:</b>	<b>655</b>

Table 4: Existing and Planned Reservoirs in the Vrbas River Sub-basin

It is important to underline that all the reservoirs are located in the upper region of the Vrbas River sub-basin (upstream of the town of Banja Luka), which provides a better opportunity for flow regulation.

Reservoirs formed by HPP structures are always multi-purpose and provide the opportunity, mainly to water and energy sector, to ensure various benefits. For water sector benefit on natural flow fluctuation is primary and favourable. Also, reservoir is a new water source which can cover water needs for various purposes: irrigation, aquaculture, water supply, tourism, etc.

Cumulative impacts of the 16 reservoirs can be reflected on natural and social environment of the Vrbas River sub-basin, such as:

- Benefit on flood control level, whereas formation of the reservoir is often a recommendable measure. Such situation with planned reservoirs in the upper region of the sub-basin, upstream of highly populated regions, can reduce flood risk.

<sup>25</sup>Source: „Update the Basis of the Water Resources Management of the Vrbas River Basin“ (2013)

- Reservoirs represent new and attractive water source and can have benefits or improve the situation regarding the water usage for water supply, irrigation, sport and tourism.
- Formation of the reservoirs is initiating necessary activities related to water quality control and protection.

Compared to the existing three large HPPs it is evident that HPP Babino Selo has much smaller capacity (5-10MW), and corresponding small environmental impact. Impacts on hydrology and water quality of HPP Babino Selo, in relation to the planned and existing downstream and upstream HPPs, are very limited, knowing the type of this plant (derivation), short distance between the water intake and the tail water, and having in mind that the reservoir volume is not considerably large.

In the upstream river stretch a project with a large dam near Gornji Vakuf is included in the Vrbas River Hydropower development study (COWI, 2013), but is unlikely to be realized.

Downstream the location of HPP Babino Selo, two further projects have been considered by EP BiH (Figure 4):

- HPP Han Skelaniska
- HPP Vinac

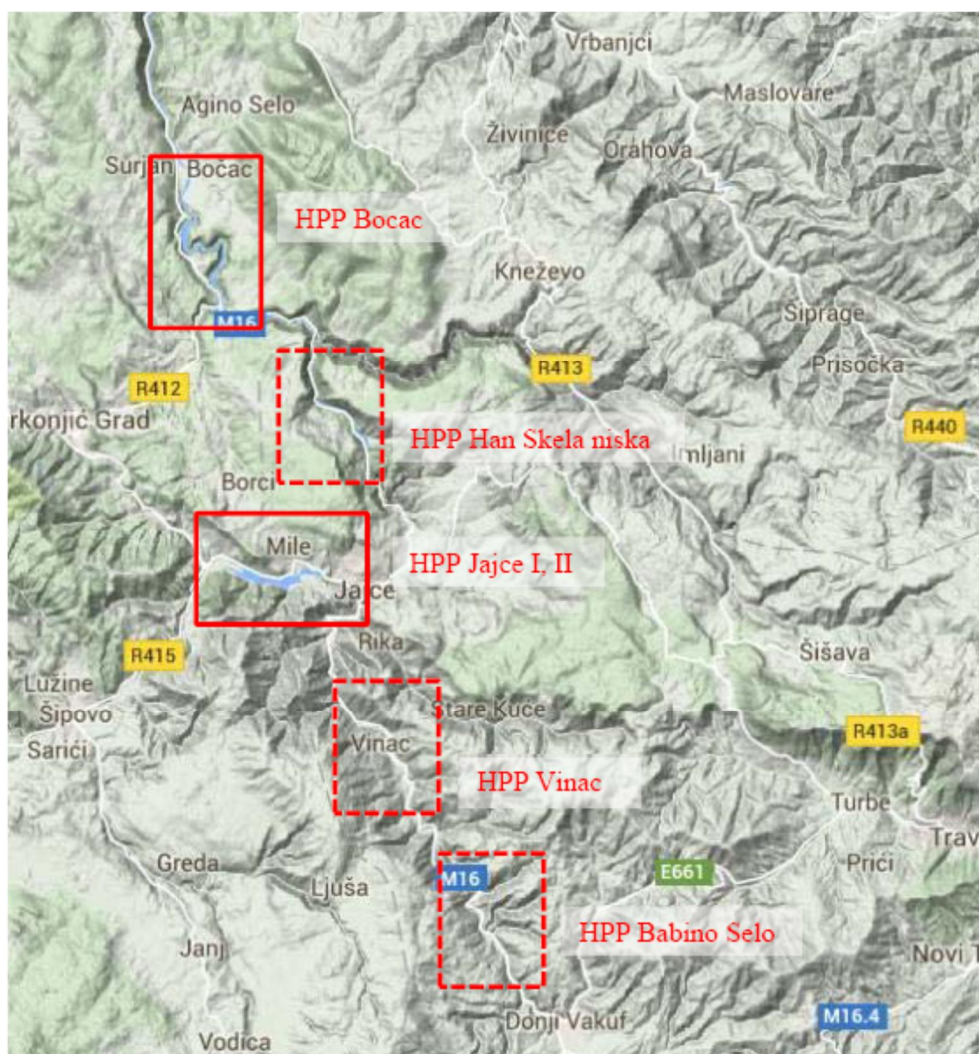


Figure 4: Location of HPP Babino Selo and Downstream Projects

During construction phase, the following cumulative impacts may be expected:

- Emissions of noise and vibrations, which may result in disturbance of the surrounding area and increase of the present ambient noise currently characterised mainly by the everyday traffic on the main road M5 (E661);
- Emissions of polluting substances (atmospheric emissions including dust, waste, leakage of hazardous substances and oil in accidental situations, etc.), which may have negative impact on local ambient air quality, quality surface waters and soil and may reflect on community health downstream of the project area.

According to EP BiH the project HPP Vinac is highly doubtful because the Municipal Council of Jajce has decided that only small power plants up to 5MW can be constructed. For project HPP Han Skelaniska, - which is currently in the stage of the feasibility study - there are problems arising with acceptance of the local authorities. Therefore, is it not yet clear whether and how these projects are to be implemented.

It is, however, evident that, under the condition that all planned hydro power plants are put into operation, significant habitat fragmentation and breaking of migratory routes for fish can be expected. On the other hand, the negative effect can be partially mitigated in case that all planned hydropower plants have functional fish ladders (fish ways or fish passes). The distance from the existing HPP on the Vrbas River which does not have fish ladders (HPP Jajce II) to planned HPP Babino Selo would be about 50 km<sup>26</sup>. With regards to cumulative impacts, further literature studies are necessary in order to more accurately assess the potential cumulative impact on fish population.

#### 4.4 Regional and National Impacts

Organization of the sectors competent for implementation of the project of construction of HPP Babino Selo is primarily on entity (FBiH), and state (BiH) level.

Sector of water management in FBiH is organized on cantonal and entity level<sup>27</sup>. Cooperation of the water sector in FBiH with other sectors, which are in some way using water resources, is recognized in the FBiH Water Management Strategy<sup>28</sup>. Under the operational goal: "Intensifying cooperation with other sectors associated with waters", the Strategy has determined the following measures:

- Intensifying inter-sectoral cooperation, and
- Promoting the principle of integrated water management in other sectors.

Through such cooperation between, primarily water and energy sector, but also the environmental sector, impacts on water related environment of such a project can be better described and understood. Also, implementation of mitigation measures can be better coordinated.

With regards to the natural water regime or water quality, there are no significant impacts of this project on entity level. From the point of water use, such a project can

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<sup>26</sup>It is important to emphasise that the necessity of construction of fish passes depends on the distance between the planned HPPs. If the distance between two or more HPPs is such that it enables the functioning of fish populations (and provided that connection with the tributaries is also enabled), then the survival of a given species of fish is possible even though one HPP (upstream or downstream) has no installed fish passes.

<sup>27</sup>Management of natural resources, according to Constitution of BiH, is the responsibility of entities. State level administration is responsible for international cooperation and coordination with competent ministries in entities (Federation of BiH and Republika Srpska) and Brčko District.

<sup>28</sup>„Water Management Strategy of the Federation of BiH 2010-2022“ (2010)

have some benefits, through improvement of coordination of water related activities on entity level.

Impacts on regional level (Danube River Basin) refer to stronger implementation of water related requirements of directives, which are transposed to local legislation: Water Framework Directive (2000/60/EC) and Urban Wastewater Treatment Directive (91/271/EEC).

The planned HPP Babino Selo is located in the part of the Vrbas basin where certain autochthonous, endemic and endangered fish species that are crucial for both species and genetic diversity in BiH are present. Construction and operation of HPP may threaten their habitats if potential impacts are not properly identified and mitigated and different pressures on these populations may have both national and regional consequences. The focus should be on sprout (*Huchohucho*), which is an endemic species of the Danube basin and its population is decreasing in the total areal of its distribution, primarily due to HPP construction.

#### 4.5 Environmental and Social Opportunities

From the view of social development, HPP structures with reservoirs are always in line with water sector planning. An important social item, security level against flood and drought impact, has been defined by the *Water Management Strategy of FBiH 2010-2022* under the following strategic goal<sup>29</sup>: “Reduction of risks of extreme hydrological phenomena”. In line with this goal, up to 2022 the activities of reconstruction and rehabilitation of existing and construction and maintenance of the new systems of protection facilities with the aim of increasing the safety level related to protection against floods have been planned. These activities can be implemented through provision of the support to planning and establishing of multipurpose water systems (reservoirs), where effects of these structures are manifested on a wider area and greater number of important economic and other facilities, in cooperation with primarily the energy, agriculture and spatial planning sectors.

Hence, the most important opportunity obtained by the multipurpose reservoir, is clearly indicated in the *Water Management Strategy of FBiH 2010-2022*, having in mind that reservoirs are the most effective measure against negative impacts of water as well as water source in the process reduction of drought impact.

Other opportunities of formation of such a reservoir which can have benefits on the surrounding social and environmental development, relate to one of the purposes of the reservoir – being a new water source for various social needs.

Reservoirs, no matter how large, change the type of surface water body from “river water body” to “heavily modified water body”, which means that the new type of water body will have less requirements regarding the water quality, described as required “good potential” instead of minimal water quality status “good”. Nevertheless, the newly formed type of water body requires water quality measures to be conducted, in order to keep the water quality to a level required to ensure the multipurpose use of the reservoir.

Some potential social benefits of the Project are the following:

- (i) development of energy sector infrastructure of FBiH (BiH),
- (ii) increase in energy production of FBiH (BiH) and
- (iii) potential increase in energy export of FBiH (BiH).

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<sup>29</sup>Source: Water Management Strategy of the Federation of BiH 2010-2022 (2010)

- (iv) local economic stimulus,
- (v) “multiplier effect” of the industry (construction works are expected to trigger the “multiplier effect” of the industry - employment of cooks, waiters and waitresses etc. in nearby services oriented business as restaurants and supplies industry).

#### 4.6 Summary of Results

Based on the results of the analysis of data collected during the scoping phase and the evaluation of the potential impacts of the selected provides a summary of the further requirements and activities to be executed during the next steps of the ESIA process.

Segment	Key Findings
Climate and Meteorological Conditions	<p>The Municipality of Donji Vakuf is characterized by continental and subalpine climate at higher altitudes with micro-locality variations related to river valleys and lower altitudes.<sup>30</sup> According to Köppen's classification of climate, the Municipality of Donji Vakuf and its surrounding area belong to the type of climate Cfb – moderately warm and humid climate with warm summers.</p> <p>The formation of the proposed reservoir has no potential to affect climate in a way to cause regional or global climate changes, or climate changes in measurable extent and therefore the impact is assessed as negligible.</p> <p>During the ESIA phase, no further collection of data related to climate and meteorological conditions will be required. Within the scoping phase, the Consultant collected enough data to carry out the complete and detailed assessment of potential impacts on climate conditions in ESIA phase.</p>
Air Quality	<p>In the project area, air quality is not monitored by the Federal Hydrometeorological Institute of BiH. The monitoring station for air quality does not exist and there is no representative data. However, except the traffic on main road M5 Jajce – Donji Vakuf, there are no major sources of air pollution near the project site.</p> <p>Within the scoping phase, the Consultant collected enough information to carry out the complete assessment of potential impacts on air quality in ESIA phase. No significant adverse impacts on air quality arising from the project activities are expected, therefore no data collection in the field of air quality will be needed. During the ESIA phase, adequate mitigation measures to avoid and/or minimise potential impacts on air quality will be proposed.</p>
Hydrology	<p>Hydrology analyses are based on monitoring data long enough for giving reliable results for determination of minimal, average and maximal flow of the Vrbas River at gauging stations VS Gornji Vakuf and VS Daljan upstream, and VS Han Skela and VS Kozluk, downstream of HPP location.</p> <p>The main hydrology indicators for VS Daljan (which is the nearest upstream gauging station and the most suitable one) are the following: <math>Q_{av.monthly95\%}=4.19 \text{ m}^3/\text{s}</math>, and <math>Q_{1/100}=366 \text{ m}^3/\text{s}</math>.</p> <p>No significant impacts of HPP structures on the general surface water (Vrbas River) flow regime during the construction, operation or decommissioning phase are expected. However, downstream of the dam and the water intake structure, on the river course section up to the water tail, environmental flow (EF) will have to be ensured. Determination of EF will be part of hydrological investigations and will be included in ESIA.</p>

<sup>30</sup>Spatial Plan of Central Bosnia Canton 2005-2025, Ministry of Spatial Planning, Reconstruction and Return of Central Bosnia Canton, 2005

<b>Segment</b>	<b>Key Findings</b>
Water Quality	<p>Regarding the Vrbas River water quality, analyses have been carried out since 1965 with a gap in the years 1992 to 1995, for locations Donji Vakuf downstream and Jajce upstream. The required Water Class II is satisfied for almost all parameters, except for hygienic parameters. Two main agglomerations, Donji Vakuf and Jajce with about 10,000 inhabitants, are not equipped with adequate wastewater treatment plants yet.</p> <p>During the construction phase, surface water quality can locally be deteriorated as a result of construction activities. During operation, various physical processes in the reservoir of the HPP, which differ from the natural condition, are expected to occur in the reservoir, of which the most important is the change of sedimentation and oxygen concentration by length and depth of the reservoir. Downstream of the dam profile, up to water tail, environmental flow will have to be maintained. This amount will have to be determined in further investigation activities. In addition, the second campaign of the Vrbas River water quality analyses (including sampling on two locations, upstream and downstream of HPP Babino Selo profile), is planned to be carried out, during the spring's high water. During ESIA stage, the Consultant will carry out a detailed assessment of potential impacts, both, to hydrology and water quality, and will propose adequate mitigation measures to avoid and/or minimise identified negative impacts.</p>
Geo-morphology	<p>With regard to the origin of the relief, there are two main types of relief formations in the project area:</p> <ul style="list-style-type: none"> <li>· fluvio accumulative relief along the River Vrbas (area of the powerhouse location in Babin Potok), and</li> <li>· fluviudenudative relief on the surrounding hills (left and right side of the project area, dam location).<sup>31</sup></li> </ul> <p>Impacts that may arise do not have the potential to affect geomorphological conditions.</p> <p>No further additional data related to geomorphology will be required in the ESIA phase. The Consultant collected enough information to carry out the complete assessment of potential impacts on geomorphology during ESIA phase.</p>

<sup>31</sup>Union of Geographical Societies, Geokarta, Geomorphology Map of Yugoslavia 1:500 000, 1992

Segment	Key Findings
Geology	<p>The substratum of the project area is made of Triassic volcanic (the left side) and sedimentary rocks (the right side) which have undergone the metamorphosis. The area in immediate vicinity to the River Vrbas is characterized by contemporary quaternary alluvial deposits (Q) with various origins and composition of sand and gravel (relevant for the location of the powerhouse and for both sides of the reservoir). A deep fault divides the left and right side of the project area.<sup>32</sup></p> <p>Implementation of the proposed Project may pose risk of development of the geodynamic processes, including:</p> <ul style="list-style-type: none"> <li>· rockfall (in cases of inadequate performance of earth works such as excavation and creation of notches during the construction phase which may lead to decrease in rock stability and consequently to occurrence of rockfall; impact is directly related to duration of earth works), and</li> <li>· karst formations (in cases of inadequate performance of earth works such as excavation, borrow pits and creation of notches during the construction phase which may lead to decrease in rock stability and consequently to occurrence of cracks; impact is directly related to duration of earth works; however, is estimated as long-term).</li> </ul> <p>Within the development of the HPP Babino Selo Feasibility Study, a detailed program of geological and geotechnical investigations (G1 Mission) is planned to be carried out by the sub-contractor engaged by Pöyry, in accordance with the scope of work agreed with the Client. After the comprehensive geological-geotechnical report is completed, the potential impacts related to development of geodynamic processes will be revised and elaborated in more detail during ESIA phase. The adequate mitigation measures will be suggested.</p>
Hydro-geology	<p>In hydrogeological terms, the following structural units are distinguished within the project area:</p> <ul style="list-style-type: none"> <li>· Ključ-Raduška Nappe – relevant for the dam location and for both sides of the reservoir except the tail of the reservoir (impermeable rocks with partially fissure porosity), and</li> <li>· Middle Bosnian Shist Mountains – relevant only for on the right side of the tail of the reservoir (partially karstic water bodies).</li> </ul> <p>The area of the location of the powerhouse, in the immediate vicinity to the River Vrbas, is characterized by contemporary Quaternary water-permeable alluvial deposits (Q - sand and gravel).<sup>33</sup></p> <p>Project may lead to disturbances of groundwater flow due to pressure of the constructed objects to the ground (in cases when heavy facilities are constructed upon terrain with low bearing capacity; indirectly, the constant pressure may lead to disturbances of the groundwater flow); impact is estimated as long-term impact that may arise during the operation phase).</p> <p>In the ESIA phase, G1 Mission will be conducted and assessment of potential impacts on geology will be completed (please see above). The adequate mitigation measures will be suggested.</p>

<sup>32</sup>Federal Ministry of Spatial Planning, Spatial Basis for the Spatial Plan of FBiH 2008-2028, 2010

<sup>33</sup>Federal Ministry of Spatial Planning, Spatial Basis for the Spatial Plan of FBiH 2008-2028, 2010

<b>Segment</b>	<b>Key Findings</b>
Landslides	<p>According to data from the Vulnerability Study of FBiH, the terrain of the project area, including locations of the necessary facilities, is considered stable without active landslides, and the risk of landslides in stable terrain is less than 3%. Based on the review of available documentation and the findings during the field visit, no active landslides were identified in the project area.</p> <p>Project may pose risk of development of the geodynamic processes, including landslides (in cases of inadequate performance of earth works during the construction phase which may lead to decrease in terrain stability and consequently to occurrence of landslides).</p> <p>In the ESIA phase, G1 Mission will be conducted and assessment of potential impacts on terrain stability and landslides occurrence will be completed (please see above). The adequate mitigation measures will be suggested.</p>
Seismic Conditions	<p>The project area covers the valley of the River Vrbas between Donji Vakuf and Jajce and belongs to active seismic zone that is characterized by earthquake potential intensity of VIII° Mercalli-Cancani-Sieberg (MCS) intensity scale.<sup>34</sup> With regard to seismic activity, Vrbas fault (Vrbasko-voljevački fault) does not belong to seismotectonic active fault, however, discontinuities and contacts zones of different tectonic units have the higher potential for earthquakes compared to other parts of the same tectonic unit .</p> <p>Possible seismic earthquake may pose risk to area during construction phase and operation phase.</p> <p>In the ESIA phase, G1 Mission will be conducted (please see above).</p>
Soil Quality	<p>The project area is covered by automorphic soil (cambisol on rich silicate rocks). It is used for forestry (broad-leaved forest and mixed forest) and agriculture purposes (agriculture and nature vegetation). Hence, it belongs to agro-zones I, II and IV and to land capability classes V, VI and VII which means that the land is characterized by the mixture of all three types of soil texture, steep slopes up to 45% and more, and the soil is poorly drained and exposed to long-lasting flooding. Therefore, the project area falls within the surface area of land affected by very low to very strong intensity of soil erosion.</p> <p>No significant adverse impacts on soil are expected within the project area; therefore, no further data collection in the field of soil protection are needed. The Consultant will propose mitigation measures to avoid and/or minimise potential impacts on soil for all phases of the Project implementation.</p>

<sup>34</sup>Federal Ministry of Spatial Planning, Spatial Basis for the Spatial Plan of FBiH 2008-2028, 2010

Segment	Key Findings
Flora	<p>In the investigated area there species from the <i>Red list of the flora of FBiH</i>, nor plant communities from the Annex IV of the <i>Habitat Directive</i> have not been recorded. Identified communities do not contribute to the natural values of this area. A large number of invasive plant species has been recorded at various sites and with various abundances. Plant species of conservation importance at the national level have not been recorded. Also, the populations of plant species or habitat types which would demand special protection regime for management and monitoring, and in accordance with FBiH legislation and Directive NATURA 2000 have not been recorded.</p> <p>Since the proposed project solution entails a small reservoir size - no significant habitat loss for the identified plant species are expected. However, during ESIA phase the Consultant will propose detailed mitigation measures (with special focus on invasive species) which will include biological quality elements, potential impacts, action/measures, indicators of success/monitoring and timing/deadlines.</p>
Fauna	<p><u>Herpetofauna:</u> Analysis of herpetofauna indicates presence of only two species of amphibians and four species of reptiles in the investigated area. European green lizard – <i>Lacerta viridis</i> (Laurenti, 1768) and dice snake – <i>Natrix tessellata</i> (Laurenti, 1768) are listed in Annex II of the Bern Convention.</p> <p>Since the proposed project solution entails a small reservoir size - no significant habitat loss for the identified animal species are expected. However, in order to preserve the identified vulnerable herpetofauna species European green lizard and Dice snake, appropriate mitigation measures need to be put in place, in accordance with the mitigation hierarchy, which includes preservation of habitats necessary for their survival, such as sheltered sites (large rocks and shady places) which enable stable thermoregulation and survival of these species.</p> <p><u>Ornithofauna:</u> The <i>Red List of Ornithofauna of FBiH</i> in the categories of endangered (EN) and vulnerable (VU) identifies the following species: <i>Aythya roca</i> (Güldenstädt, 1770) (EN), <i>Phalacrocorax carbo</i> (Linnaeus, 1758) (VU), <i>Ardeacinerea</i> Linnaeus, 1758 (VU), and <i>Egretta garzetta</i> Linnaeus, 1766 (VU). These species demand regular monitoring of the state of the population which includes counting, locating of wintering sites and individuals during over flight. <i>Aythya roca</i> (ferruginous duck) does not nest in this area (there are only three nesting sites (Bardača, Hutovoblato and Livanjsko polje), but observation of migration are not excluded.</p> <p>During ESIA phase a set of detailed mitigation measures which will include biological quality elements, potential impacts, action/measures, indicators of success/monitoring and timing/deadlines will be prepared.</p>

Segment	Key Findings
Ichthyofauna	<p>The Vrbas River in Donji Vakuf area has a speed water flow and according to hydrological and ichthyological characteristics it is located within hyporhithral zone (grayling region). The ichthyofauna of the Vrbas River in the area of the planned HPP Babino Selo (Donji Vakuf) is presented with seven fish species from three families. Of particular importance is that one of the fish species, huchen (<i>Hucho hucho</i>), is an endemic species of the Danube basin and according to the International Union for Conservation of Nature (IUCN) Red List and The Red List of Fauna FBiH it has the status of endangered species (EN).</p> <p>Therefore the project area is identified as a priority biodiversity feature acc. EBRD PR6. A detailed assessment of the existing habitat and huchen population (including sediment analysis, extended habitat description, habitat modelling for various flow conditions before and after construction of the power plant, population assessment, food source analysis) is required in order to ensure that the requirements of EBRD PR6 and ESP are met.</p> <p>Based on the results of this additional study, a biodiversity action plan (BAP) including biodiversity monitoring plan (BMP) will have to be developed.</p> <p>In order to minimize the negative impact of the planned HPP Babino Selo on ichthyofauna and aquatic ecosystems in general, environmental flow should be provided and HPP needs to have the technical solutions that can provide upstream and downstream migrations for migratory fish species (fish passes, system that discourages them from entering the pipeline, fish friendly turbines).</p> <p>The first field research of ichthyofauna was carried out in November 2015 during preparation of this document, however, in order to collect additional data on ichthyofauna of the project area additional field survey (earliest June – as fishing activities are not allowed in April/May) would be necessary. Additional desk study research is also planned during ESIA phase, in order to cover details on the ecological and biological characteristics of all the detected fish species with a special focus on endemic species. A set of detailed mitigation measures to avoid, prevent or minimize potential impacts on fish, with focus on endangered species, will be prepared.</p>

Segment	Key Findings
Landscape and Visual Issues	<p>The project area is characterized by:</p> <ul style="list-style-type: none"> <li>· natural landscape and scenery (forests – mostly deciduous trees and shrubs, the River Vrbas and its tributaries, riparian vegetation along the river and its tributaries),</li> <li>· landscape and scenery created by human activities (roads and accompanying road infrastructure, residential objects, objects for agricultural purposes (workshops, stables and barns), agricultural fields with complex crops, facilities of the local economy (Restaurant “Šest braće”).</li> </ul> <p>The Project will affect the landscape and scenery by causing (i) changes in landscape during the construction phase (and during decommissioning).</p> <p>This may result in decrease of the current natural and esthetical values due to necessary earth works and civil works, temporary storages of building material and construction of necessary facilities, presence of personnel and machinery, and constructing structures; identified impacts are estimated as short-term; (ii) changes in landscape during construction phase and operation phase due to formation of reservoir and construction of necessary facilities (dam, powerhouse, relocation of the road, tunnels etc.); impact is estimated as long-term.</p> <p>During ESIA phase, no further collection of data related to landscape and scenery will be required. Within the scoping phase, the Consultant collected enough information to carry out the complete assessment of potential impacts on landscape and scenery in the ESIA phase. The adequate mitigation measures will be suggested.</p>
Noise	<p>There are no available data on daily ambient noise level on the main roads covered by this Project. The main source of noise noticed in the project area was everyday vehicle traffic on the main road M5 (E661).</p> <p>In terms of noise emission and vibration disturbances related to the Project, the sources of noise and vibration are expected during (i) construction phase (construction activities), operation phase (in the power generation process) and decommissioning phase (potential demolition of facilities).</p> <p>No additional data collection related to impact from noise will be required in the ESIA phase. The Consultant will carry out complete assessment of potential impacts from noise distribution and assessment of noise levels at the nearest residential objects. The adequate mitigation measures will be suggested to avoid, minimize and/or mitigate identified impacts.</p>
Demography	<p>The population of the Municipality of Donji Vakuf is 14,739 persons. The number of households in the Municipality is 4,221 and the number of dwellings is 5,582. The Municipality is medium densely populated with 43.33 persons per square km. There are no available data on demography in the Project area. Socio-economic data (specifically, data on demography in the Project area) will be collected through the Socio-economic Survey of Project Affected Persons (PAPs) in the ESIA phase.</p>
Ethnical Structure	<p>It is estimated that the population of the Municipality of Donji Vakuf consists of 98.7 % of Bosniaks, 0.62 % of Croats and 0.59 % of Serbs. According to information provided by representatives of Local Communities Vrbas and Babin Potok, the population of the Project area is 100 % Bosniaks. Impacts that may arise do not have the potential to affect ethnical structure in the Project area. Additional data on ethnical structure (Project specific) will be collected through the Socio-economic Survey of PAPs in the ESIA phase.</p>

<b>Segment</b>	<b>Key Findings</b>
Minority Groups	<p>A small community of Roma people (app. 100 persons) is present in the Municipality of Donji Vakuf, self-declared mostly as Bosniaks. Other minority groups in the Municipality have not been identified. There is no official data on minority groups available in the Project area. No impacts are identified. Additional data on minority groups in the Project area will be collected through the Socio-economic Survey of PAPs as well as through interviewing the local community representatives and transect walks.</p>
Economy	<p>There is 1 small enterprise and 11 micro enterprises in the area of two local communities: Vrbas and Babin Potok (classification according to the number of employees), as follows: (i) Sawmill and factory of facade blocks “Udarnik d.o.o.” employs 20 employees, (ii) Sawmill “Bedem d.o.o.” employs 4 employees, (iii) Restaurant “Šest braće” employs 3 employees, (iv) approximately 9 small craft shops operating in the Local Community of Vrbas.</p> <p>The following businesses are located in the vicinity of the planned Project infrastructure: Restaurant “Šest braće” in Krivače and currently closed Hotel “Bosnae” in Babino Selo.</p> <p>No significant impacts on economy in the Project area are identified. Additional data on businesses in the Project area will be collected through a survey using a questionnaire for local businesses to be prepared. During the ESIA phase, adequate mitigation measures related to economy will be developed.</p>
Agriculture	<p>According to observations from field visits, Project area is very favourable for agriculture production, and there are existing agricultural fields in these areas with complex crop plants (private lands). During the field visits, agricultural fields for livelihood purposes, i.e. raspberries fields, corn fields, cabbage fields and orchards (mostly apple orchards) were recorded.</p> <p>No significant impacts on agriculture in the Project area are identified. Additional data on agriculture will be collected through the Socio-economic Survey of PAPs as well as through interviewing the local community representatives and transect walks.</p>
Livelihood	<p>Intense raspberry production has been taking place in the Project area in the last 5 years. The number of households involved in raspberry production increases each year. Currently, there are app. 15 hectares of raspberry in the Local Community of Vrbas.</p> <p>No significant impacts on livelihood in the Project area are identified. Additional data on livelihoods (Project specific) will be collected through the Socio-economic Survey of PAPs in the ESIA phase, adequate mitigation measures related to livelihoods will be developed, and Land Acquisition and Livelihood Restoration Plan (LALRP) will be developed.</p>
Employment and Labor Force	<p>There are no available data on labour and employment at the local community level. Consequently, there are no available official data on labour and employment in the Project area. Negative impacts on employment have not been identified.</p> <p>The Project is expected to have positive impacts on the local labour market, increase employment rates and possibly the average income for the local population. Additional data on employment and educational levels among the local population will be collected through the Socio-economic Survey of PAPs. During the ESIA phase, potential community impacts, worker influx, contractor management etc. will be analysed. A set of guidelines and a full scope of mitigation measures on employment and economy will be developed in the ESIA phase.</p>

<b>Segment</b>	<b>Key Findings</b>
Gender Issues	<p>There is no monitoring of gender issues at Cantonal or Municipal levels. Official statistical data about gender ratio for the Municipality of Donji Vakuf or the Project area are not available. No impacts related to gender issues are expected. No further studies related to gender issues will be required.</p>
Vulnerable groups	<p>Vulnerable groups in the Municipality of Donji Vakuf are: (i) unemployed persons (particularly middle aged persons and women),(ii) young people, (iii) persons with special needs,(iv) retirees, and (vi) women (particularly single mothers). Data on vulnerable groups in the Project area are not available. No significant impacts on vulnerable groups in the Project area are identified. Vulnerable groups among PAPs will be identified through the Socio-economic Surveying in the ESIA phase. During the ESIA phase, adequate mitigation measures related to vulnerable groups will be developed.</p>
Education	<p>There are no educational institutions in the Project area, and no available official data on the number of students at local community level. According to information provided by the President of the Local Community Vrbas, there are app. 150 students (in primary and secondary education) in this local community. According to information provided by the President of the Local Community Babino Selo, the population of this local community is mainly elderly. No significant impacts on education in the Project area are identified. No further studies related to education will be required.</p>
Housing	<p>The rural type of settlements dominates in the Project area. The majority of properties are residential two-storey houses. In general, houses are made of brick with tile roofs. Most of the houses have no facades. The majority of houses have a garden along or around the houses, orchards and agricultural land (farmland) near the houses, auxiliary facilities such as storage spaces, garages, and barns along or around the houses. No significant impacts on housing in the Project area are expected. Additional information on housing will be collected in the ESIA phase.</p>

<b>Segment</b>	<b>Key Findings</b>
Transport	<p>The road network of the Project area consists of the Main Road M5 (Travnik–Donji Vakuf - Jajce) and local roads. The Main Road M5 (Travnik–Donji Vakuf - Jajce) is characterized by a large number of vehicles in traffic (average annual daily traffic is 3,054 on M5 Jajce–DonjiVakuf. Local roads are characterized by a small number of vehicles in traffic, and are mostly used only by the local population. Three companies for passenger transport operate on the route Jajce-Donji Vakuf (out of a total of 9 companies operating in the Municipality of Donji Vakuf). The Project is expected to have impacts on roads and traffic, with varying scopes in the different phases of the Project.</p> <p>The construction site of dam is in the close proximity to the local road, and the construction of the dam may lead to road damage (particularly during heavy machinery accessing the construction site) during the construction phase. Increased traffic flow in the area leading to congestion and obstruction is likely to be experienced on main and local roads during the construction and decommissioning phases. This is mainly linked to the delivery of construction material to site and collection of resulting waste from construction work in construction phase and removal of material in decommissioning phase.</p> <p>Part of the local road (access side road length of app. 50 meters) will probably be flooded by reservoir formation in the Krivače settlement during the operation phase. This impact is long-term. In the ESIA phase, the entire scope of impacts on transport will be developed, as well as adequate mitigation measures related to transport.</p>
Water Users	<p>The main water use, in this part of Vrbas River sub-basin, is water supply for population of towns of Donji Vakuf and Jajce, upstream and downstream of HPP location. Water sources are ground water while Jajce Town is supplied via open water intake of the Pliva River, a right tributary of the Vrbas River. There is no significant water use for other purposes, such as industry, irrigation, tourism or fish farming.</p> <p>No significant impact of HPP structures on the main water users are expected, having in mind their locations and water resources that are used. Only local, individual water supply systems can be under the negative impact during construction phase. Further investigations are foreseen during ESIA stage in order to determine locations of these water supply systems.</p>
Recreation	<p>The Municipality of Donji Vakuf is located around the River Vrbas and its tributaries, and the activities within the Municipality are mainly concentrated along the River Vrbas. During the site visit meetings and consultations were organised with 3 organizations identified as water use interest groups: (i) Fishing Club "SRD Vrbas, DonjiVakuf", (ii) Rafting Club "Dabar", and (iii) Hunting Club "Semešnica".During the ESIA phase, additional data collection related to recreation will not be required; however, mitigation measures related to recreation will be developed.</p>

<b>Segment</b>	<b>Key Findings</b>
Current Land Use and Land Value Assessment	<p>The Project area has very valuable arable land and belongs to the first zone according to the land capability classification, with predominantly land of IVb capability class. The Project is expected to affect current land use practices in surrounding areas of the dam, waterway and powerhouse. The impacts related to land use restrictions will depend on the issue of ownership of land, which will be precisely defined when the exact positions of the permanent structures and the waterway route are determined. The Project is expected to lead to access restrictions at the locations of the dam, waterway and powerhouse. Impacts in terms of access restrictions vary in the different phases of the Project. Loss of natural resources referring to several plots of agricultural land (fields and pastures) is linked to powerhouse and waterway construction during the construction and operation phases. For the purposes of powerhouse construction, loss of natural resources is expected to a small extent (app. 800 square meters). This impact is long term. Construction of access roads and placement of staff, machines and material around the powerhouse location will also impact pastures in the area in the short-term.</p> <p>A Socio-economic Survey will be carried out in the ESIA phase by the Consultant. The Survey will provide detailed data on land use and private properties in the project area. Additional data on current land use and land value assessment will be collected through the Census in the ESIA phase, and adequate mitigation measures developed as well.</p>
Existing Land Properties and Material Assets	<p>Land in the location of the powerhouse is private property consisting of 3 cadastral plots mostly categorized as arable land. The planned underground waterway in alternative “a” is expected to pass through land categorized as forest land (mostly publicly owned). Land in the location of the dam location is categorized as forest, river, local roads and railway (all in public ownership). Therefore, the Project is expected to involve the complete acquisition<sup>35</sup> or incomplete acquisition<sup>36</sup> of privately owned land for the purpose of construction of permanent structures such as a waterway and powerhouse. Expropriation of residential structures (houses) or physical relocation is not expected.</p> <p>A Socio-economic Survey of PAPs will be carried out by the Consultant in the ESIA Phase.</p>
Cultural, Historical and Archaeological Heritage	<p>In accordance with the List of Proclaimed National Monuments in BiH adopted by the Commission for Preserving National Monuments of BiH, no cultural heritage and archaeological findings have been recorded in the Project area, therefore no impacts on cultural, historical and archaeological heritage are identified. There is no need for additional studies during ESIA phase.</p>

<sup>35</sup>According to the Law on Expropriation of FBiH (“Official Gazette of FBiH”, No. 70/07, 36/10 and 25/12), complete expropriation allows the expropriation beneficiary to obtain legal title over the expropriated property, while the rights of the previous owner over the real property as well as other rights over that real property cease to exist.

<sup>36</sup>According to the Law on Expropriation of FBiH, incomplete expropriation provides the beneficiary with usufruct rights on the land and structures, as well as the lease of the land for a definite period of time. At the end of the lease, usufruct rights over land are returned to the previous owner.

<b>Segment</b>	<b>Key Findings</b>
Community Health, Safety and Security	<p>During construction and operation phase the Project potentially has no negative impact on the population health, except for accidental situations, which may lead to leakage of oil and lubricants (impact on the community downstream of the project area on soil or water irrigation systems that use water from the River Vrbas).</p> <p>During the operation phase, formation of the reservoir and normal functioning of the planned HPP may lead to degradation of the water quality and thus indirectly increase the occurrence of the water related diseases. Indirect impacts are possible if the planned reservoir is used for bathing activities, in case of poor water quality (categories III and IV). No direct impacts on population health as a result of water related diseases are expected, since the water from the River Vrbas is not used for water supply.</p> <p>No additional data collection related to impacts on community health will be required in the ESIA phase. The 2<sup>nd</sup> water campaign which is to be performed in late March 2016 will be used to get additional data on water quality in the project area. The Consultant will propose adequate mitigation measures to avoid, minimise and/or mitigate the potential impacts on community health.</p> <p>Areas of high risks against flood protections are recognized at GornjiVakuf, Bugojno and DonjiVakuf towns, upstream of HPP locations. Only part of Donji Vakuf urban area is protected against the Vrbas River flood impact by dykes in length of about 1 km.</p> <p>As the dam height and the volume capacity of the reservoir can have limited impact on situation regarding the flood protection, there is no need for further studies.</p>

Table 5: Summary Table of the Findings (Results of Scoping)

It must be noted that both local legislation and EBRD requirements will be observed during Project implementation, and that whichever are more stringent will be applied.

## 5 DETAILED WORK PLAN FOR ESIA

### 5.1 Description of Activities, Additional Data that need to be Collected and Other Necessary Studies

As identified in Chapter 4, the Project will have impacts on the following key environmental and socio-economic aspects:

- Hydrology aspect - Environmental flow;
- Water quality;
- Resource accessibility – water supply;
- Riparian flora and vegetation;
- Ichthyofauna and aquatic habitats;
- Land Acquisition and Physical Displacement;
- Economic Displacement;
- Restrictions on Land Use and Damage to Private Properties;
- Impacts on Resource Accessibility;
- Impacts on Employment and Contribution to Economy.

These aspects will be further investigated and assessed within the ESIA phase, through specialist studies or collection of additional information. All environmental and socio-economic issues will be identified, investigated and addressed in the ESIA document in order to provide the Client and the authorities with sufficient information for decision making.

After the scoping phase it can be concluded that impacts of the Project on other environmental and social aspects would not be significant or are expected to be short-term, considering the existing environmental and social conditions and the Project location.

The following specialist studies and/or additional work are proposed for the ESIA phase of the Babino Selo HPP.

#### 5.1.1 Determination of Environmental Flow

According to the *Law on Waters* (Official Gazette of FBiH, No. 70/06), environmental flow (EF) “represents the minimal flow that ensures the preservation of natural equilibrium and water depended ecosystems”<sup>37</sup>. This definition is taken over in the in the *Regulation on the Method for Determining Environmental Flow* (Official Gazette of FBiH, No. 4/13).

According to the abovementioned Regulation, the purpose of determining the EF is the following: “*The EF shall be determined for the purpose of maintaining or restoring the structure and function of aquatic and water-dependent ecosystems, contributing to prevention of degradation and to achievement of the goals of environmental protection through the sustainable use of water*”.

The Regulation describes the methodology of EF determination, in relation to the type of affected area or surface water body. In line with the Regulation, the Consultant will carry out the study for preliminary EF determination, during ESIA phase.

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<sup>37</sup>Article 62 of the Law

Minimal water flow downstream of the water intake structure, on river section up to the water tail, would be, beside EF, increased for the other downstream needs: landscape purpose, pollution dilution or irrigation. This flow can be named as “water management minimal flow”.

### 5.1.2 Water Quality Analysis

Regular water quality analyses of the Vrbas River sub-basin are being carried out since 1965, with interruption in the period 1992-1995, on pre-determined locations, by institutions of water sector. These results are presented in Chapter 4.

For the purpose of preparation of this study, during September 2015, the first water quality analyses has been conducted on two profiles close upstream and downstream of the planned HPP location. The results of are also presented in Chapter 4.

For the next phase, ESIA, the Consultant will carry out the second water quality analyses in the period of March 2016, during the high water flow and corresponding water quality. The sampling will be carried out on the same locations as in the first water quality campaign (Figure 5).

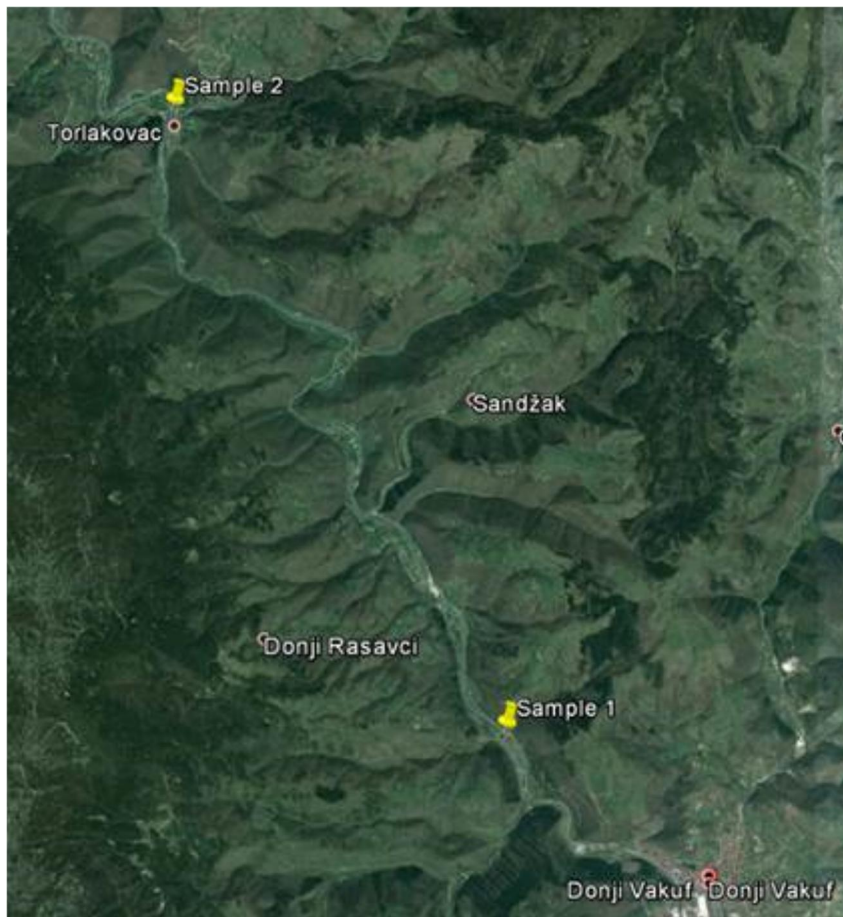


Figure 5: Sampling Locations for the Water Quality Analysis

Water analysis will be carried out by the accredited laboratory (BATA<sup>38</sup> certification), and the following parameters will be analysed:

- Dissolved oxygen
- pH
- Suspended solids
- Conductivity at 20 °C
- Degree of saprobity according Liebmann
- COD
- BOD<sub>5</sub>
- Soluble reactive phosphorus (SRP; PO<sub>4</sub>)
- Ammonium (NH<sub>4</sub>)
- Nitrites (NO<sub>2</sub>)
- Nitrates (NO<sub>3</sub>)
- Sulphates (SO<sub>4</sub>)
- Total organic carbon (TOC)
- Iron (Fe)
- Manganese (Mn)
- Nickel (Ni)
- Zink (Zn)
- Copper (Cu)
- Lead (Pb)
- Chrome (Cr)
- Arsenic (As)
- Cadmium (Cd)
- Mercury (Hg)
- Pesticides (triazine-pesticides and organochlor pesticides)

### 5.1.3 Geological and Geotechnical Investigations Program

Within the development of the HPP Babino Selo Feasibility Study, a detailed program of geological and geotechnical investigations is planned to be carried out by the sub-contractor engaged by Pöyry, in accordance with the scope of work agreed with the Client.

Although this program is not foreseen within the ESIA process, after the G1 Mission is carried out, the potential impacts related to development of geodynamic processes and presented within this report will be revised and elaborated in more detail in ESIA Phase in accordance with the findings in G1Mission.

Engineering Geology Study- G1 Mission will be conducted in accordance with the *Regulation on Geotechnical Investigation and Organizations and Geotechnical Engineering*<sup>39</sup>, as well as agreed scope of work. During G1 Mission, the terrain is tested for complete geotechnical identification, classification and determination of geotechnical characteristic of the soil and rock at the location of the building, or the part of the building which influences the ground during the construction and exploitation.

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<sup>38</sup> Institute for Accreditation of Bosnia and Herzegovina

<sup>39</sup>Official Gazzete of FBiH, br. 60/09

Engineering Geology Study will reveal more information on:

- type of the substratum,
- vertical division / vertical profile of the substrate,
- terrain stability and coefficient of soil bearing capacity,
- permeability of the substratum and coefficient of permeability of substratum,
- groundwater levels.

Therefore, baseline conditions related to the ESIA Phase as well as potential impacts from the ESIA Phase can be completed after the G1 Mission is submitted.

#### **5.1.4 Mapping of Flora and Fauna**

During the ESIA phase the Consultant will prepare precise and accurate maps of the distribution of flora and fauna. GIS maps of all investigated groups of organisms will be prepared in Arc GIS software and delivered with the report.

#### **5.1.5 Collection of Additional Data on Ichthyofauna of the Vrbas River Basin**

The presence of the huchen (*Hucho hucho*), an endemic species of the Danube basin and according to the International Union for Conservation of Nature (IUCN) Red List and The Red List of Fauna FBiH with the status of endangered species (EN) identifies the project area as a priority biodiversity feature acc. EBRD PR6.

Therefore in addition to the collected baseline data, an extensive assessment of the existing habitat and huchen population (including sediment analysis, extended habitat description, habitat modelling for various flow conditions before and after construction of the power plant, population assessment, food source analysis) is required in order to ensure that the requirements of EBRD PR6 and ESP are met.

In order to collect additional data on ichthyofauna of the project area a second campaign of field survey is necessary. This survey will include ichthyofauna sampling (field work) and analysis of qualitative (fish determination) and quantitative structure (individual number and biomass of determinate fish species) of fish communities. Ichthyofauna sampling will be conducted at several points (upstream and downstream of the planned HPP Babino Selo) by using electro-generator for fish sampling and gill nets with different mesh types, if necessary. Sampling activities will be proceeded according to international standard DIN EN 14011 Water quality - Sampling of fish with electricity.

Further, in order to cover details on the ecological and biological characteristics of all the detected fish species with a special focus on endemic species, additional desk study research is planned during ESIA phase. Furthermore, the existing legislation will be analysed from the aspects of fish funds and environmental protection. In order to collect and analyse as many data as possible, the Consultant will collect all the relevant and available references on the ichthyofauna composition in the target area (during ESSS phase the Consultant did not manage to obtain the reference titled *Ribolovno-gospodarska osnova za područje Srednjobosanskog kantona, Poljoprivredno-prehrambeni fakultet Sarajevo (2008)*).

The planned activities during ESIA phase will also focus on measures and solutions targeting the minimization of potential negative impacts of the planned HPP Babino on the ichthyofauna of the Vrbas River basin and its tributaries.

### **5.1.6 Resource Accessibility – Water Supply**

Regarding the impact of the Project on resource accessibility, for the purpose of water supply, two settlements near upstream and downstream of the HPP location could be affected due construction phase of the project: Babin Potok and Krivače.

During ESIA phase, it is planned to make more detailed description of the existing water supply resources used for water supply of mentioned settlements and their possible sensitivity to impacts during construction of HPP structures.

### **5.1.7 Social Impact Assessment Study and Land Acquisition and Livelihood Restoration Plan**

Secondary data will be validated and substantiated by undertaking a Socio-economic Survey and Census of directly affected land plots and assets in the project area. The Survey will include collection of data and information on the local communities, households, businesses and relevant socio-economic landmarks.

The objectives of the Social Impact Assessment can be summarised as follows:

- To define the area affected by the Project and people associated with these areas;
- To provide a detailed description of the people living and working in the project affected area, including demographic data/information;
- To describe all economic and livelihood activities in the project affected area;
- To thoroughly describe the specific land ownership structures and land uses, including a description of all land users;
- To count the number of directly affected households living and/or working (formally and informally) in the affected project area;
- To open and maintain a database of households/ individuals that will be directly affected by the Project;
- To describe the status of education, including levels of education, skills, literacy,
- To describe the status of health, including common diseases, causes of diseases, and type;
- To provide an overview of all social infrastructure in the project area;
- To identify social and economic impacts that will result from the Project
- To propose appropriate mitigation measures for addressing the impacts identified; and
- To develop a LALRP.

A methodological process will be defined in a way to be rigorous, defensible and appropriate to the local context, objectives of the study and survey population (households).

The sampling method will include all households/businesses directly affected by the Project.

## **5.2 Timeline of Activities**

### *Determination of Environmental Flow*

Determination of environmental flow will be carried out in line with FBiH legislation during the first part of ESIA development (January/February 2016).

### *Water Quality Analysis*

The Consultant will carry out the second water quality analyses in the period of March 2016, during the high water flow and corresponding water quality.

### *Geological and Geotechnical Investigations Program*

Activities related to G1 Mission will be conducted in accordance with the agreed timeline of activities by the sub-contractor engaged by Pöyry. The results of the G1 Mission will reflect on the completion of the baseline information and potential impacts related to risk of development of the geodynamic processes.

### *Mapping of Flora and Fauna*

Detailed mapping of all investigated groups of organisms will be carried out during the first phase of ESIA development –February 2016.

### *Collection of Additional Data on Ichthyofauna of the Vrbas River Basin*

The collection of additional data on ichthyofauna will cover various activities

- Desktop review of additional literature (March/April)
- Field survey (June)
- Laboratory work (June)
- Development of habitat model (supplementary, depending on possibility of terrestrial survey, expected June, earlier if the water level conditions allow)
- Habitat analysis (supplementary, subsequently terrestrial survey)
- Elaboration of habitat study (supplementary, subsequently terrestrial survey)

### *Social Impact Assessment Study and Land Acquisition and Livelihood Restoration Plan*

The Socio-economic Survey and Census will be conducted in accordance with the agreed Project timeline. The results of the Socio-economic Survey will be available in February or early March, 2016. On the basis of the Census and results of the Socio-economic Survey, LALRP will be developed by the end of the April, 2016.

Detailed timeline of the planned activities for the ESIA phase is presented in Table 6.

It has to be noted, that the timeline is heavily affected by the required 2<sup>nd</sup> field campaign for the aquatic fauna, which can be conducted earliest in June due to legal fishing restrictions.

Table 6: Timeline of Activities for ESIA Phase

N°	Activity	2016												2017	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
<b>Phase 2- E&amp;S Impact Assessment</b>															
1.	Full-scale assessment														
1.1	Collection of additional baseline data · Determination of environmental flow · Collection of data for detailed description of the existing water supply resources · Results of the G1 Mission														
1.2	Mapping of Flora and Fauna														
1.3	Socio-economic survey (resettlement) for the selected alternative and consultative meetings with LCOs, as appropriate														
1.4	Water quality analysis – 2 <sup>nd</sup> campaign														
1.5	Development of huchen habitat study (to be agreed with EP BiH and EBRD)														
1.6	2 <sup>nd</sup> field research of ichthyofauna and laboratory work														
1.7	Assessment (evaluation) of identified impacts														
1.8	Development of mitigation measures														
2.	Drafting ESIA documents														
2.1	Drafting ESMMP (including Waste Management Plan, BAP and BMP)														
2.2	Drafting NTS														
2.3	Development of Draft ESIA document														
2.4	Development of LALRP														
2.5	Submission of Draft ESIA to EP BiH and EBRD														
2.6	Translation of Draft ESIA and NTS to Bosnian														
2.7	Public disclosure														
2.8	Finalization of ESIA Report														
2.9	Submission of Final ESIA to EP BiH and EBRD														
<b>Deliverables</b>															
a)	Draft ESIA (including ESMMP, NTS)														
b)	Final ESIA Report														

## 6 CONCLUSIONS

As pointed out in section 4.6, due to the small size of the power plant and the resulting area of influence most of the impacts of the projects are considered short term and moderate. The most critical issue is the presence of the huchen as an endangered species, which classifies the project area a priority diversity feature according to EBRD PR6.

The execution of the project requires the compliance with §16 of EBRD PR6, which includes

- no other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value
- stakeholders are consulted in accordance with PR 10
- the project is permitted under applicable environmental laws, recognising the priority biodiversity features
- the project does not lead to measurable adverse impacts on those biodiversity features for which the critical habitat was designated as outlined in paragraph 14
- the project is designed to deliver net gains for critical habitat impacted by the project
- the project is not anticipated to lead to a net reduction in the population of any endangered or critically endangered species, over a reasonable time period
- a robust and appropriately designed, long-term biodiversity monitoring and evaluation programme aimed at assessing the status of critical habitat is integrated into the client's adaptive management programme.

In order to guarantee the fulfilment of above requirements it is necessary to conduct a thorough and extensive assessment of the vulnerability of the local huchen population.

## ANNEXES

### ANNEX 1 - DETAILED LEGAL AND INSTITUTIONAL FRAMEWORK

The *Constitution of BiH*, an annex to the General Framework Agreement for Peace in Bosnia and Herzegovina (the Dayton Agreement) adopted in 1995, defines BiH as a sovereign state with a decentralized political and administrative structure.

Environmental management in BiH is fragmented and is carried out at four administrative levels: state level, entity level, cantonal level and municipal level. According to the *Constitution of BiH*, environmental management policy and the use of natural resources fall under the jurisdiction of two entities (FBiH and RS) and Brcko District. However, the Ministry of Foreign Trade and Economic Relations of BiH (MoFTER) has the authority to define the policy and main principles, coordinate the activities and harmonize the plans of entity bodies in accordance with international obligations in the fields of agriculture, energy, environmental protection, development and use of natural resources, and tourism<sup>40</sup>

#### 1 INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL PROTECTION

According to the *Constitution of FBiH*<sup>41</sup>, Chapter III, Article 2, para. c), environmental protection policy is under the joint responsibility of FBiH and the Cantons. The Federal Ministry of Environment and Tourism (FMET) is responsible for environmental management at entity level with its own authorities and jurisdictions, whereas the Cantonal ministries in charge of environment in 10 cantons of FBiH are responsible for environmental management at Cantonal level. The key institutions related to the environmental protection and pertinent to this Project are listed in Table 7.

Institution	Main responsibilities
State level	
Ministry of Foreign Trade and Economic Relations of BiH (MoFTER)	Definition of policies, basic principles, coordination of activities and harmonization of plans of entities' bodies, government and institutions in accordance with international obligations in the areas of agriculture, energy, environmental protection, development and use of natural resources and tourism <sup>42</sup>
FBiH level	

<sup>40</sup>Pursuant to the provisions of the Law on Ministries and Other Administrative Bodies in BiH (Official Gazette of BiH, No. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)

<sup>41</sup> Constitution of FBiH (Official Gazette of FBiH, 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)

<sup>42</sup>Article 9 of the Law on Ministries and Other Bodies of BiH (Official Gazette BiH, No. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)

Institution	Main responsibilities
Federal Ministry of Environment and Tourism (FMET)	Administrative and professional tasks related to air, water and soil protection, monitoring and environmental standards, drafting environmental strategy and policy, tourism development. Competent for issuing Environmental Permits for plants and facilities with mandatory environmental impact assessment. Environmental permit takes into account the overall environmental management of the facility, including emissions to air, water and soil, generation of waste, use of raw materials, energy efficiency, noise, accidents and rehabilitation of the site after the closure of the plant
Federal Ministry of Physical Planning (FMPP)	Responsible for physical planning and land use at entity level. Competent for issuing Urban Permits, Construction Permits and Use Permits for Construction and operations of importance to the FBiH and constructions which undergo to Environmental Permit procedure based on the EIA Study.
Federal Ministry of Agriculture, Water Management and Forestry	Agriculture, water management and forestry related services: protection and use of agricultural land, protection of agricultural crops and products; health protection of animals, food industry, protection of forests, water sources, use of water.
Federal Ministry of Health	Administrative, professional and other tasks related to the responsibilities of the FBiH in the field of public health and sanitary inspections.
Federal Administration for Inspection Affairs	Organized into Inspectorates which cover different sectors and issues. Inspectorates in charge of occupational health and safety issues are the Labour Inspectorate and Health-Pharmaceutical Inspectorate which control compliance with the laws and by-laws that regulate employment, workers' rights and regulations that ensure occupational health and safety. Inspectorate for Urban Planning and Environmental Protection ensures the proper application of laws and regulations related to physical planning, construction and environmental protection.
Sava River Basin District Agency	Managing the water area of the Sava River basin: organizing, collecting and dissemination of data on water resources; organizing hydrological monitoring and water quality monitoring; monitoring of the environmental state of surface waters and the monitoring of groundwater; issuing water permits.
Federal Hydrometeorological Institute of BiH	Monitoring in the field of meteorology, hydrology, environmental quality and seismology; research in the field of atmosphere, water resources, environmental quality (air, water, soil) and seismic processes.
Federal Agropedology Institute	Mapping and determination of the soil quality of agricultural land; control of agricultural soil fertility; monitoring of contamination levels with pollutants (heavy metals) in agricultural land; zoning of agricultural land and its rational use; monitoring of agricultural land and changes in the soil; establishment of Land Information System (LIS) of agricultural land and keeping records on agricultural land.

Institution	Main responsibilities
Federal Forestry Administration	Data collection and management of a database on the state and development of forests, including an inventory of all forests, the establishment and maintenance of the cadastre of forests and forest land cadastre and forest infrastructure of state-owned forests at FBiH level.
Institute for Public Health of FBiH	Health promotion and disease prevention, control of infectious diseases, health and the environment, planning and programming, research in public health at FBiH level.
Cantonal level	
Ministry of Physical Planning, Construction, Environmental Protection, Return and Housing Affairs of Central Bosnia Canton	Environmental protection activities and spatial planning at cantonal level. Issuance of Environmental Permits, Urban Permits, Construction Permits and Use Permits for projects that do not undergo to mandatory environmental impact assessment, for projects of importance of Canton and which covers two or more Municipalities.
Cantonal Institute for Urbanism, Spatial Planning and Protection of the Cultural / Historical heritage (Central Bosnia Canton)	Spatial planning, design, use, evaluation and area protection, development of spatial - planning and urban - technical documentation at cantonal level, monitoring the implementation of the <i>Spatial Plan of the Central Bosnia Canton 2005 - 2025</i> and participation in its harmonization in accordance with the <i>Spatial Plan of the Federation of Bosnia and Herzegovina</i> , establishment and development of a single cantonal geoinformation systems (GIS), protection of the cultural - historical and natural heritage, harmonization and implementation of spatial plans of municipalities.
Cantonal Forestry Administration of Central Bosnia Canton	Provides immediate protection of state forests, collects data and maintains a database on the state and development of forests, establishes and maintains the cadastre of forests and forest land at cantonal level.
Cantonal Administration for Civil Protection of SBK	Performs administrative and professional tasks in the field of protection and rescue, fire prevention and fire fighting affairs and civil protection inspection, inspection of fire protection and inspection on fire fighting at cantonal level.
Public Health Institute of Central Bosnia Canton	Collects statistical reports in the field of health in the area of the Canton, supervise, monitor and analyse the epidemiological situation in the area of Canton, by proposing and, if necessary, implementing control measures, supervise the implementation of compulsory immunization, monitor, analyse and evaluate the impact of the environment (air, soil, noise) on the population of the Canton.

Table 7: Institutions Relevant for the Project

## 1.1 OVERVIEW OF THE KEY ENVIRONMENTAL AND SOCIAL LEGISLATION

Implementation of this project requires compliance with relevant national environmental and social laws.

### 1.1.1 Laws Regulating Environmental Protection

#### *Law on Environmental Protection*

The *Law on Environmental Protection* (Official Gazette of FBiH, No. 33/03 and 38/09) regulates the preservation, protection, restoration and improvement of the ecological quality and capacity of environment and of the quality of life; measures and conditions for managing, preserving and for rational use of natural resources; the framework for legal measures and institutions for the preservation, protection and improvement of environmental protection; financing environmental activities and for voluntary measures; responsibilities and tasks and duties of public administration at different state levels. This Law also regulates Environmental Impact Assessment procedure and the issuance of Environmental Permit at FBiH level.

#### *Law on Air Protection*

The *Law on Air Protection* (Official Gazette of FBiH, No. 33/03 and 4/10) lays down technical conditions for the prevention or where that is not practicable, for the reduction of emissions into the air from human activities, which have to be respected during production processes on territory of FBiH, planning of air quality protection, special emission sources, emission inventory, air quality, monitoring and sanctions for legal and private entities and natural persons. Limit values, target values and alert thresholds for pollutants and the date of their entry into force are defined by the by-laws to this Law.

#### *Law on Nature Protection*

The *Law on Nature Protection* (Official Gazette of FBiH, No. 66/13) regulates the competence of bodies for nature protection, general conservation measures, evaluation of operations in nature, habitats and ecologically important areas, species and subspecies, protection and conservation of biodiversity and ecosystems, the establishment of Natura 2000, measures to protect species and subspecies, transboundary movement of protected wild species and sub-species, and monitoring, access to information and public participation, a sign of nature protection, promotion of education in the protection of nature, awards and prizes for achievements in the nature protection, and financing for nature protection.

#### *Law on Waste Management*

The *Law on Waste Management* (Official Gazette of FBiH, No. 33/03, 72/09) regulates all categories of waste (with the exception of radioactive waste, gases emitted into the atmosphere and wastewaters), as well as all types of waste management activities, operations and systems. The provisions of this Law also apply to waste generated by activities of prospecting; extraction, treatment and storage of mineral resources and the operation of quarries; liquid waste; animal waste and other non-hazardous materials of natural origin that can be used for agricultural purposes; and defused explosives. The law regulates waste management, planning and treatment, waste and hazardous waste cross-border transport with the objective to encourage and provide the basic conditions for the prevention of production, recycling and processing of waste for re-use; the extraction of secondary raw materials and possibly of energy thereof.

#### *Law on Waters*

The *Law on Waters* (Official Gazette of FBiH, No. 70/06) regulates water management and planning on the territory of FBiH. Water management includes water protection, water use, protection from harmful water effects and regulation of watercourses and other waters. This Law contains also provisions for public water resources, water facilities, legal persons and other institutions competent for specific water management issues and other issues pertaining to waters in FBiH such as the procedure for obtaining a Water Permit.

#### *Law on Protection from Noise*

The *Law Protection from Noise* (Official Gazette of FBiH, No. 110/12) regulates the permissible noise levels, noise protection measures, the way of measuring and recording noise, noise limits classified according to the atmosphere, land use and the time of day (day or night), in order to protect human health, working and living space, and the environment in general.

#### *Law on Freshwater Fishing*

The *Law on Freshwater Fishing* (Official Gazette of FBiH, No.64/04) regulates fishing waters, fishing, aquaculture, fishes protection, fishing-guard service, administrative and inspection supervision over the implementation of this Law and other issues relevant to freshwater fishing in FBiH. According to this Law fishes in the fishing waters have to be used in a sustainable way that contributes to the conservation of biological diversity of ecosystems.

#### *Law on Forests*

The *Law on Forests* (Official Gazette of Central Bosnia Canton, No. 5/14) regulates forest planning, economic activity in forestry, protection against biotic and abiotic harmful factors, transport of timbers and secondary (non-timber) forest products, forests and forest lands with a special management regime, forests and forest lands protection from damages; secondary (non-timber) forest products and protection of endangered species, traffic in the forests, management of forests and forest lands.

### **1.1.2 Laws Regulating Physical Planning, Construction and Roads Maintenance and Management**

#### *Law on Physical Planning and Land Use at the Level of FBiH*

The *Law on Physical Planning and Land Use at the Level of FBiH* (Official Gazette of FBiH, No 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) regulates land use planning on the territory of FBiH through the preparation and adoption of plans and their implementation, the type and content of planning documents, land use at the entity level, supervision of the implementation of planning documents of importance to FBiH, supervision over the implementation of this law, as well as penalties for legal entities and individuals. This Law contains also the procedures for obtaining Urban Permit, Construction Permit and Use Permit.

#### *Law on Construction Products*

The *Law on Construction Products* (Official Gazette of FBiH, No 78/09) regulates the technical performances, conformity assessment and proving the usability of construction

products as a condition for their placing on the market, the distribution and use to the extent necessary to meet the essential requirements of a building designated by special regulations, the implementation of administrative and other procedures and in this respect rights and obligations of the state administration, legal entities and individuals.

#### *Law on Concessions of FBiH*

The *Law on Concessions of FBiH* (Official Gazette of FBiH, No. 40/02 and 61/06) regulates the conditions under which local and foreign legal persons may be granted concessions for the provision of infrastructure and services as well as exploitation of natural resources, financing, design, construction, reconstruction, maintenance and/or operation of this infrastructure and all of its related facilities and equipment in fields that fall within the exclusive jurisdiction of the Federation of Bosnia and Herzegovina, its authority to grant concessions, and the establishment of the Commission for Concessions of the Federation, contents of concession contract, termination of concession contract, obligations of the Concessionaire, resolution of disputes and other issues of importance for granting of Concessions on the territory of the FBiH. Concession for Construction of facilities for energy supply with the capacity over 5MW is regulated by this Law on FBiH level.

#### *Law on Roads*

The *Law on Roads of FBiH* (Official Gazette of FBiH, No. 12/10 and 16/10) regulates the legal status of public roads on the territory of FBiH, closely defining the road management rules and requirements (physical planning and administrative provisions), construction, maintenance, additional management and public works regarding the construction of roads, the protection of roads and conditions for the provision of public and private road transport, financing of public roads, concessions on public roads, concrete technical rules for the implementation of the provisions of this Law.

#### *Law on Basis of Road Traffic Safety in BiH*

The *Law on Basis of Road Traffic Safety in BiH* (Official Gazette of FBiH, No 6/06, 75/06, 44/07, 84/09, 48/10 and 18/13) regulates basic principles for traffic participants behaviour and other participants in the transport, the basic requirements to be met by roads in terms of road traffic safety, maintenance of the Central Registry of drivers and vehicles, road traffic rules, traffic signs system and signs given by authorized persons , duties in the event of traffic accidents, training of candidates for drivers, requirements for vehicles devices and equipment, dimensions, total weight, axial load, the basic conditions that need to be met by vehicle on traffic roads, as well as other issues related to road. Roads shall be designed, constructed, equipped and maintained to suit their purpose and requirements of traffic safety.

### **1.1.3 Laws regulating health and safety at work, labour and social issues**

#### *Law on Safety at Work*

The *Law on Protection at Work* (Official Gazette of SR BiH, No. 22/90) regulates measures to provide immediate safety of workers, measures in relation to working conditions, measures regarding the special protection of workers, rights, duties and responsibilities of the organization, employers and workers, and the other provisions regarding the health and safety at work.

#### *Law on Protection against Fires and Protection of Fire-fighters*

The *Law on Protection against Fires and Protection of Fire-fighters* (Official Gazette of FBiH, No. 64/09) regulates the organization and operation of fire protection and fire service, planning and implementation of fire protection measures, organization and functioning of the fire service and fire-fighting (fire intervention), professional training and development of employees and fire-fighters, financing and other issues of importance to the organization and functioning of fire protection and fire-fighting in FBiH.

#### *Labour Law of FBiH*

The *Labour Law of FBiH* (Official Gazette of FBiH, No. 62/15) regulates the establishment of an employment relationship, the rights and obligations deriving from employment relationship, working hours, salaries, breaks and absences from work, occupational protection and safety termination of employment contracts, collective agreements, peaceful settlement of collective labour disputes and other issues deriving from the employment relationship.

#### *Law on Pension and Disability Insurance*

The *Law on Pension and Disability Insurance* (Official Gazette of FBiH, No. 29/98, 49/00, 32/01, 73/05, 59/06, 04/09) regulates and determines the rights, conditions of pension and disability insurance, pension schemes, who can obtain the disability insurance, provision of funds for pension and disability insurance and other issues related to pension and disability insurance.

#### *Law on Strikes*

The *Law on Strikes* (Official Gazette of FBiH, No. 14/00) regulates and guarantee the rights of employees to strike, conditions and ways of organizing the strike, the right of trade unions to initiate a strike, the right of the employer to exclude the employee from work and other issues related to the strike.

Other Laws regarding labour and social issues relevant for the project are *Law on Basis of Social Protection, Protection of Civil War Victims and Protection of Families with Children* (Official Gazette of FBiH, No. 36/99, 54/04, 39/06 and 14/09) and *Law on Employee Councils of FBiH* (Official Gazette of FBiH, No. 38/04).

### **1.1.4 Laws regulating land acquisition and resettlement**

#### *Law on Expropriation*

In FBiH, expropriation, i.e. acquisition of real property in public interest, is regulated by the *Law on Expropriation of FBiH* (Official Gazette of FBiH, No. 70/07, 36/10 and 25/12), whereas the implementation of expropriation procedures is dealt with by municipal administrations. This Law regulates the conditions (establishing public interest), the procedure for expropriation of real property for construction of facilities in the public interest and the compensation for expropriated property. It also addresses the issues of grievances and disputes handling, and, to a limited extent, compensation eligibility.

#### *Law on Proprietary Rights*

The *Law on Proprietary Rights* (Official Gazette of FBiH, No. 66/13, 100/13) regulates the issues of acquiring, using, disposing of, protecting and terminating ownership rights and other proprietary rights and possession rights, including the 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 erected on someone else's land.

#### *Law on Construction Land*

The *Law on Construction Land of FBiH* (Official Gazette of FBiH, No. 67/05) allows for the legalization of informally constructed structures on construction land in state ownership on which a structure has been built. This Law enables the subsequent issuing of a permit for construction, by the Municipal Council, in accordance with the Law on Spatial Planning. Legalization of informally constructed buildings is further regulated by decrees taken at cantonal level, and implemented at municipality level.

#### *Law on Agricultural Land*

The *Law on Agricultural Land* (Official Gazette of FBiH, No. 52/09) contains definitions, basic principles, management, protection, use, planning, and records related to agricultural land. The aim of this Law is preservation, intended use, increase in production capacity and improvement of the agricultural land as a limited and non-renewable natural resource, as well as harmonization of interests of all stakeholders involved in the use of agricultural land in the economic and political development of the Country.

#### *Law on Protection and Use of Cultural-Historical and Natural Heritage*

The *Law on Protection and Use of Cultural-Historical and Natural Heritage* (Official Gazette of SR BiH, No. 20/85, 12/87 and 3/93) aims to create conditions to enable cultural-historic and natural heritage to be available to the public for educational, cultural and scientific needs. This Law regulates also the protection of cultural-historic and natural heritage.

## **1.2 SPECIFIC ENVIRONMENTAL REQUIREMENTS**

During implementation of project activities, EP BiH and Contractors for construction, maintenance (and decommissioning) works are required to respect the emission limit values in order to preserve the environment and the health and safety of local communities. Construction works may lead to environmental pollution and increased exposure of local communities associated with deterioration in environmental quality (contamination water, poor air quality etc.). For these reasons, the contractors are required, according to public procurement procedures, to develop and implement specific monitoring plans for environmental protection as well as for health and safety, taking into account the emission limits prescribed by FBiH legislation.

#### ***Wastewater/Effluent Discharges***

The *Law on Waters*<sup>43</sup> regulates water and wastewater management and planning on the territory of FBiH. The maximum permitted quantities of hazardous and harmful substances in wastewaters before discharging into natural recipients (surface waters) or into public sewerage system are stipulated by the *Decree on Conditions for Discharge of Wastewater into Natural Recipients and into the Public Sewerage System*<sup>44</sup>.

In EU, water policy is regulated by *Directive 2000/60/EC on establishing a Framework for Community Action in the Field of Water Policy* which aims to protect and restore aquatic ecosystems, as well as to guarantee long-term, sustainable water usage for

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<sup>43</sup> Official Gazette of FBiH No. 70/06

<sup>44</sup> Official Gazette of FBiH, No. 04/12

individuals, businesses and the natural world. Two important Directives are related to water discharge into natural recipients and urban waste water treatment:

*Directive 2006/11/EC on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment of the Community* lays down rules for protection against, and prevention of, pollution resulting from the discharge of certain substances into the aquatic environment. It applies to inland surface water, territorial waters and internal coastal waters. Two lists of dangerous substances have been compiled to combat pollution:

- discharge of substances in list I must be eliminated; while
- discharge of substances in list II must be reduced.

*Directive 91/271/EEC (as amended by Directive 98/15/EC) on Urban Waste Water Treatment* concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. The objective of the Directive is to protect the environment from the adverse effects of the abovementioned waste water discharges.

EU provisions on emission limit values of wastewater, in terms of defining the limit values of pollutants, have not been fully transposed into FBiH legislation. However, the most stringent limits will be applied during the implementation of the Project, whether they are FBiH, international or EU, in order to ensure environmental protection and community health and safety.

### **Noise Emissions**

The *Law on Protection from Noise*<sup>45</sup> prescribes the limit values of external noise for planning new facilities and sources of noise in FBiH.

These noise levels are in line with the levels defined in IFC EHS Guidelines on Environmental Noise Management.

According to the Law, noise measuring and evaluation of noise levels is conducted according to International standards ISO 1996/1, ISO 1996/2 and ISO 1996/3 that are set as the requirement in *Directive 2002/49/EC on the Assessment and Management of Environmental Noise* and *Directive (EU) 2015/996 Establishing Common Noise Assessment Methods According to Directive 2002/49/EC*, as well as BAS ISO 9612 i BAS EN 60804.

### **Soil Quality**

There is no specific legislation directly regulating this area, and BiH does not have systematic soil quality monitoring<sup>46</sup>. However, the *Regulation on the Allowable Concentrations of Hazardous Substances in Soil and Methods of their Testing* (Official Gazette of FBiH, No. 72/09) sets the limit values for heavy metals and other harmful substances in agricultural soil.

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<sup>45</sup>Official Gazette of FBiH No. /12

<sup>46</sup> Source: State of the Environment Report of Bosnia and Herzegovina 2012

## 2 EU ENVIRONMENTAL IMPACT ASSESSMENT (EIA) DIRECTIVE AND ENVIRONMENTAL PERMITTING PROCEDURE IN FBiH

The EIA Directive<sup>47</sup> covers a broad range of activities ranging from industrial to infrastructure projects. It introduces procedural elements to be followed such as the provision of an environmental impact statement and consultation with the public and environmental authorities within the framework of development consent procedures for the activities covered. Member States may regulate the EIA procedure as a permitting procedure or by adding it to existing permitting procedures under other pieces of EU (or national) legislation. The results of the EIA procedure have to be taken into consideration in the development consent procedure.

The amended EIA Directive simplified the rules for assessing the potential effects of projects on the environment. It is in line with the drive for smarter regulation, so it reduces the administrative burden.

Environmental permitting procedures in FBiH are regulated separately at two levels: the FBiH level and Cantonal level, depending on the facility type, facility capacity, annual production, etc.<sup>48</sup>

The environmental permitting procedure in FBiH is regulated by:

- *Law on Environmental Protection* (Official Gazette of FBiH, No. 33/03 and 38/09) and
- *Regulation on Facilities Subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit* (Official Gazette of FBiH, No. 19/04).

The above-mentioned Regulation provides a list of plants and facilities subject to mandatory Environmental Impact Assessment (EIA) and permitting procedures at FBiH level, as well as plants and facilities that undergo individual evaluation concerning the EIA requirement. Plants for hydroelectric energy production with output > 5 MW for individual plants or > 2 MW for several plants in a row at a distance less than 2 km are subject to mandatory EIA and permitting procedures at the level of FBiH.<sup>49</sup> For plants for hydroelectric energy production with output > 1 MW environmental impact assessment is carried out on the basis of the evaluation of FMET. If FMET assess that it is not necessary to conduct an EIA, the Application for the Environmental Permit (Environmental Request and Waste Management Plan) shall be submitted, otherwise, it is necessary to conduct EIA.<sup>50</sup> For plants for hydroelectric energy production with output < 1 MW, Environmental Permit is issued by the competent Cantonal Ministry.

Environmental permitting procedures include submission of a Request for Environmental Permit, which contain the documentation developed in accordance with Article 54a of the *Law on Environmental Protection*<sup>51</sup>, including a Waste Management Plan. For plants and facilities requiring a mandatory EIA, along with the Request for the Environmental Permit, instead of documentation developed in accordance with Article 54a, the investor is required to submit an Environmental Impact Study (EIA Study).

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<sup>47</sup>Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (as amended by Directive 2014/52/EU)

<sup>48</sup>Law on Environmental Protection (Official Gazette of FBiH, No. 33/03 and 38/09)

<sup>49</sup> Articles 3 and 4 of the Regulation on Facilities Subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit (Official Gazette of FBiH, No. 19/04)

<sup>50</sup> Articles 5 and 6 of the Regulation on Facilities Subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit (Official Gazette of FBiH, No. 19/04)

<sup>51</sup> Official Gazette of FBiH, No. 33/03 and 38/09

The EIA Study has to be performed by the institution/company authorised by the FMET for preparation of EIA Study. After the Investor submits the Request for Environmental Permit with the EIA Study to the FMET, the Ministry makes the EIA Study available to the public, sends a copy to relevant authorities and other interested parties, allowing 30 days for receiving comments, and appoints the expert committee to review the submitted EIA Study. Furthermore, the FMET is obliged to organize a public discussion as near as possible to the sub-project location, and to invite the public to consultations via printed (or electronic) media/radio/TV. The public needs to be informed about the public consultations at least 15 days in advance. The Investor needs to assist the FMET during the consultation process. After the EIA Study is revised and all the relevant comments received from interested parties incorporated, and after positive evaluation of the expert committee, the FMET issues the Environmental Permit (within 30 days following receipt of the evaluation of the EIA Study). Overall, in case when the EIA Study is needed, the FMET issues the Environmental Permit within 60 days from EIA Study receipt. Environmental Permits are valid for five years. EIA process in FBiH for Plants and Facilities Subject to Mandatory EIA is presented in Annex 1 above. The Environmental Permit aims to ensure that, in the earliest phase of design, the Investor foresees measures for prevention of negative effects that the project could have on the environment; accordingly, the Environmental Permit must be obtained before Urban Permit, and is to be attached to the application for Urban Permit.

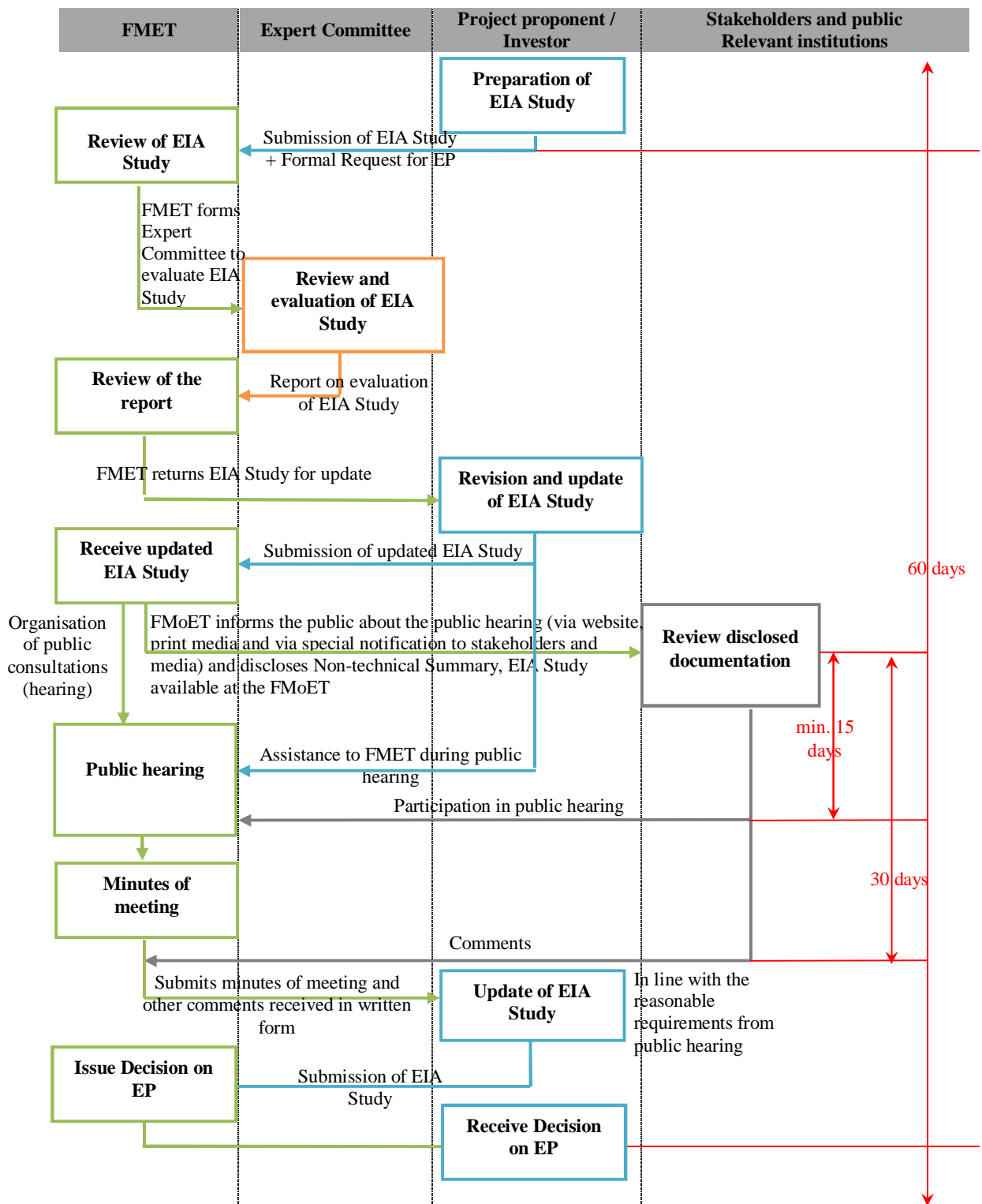


Figure 6: EIA Process in FBiH for Plants and Facilities Subject to Mandatory EIA

## 2.1 Transposition of EIA Directive into FBiH Legislation

According to the latest available Monitoring transposition and implementation of the EU environmental acquis *Progress Report 7* for BiH for the period May 2011 – March 2012 developed under EUROPEAID /124644/D /SER /MultiService Contract No. ENV.E1 /2010 /22.02.07.01 /557460, the Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC codified by Directive 2011/92/EU has been transposed into local legislation through the *Law on Environmental Protection and Regulation on plants and facilities for which an Environmental Impact Assessment is mandatory and on plants and facilities that can be built and operated only if granted Environmental Permit*. Table 8 provides the transposition status for the EIA Directive for the period during which transposition has been monitored, i.e. 2007 – 2012.

Year information provided	Progress monitoring score	Expected date complete transposition
Year 1 [2007]	115/225 (51 %)	Not determined yet
Year 2 [2008]	195/225 (87%)	Not determined yet
Year 3 [2009]	190/225 (%) (84.5%)	Not determined yet
Year 5 [2010]	190/225 (%) (84.5%)	Not determined yet
Year 6 [2011]	190/225 (%) (84.5%)	Not determined yet
Year 7 [2012]	190/225 (%) (84.5%)	Not determined yet

Table 8: Transposition Status of EIA Directive into FBiH Legislation

The FMET is the authority responsible for implementation of the provisions of the Directive that has been transposed into local legislation. The whole EIA procedure is in place, from requests by developers for scoping, to public consultations, to approval of the assessment. No change in implementation practice was reported in comparison to previous progress monitoring. A unit for environmental permitting has been established within FMET, which also deals with EIA procedure.

The projects listed in Annex I are all subject to EIA procedure. However, some of the thresholds applied in the Regulation are stricter than those provided in the Directive. In terms of which projects listed in Annex II are to be subject to EIA, the decision is made through a case-by-case examination on the basis of thresholds or selection criteria according to Annex III of the Directive.

Information relating to EIA is, to a large extent, made public through announcements in newspapers, the ministry's website and written notice directly to the public concerned.

However, *Directive 2011/92/EU* was amended by *Directive 2014/52/EU*, presumably lowering the transposition level into local legislation in light of the amendments brought by this piece of legislation.

## 2.2 Gap Analysis between the EIA Directive and FBiH Legislation

Issue	EIA according to EIA Directive	EIA according to FBiH legislation
Significant effects	For Project listed in Annex I of EIA Directive shall be made subject to an assessment in accordance with Articles 5 to 10 of EIA Directive	Article 4 of the Regulation contains the list of plants and facilities subject to mandatory EIA and permitting procedures at FBiH level.
Likely to have significant effects	For Project listed in Annex II of EIA Directive, Member States shall determine whether the project shall be made subject to an assessment in accordance with Articles 5 to 10 of EIA Directive. Member States shall make that determination through a case-by-case examination or thresholds or criteria set by the Member State, or applying both procedures by taking into account the relevant selection criteria set out in Annex III of EIA Directive.	Article 6 of the Regulation contains the list of plants and facilities for which FMET shall determine whether the project shall be made subject to EIA, by taking into account the relevant selection criteria set out in Chapter IV of this Regulation.
Screening	For projects listed in Annex II of EIA Directive, the developer shall provide information on the characteristics of the project and its likely significant effects on the environment according to Annex IIA of EIA Directive. The competent authority shall make its determination according to the criteria provided in Annex III of EIA Directive. The determination shall be made available to the public.	When evaluating the EIA requirement, the FMET takes into account individual project characteristics (e.g. industrial plant/facility size, waste generation, pollution, etc.), project location and environmental sensitivity, as well as characteristics of potential impacts (e.g. impact extent, probability, etc.).
Screening duration	Competent authority makes its determination as soon as possible and within a period of time not exceeding 90 days from the submission of all the information required. In exceptional cases competent authority may extend that deadline to make its determination; in that event, the competent authority shall inform the developer in writing of the reasons justifying the extension and of the date when its determination is expected.	/
EIA Documentation / Document	Where an environmental impact assessment is required, the developer shall submit an environmental impact assessment report containing	Where an environmental impact assessment is required, investor is required to submit Environmental Impact Study (EIA Study)

Issue	EIA according to EIA Directive	EIA according to FBiH legislation
Content	information required according Article 5 and Annex IV of the EIA Directive. This report shall be prepared by competent experts.	containing information required according Article 12 of the Regulation. This report shall be prepared by authorized institution.
Consultations	<p>Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities or local and regional competences are given an opportunity to express their opinion on the information supplied by the developer and on the request for development consent.</p> <p>The public shall be informed electronically and by public notices or by other appropriate means, of the following matters early in the environmental decision-making procedures.</p> <p>The public concerned shall be given early and effective opportunities to participate in the environmental decision-making procedures and be entitled to express comments and opinions when all options are open to the competent authority or authorities before the decision on the request for development consent is taken.</p>	<p>After the Investor submits the Request for Environmental Permit with the EIA Study to the FMET, the Ministry makes the EIA Study available to the public, sends a copy to relevant authorities and other interested parties, allowing 30 days for receiving comments, and appoints the expert committee to review the submitted EIA Study. Furthermore, the FMET is obliged to organize a public discussion as near as possible to the sub-project location, and to invite the public to consultations via printed (or electronic) media/radio/TV. The public needs to be informed about the public consultations at least 15 days in advance.</p>
Transboundary environmental impacts	<p>Member state has to send to the affected Member State as soon as possible and no later than when informing its own public, a description of the project, together with any available information on its possible transboundary impact and information on the nature of the decision which may be taken. Member States concerned shall enter into consultations regarding, inter alia, the potential transboundary effects of the project and the measures envisaged.</p>	<p>FMET has to send to the affected Member State or Entity (RS or Brčko District) a description of the project, together with any available information on its possible transboundary impact and information on the nature of the decision which may be taken. Member States or Entity concerned shall enter into consultations regarding, inter alia, the potential transboundary effects of the project and the measures envisaged.</p>
Consideration of Information by the Competent Authority before making	<p>The environmental information and the results of consultations must be considered by the competent authority in reaching its decision on the application for development consent</p>	<p>All the relevant comments received from interested parties will be taken into account during the approval of EIA Study. It is necessary to obtain a positive evaluation of the expert</p>

Issue	EIA according to EIA Directive	EIA according to FBiH legislation
Decision		committee.
Announcement of Decision	<p>When a decision to grant or refuse development consent has been taken, the competent authority or authorities shall promptly inform the public and the authorities.</p> <p>The decision to grant development consent shall incorporate the reasoned conclusion and any environmental conditions attached to the decision, a description of any features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment as well as, where appropriate, monitoring measures.</p>	The FMET issues the Environmental Permit within 60 days from EIA Study receipt

Table 9: EIA procedures according to the EIA Directive and according to FBiH legislation

As shown above, the main differences between the two procedures are contained in prescriptions related to the duration of screening process and public consultations. The EIA Directive prescribes the duration of screening process while it is not prescribed by the FBiH legislation. According to the EIA Directive public is informed early in the environmental decision-making procedures while according to the FBiH legislation FMET is obliged to organize a public hearing and inform public about the project and to update the EIA study in line with the reasonable requirements from public hearing before issuing the Decision on Environmental Permit.

### 2.3 PROCEDURES FOR OBTAINING URBAN PERMITS, CONSTRUCTION PERMITS AND USE PERMITS IN FBiH

Issuance of Urban Permits, Construction Permits and Use Permits is regulated both at FBiH level and Cantonal level. The Federal Ministry of Physical Planning (FMPP) is responsible for physical planning and land use at entity level, while the Cantonal ministries in charge of physical planning are responsible for physical planning and land use at Cantonal level.

The *Law on Physical Planning and Land Use at the Level of FBiH* (Official Gazette of FBiH, No. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) regulates the procedure for obtaining the Urban Permit at entity level. According to this Law, construction may be authorised if it is in accordance with the physical planning documentation and other conditions laid down for that area by the Urban Permit.

According to the *Decree on Determination of Spatial Intervention and Constructions for which the Federal Ministry of Physical Planning Issues Urban Permits and/or Location Information* (Official Gazette of FBiH, No 32/14), constructions which undergo environmental permitting procedure based on the EIA Study require the issuance of an Urban Permit at entity level by the FMPP as such infrastructure objects are of interest to FBiH. In this case, the request for obtaining an Urban Permit is submitted to FMPP and includes all the documents stipulated by Article 39 of the *Law on Physical Planning and Land Use at the Level of FBiH*, including the Environmental Permit and the Preliminary Design.

FMPP issues the Urban Permit on the basis of an opinion issued by the Cantonal Ministry in charge of physical planning. The Cantonal Ministry is required to submit its opinion within 15 days from the day it receives the request from FMPP. FMPP issues the Urban Permit within 30 days from the day the request for Urban Permit is submitted and the day it receives all necessary documents stipulated by Article 39 of the aforementioned Law. The Urban Permit is valid for one year. The validity of the Urban Permit maybe extended for another year based on reasonable causes.

According to Article 40 of the *Law on Physical Planning and Land Use at the Level of FBiH*, the Construction Permit is issued by FMPP for:

- Construction and operations that take place in the territory of two or more Cantons,
- Construction and operations of importance to FBiH on the territories and areas of importance for the FBiH,
- Construction on the inter-state border,
- Construction of free zones,
- Construction and performance of activities and operations that may significantly affect the environment, human life and health of FBiH and beyond,
- Construction and operations of importance to the FBiH,
- Construction and operations in the areas within the boundaries of the National Monuments.

The Request for Construction Permit is submitted to FMPP and includes all the documents specified in Article 55 of the *Law on Physical Planning and Land Use at the Level of FBiH*, including the Urban Permit and the Main Design. FMPP issues the Construction Permit within 30 days from the day the request for obtaining the Construction Permit is submitted. The validity of Construction Permit is one year, and

construction works have to be initiated in this period. The validity of Construction Permit may be extended for another year based on reasonable causes.

A construction may be used only after obtaining a Use Permit. For the construction listed in Article 40 of the *Law on Physical Planning and Land Use at the Level of FBiH*, Use Permit is issued by FMPP and the request contains the documents listed in Article 66 of the Law, including the Construction Permit.

The Use Permit may be issued only after a technical inspection of the construction is performed by the expert committee appointed by FMPP within 8 days from receiving the request for Use Permit. The technical inspection must be performed within 30 days from the day the request for Use Permit is submitted to FMPP. The expert committee submits its report to FMPP within 8 days from the day of the completed technical inspection. If the expert committee reports any identified defects on the construction that need to be eliminated, the FMPP sets a deadline for the completion of the elimination of defects which cannot be longer than 90 days. If the committee reports that the construction may put into use /operation, FMPP issues the Use Permit within 10 days from the submission of the report on technical inspection of the construction by the committee<sup>52</sup>.

### 2.3.1 Relevant Documents Needed at Construction Sites

According to the *Decree on Construction Site Organisation, Mandatory Documentation on Construction Site and Construction Work Participants* (Official Gazette of FBiH, No. 48/09, 75/09 and 93/12), the Contractor engaged for construction works is required to develop the Construction Site Organization Plan which contains the following:

- Description of preparatory works and site arrangements works during and after construction works,
- Description of technological scheme,
- Management Plan on Safety (composed of Occupational Safety Management Plan and Fire Fighting and Explosion Management Plan),
- Environmental Management Plan during construction works.

The Construction Site Organization Plan must be developed by the Contractor for construction works prior to the commencement of construction works. The Plan has to be controlled and signed by the Supervisory Authority which is the legal entity responsible for the overall supervision of construction works, as stipulated by the above-mentioned Decree. The Plan should correspond to the requirements, safety measures and obligations contained in the Environmental Permit or environmental requirements laid down in the approval process for the construction.

During construction works, the Contractor should have the following documents on the construction site:

- Decision on registration in the Court Register and the authorisation granted by FMPP for construction activities,
- Contract for construction works between the Investor and the Main Contractor, and all contracts between the Main Contractor and the contractors for construction of individual,

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<sup>52</sup> Articles 68 – 73 of the *Law on Physical Planning and Land Use at the Level of FBiH* (Official Gazette of FBiH, No. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10)

- Legal act on the appointment of the responsible person (leader of construction works - construction manager or managers of individual works), with documents confirming the professional qualifications and employment status of such person(s),
- Legal act on the appointment of the supervisory authority (supervising engineer or supervising team and coordinator), with documents confirming the professional qualifications and employment status of such person(s),
- Construction Permit, Main Design and Geotechnical Design,
- Certified Detailed Designs with amendments,
- Construction Diary,
- Construction Book,
- Quality Assurance Plan,
- Construction Waste Management Plan,
- Study on staking out of the construction, developed by a legal entity or individual, authorised for performing geodetic activities.

### **3 IFI POLICIES AND STANDARDS**

#### **3.1 EBRD Environmental and Social Policy**

The EBRD's Environmental and Social Policy 2014 (ESP) is a key EBRD document, which details the commitments of the Bank's Funding Agreement to promote in the full range of its activities, environmentally sound and sustainable development. EBRD-financed projects are expected to meet good international practice related to sustainable development. To help clients and/or their projects achieve this, the Bank has defined specific Performance Requirements (PR) for key areas of environmental and social issues and impacts as listed below:

- PR 1: Assessment and Management of Environmental and Social Impacts and Issues,
- PR 2: Labour and Working Conditions,
- PR 3: Resource Efficiency and Pollution Prevention and Control,
- PR 4: Health and Safety,
- PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement,
- PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources,
- PR 7: Indigenous Peoples,
- PR 8: Cultural Heritage,
- PR 9: Financial Intermediaries,
- PR 10: Information Disclosure and Stakeholder Engagement.

New facilities or business activities to be financed by EBRD are designed to meet PRs from the outset. If a proposed business activity to be financed relates to existing facilities that do not meet PRs at the time of Board approval, the client will be required to adopt and implement an Environmental and Social Action Plan (ESAP), which is satisfactory to EBRD and delivered within the agreed timescale (European Bank for Reconstruction and Development, Environmental and Social Policy, 2014).

### **3.2 World Bank Group Environmental, Health, and Safety Guidelines**

The World Bank Group Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP), as defined in International Finance Corporation's (IFC) Performance Standard 3: Resource Efficiency and Pollution Prevention.

The following World Bank Group EHS Guidelines are in compliance with the project:

- General Environmental, Health and Safety (EHS) Guidelines

The General EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors, and are organized by the following fields:

1. Environmental
  2. Occupational Health and Safety
  3. Community Health and Safety
  4. Construction and Decommissioning
- EHS Guidelines for electric power transmission and distribution projects.

### **3.3 Applicable EU Regulatory Framework**

#### **3.3.1 EIA and Environmental Protection Directives**

The EIA Directive covers a broad range of activities ranging from industrial to infrastructure projects. It introduces procedural elements to be followed such as the provision of an environmental impact statement and consultation with the public and environmental authorities within the framework of development consent procedures for the activities covered. Member States may regulate the EIA procedure as a permitting procedure or by adding it to existing permitting procedures under other pieces of EU (or national) legislation. The results of the EIA procedure have to be taken into consideration in the development consent procedure.

Directives in field of environmental protection relevant for the Project are listed below:

- Directive 2000/60/EC establishing a Framework for Community Action in the Field of Water Policy,
- Directive 2006/11/EC on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment of the Community,
- Directive 91/271/EEC concerning Urban Waste Water Treatment,
- Directive 2008/98/EC on Waste and repealing Certain Directives,
- Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise,
- Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe,
- Directive 2000/14/EC on the Approximation of the Laws of the Member States relating to the Noise Emission in the Environment by Equipment for Use Outdoors (as amended by the Directive 2005/88/EC and the Regulation (EC) No. 219/2009).

### 3.3.2 Occupational Health and Safety (OHS) Directives

EU has adopted several Directives to improve and guarantee occupational health and safety. The key Directives adopted at the end of '80s are Directive 89/391/EEC and Directive 89/654/EEC.

*Directive 89/391/EEC on the Introduction of Measures to Encourage Improvements in the Safety and Health of Workers at Work* encourages improvements in occupational health and safety in all sectors of activity, both public and private, promotes workers' rights to make proposals relating to health and safety, to appeal to the competent authority and to stop work in the event of serious danger, and seeks to adequately protect workers and ensure that they return home in good health at the end of the working day.

*Directive 89/654/EEC concerning the Minimum Safety and Health Requirements for the Workplace* lays down minimum requirements for safety and health at the workplace. Requirements are related to stability and solidity of buildings, electrical installations, emergency routes and exits, fire detection and fire fighting, ventilation of enclosed workplaces, room temperature, natural and artificial room lighting, floors, walls, ceilings and roofs of rooms, windows and skylights, doors and gates, traffic routes - danger areas, specific measures for escalators, loading bays and ramps, room dimensions and air space in rooms - freedom of movement at the workstation, rest rooms, pregnant women and nursing mothers, sanitary equipment, first aid rooms, handicapped workers and outdoor workplaces

*Directive 92/57/EEC on the Implementation of Minimum Safety and Health Requirements at Temporary or Mobile Construction Sites* is also relevant for this Project because it lays down minimum safety and health requirements for any construction site at which building or civil engineering works are carried out and intends to prevent risks by establishing a chain of responsibility linking all the parties involved.

The list of other Project pertinent OHS EU legislation is given below:

- Directive 2009/104/EC concerning the Minimum Safety and Health Requirements for the Use of Work Equipment by Workers at Work,
- Directive 98/37/EC on the Approximation of the Laws of the Member States relating to Machinery,
- Directive 2006/95/EC on the Harmonization of the Laws of Member States relating to Electrical Equipment Designed for Use within Certain Voltage Limits,
- Directive 2004/108/EC on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility and Repealing Directive 89/336/EEC,
- Directive 89/656/EEC on the Minimum Health and Safety Requirements for the Use by Workers of Personal Protective Equipment at the Workplace,
- Directive 92/85/EEC on the Introduction of Measures to Encourage Improvements in the Safety and Health at Work of Pregnant Workers and Workers Who Have Recently Given Birth or Are Breastfeeding,
- Directive 91/383/EEC Supplementing the Measures to Encourage Improvements in the Safety and Health at Work of Workers with a Fixed - Duration Employment Relationship or a Temporary Employment Relationship,

- Directive 92/58/EEC on the Minimum Requirements for the Provision of Safety and/or Health Signs at Work,
- Directive 90/269/EEC on the Minimum Health and Safety Requirements for the Manual Handling of Loads Where There Is a Risk Particularly of Back Injury to Workers,
- Directive 90/270/EEC on the Minimum Safety and Health Requirements for Work with Display Screen Equipment,
- Directive 2003/10/EC on the Minimum Health and Safety Requirements regarding the Exposure of Workers to the Risks Arising from Physical Agents (Noise),
- Regulation (EU) No 305/2011 Laying Down Harmonised Conditions for the Marketing of Construction Products and repealing Council Directive 89/106/EEC,
- Directive 93/68/EEC amending Directives 87/404/EEC (simple pressure vessels), 88/378/EEC (safety of toys), 89/106/EEC (construction products), 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 89/686/EEC (personal protective equipment), 90/384/EEC (non-automatic weighing instruments), 90/385/EEC (active implantable medicinal devices), 90/396/EEC (appliances burning gaseous fuels), 91/263/EEC (telecommunications terminal equipment), 92/42/EEC (new hot-water boilers fired with liquid or gaseous fuels) and 73/23/EEC (electrical equipment designed for use within certain voltage limits).

### ***Road Safety Directives***

*Directive 2008/96/EC on road infrastructure safety management* is applied to roads which are part of the trans-European road network, whether they are at the design stage, under construction or in operation. This Directive could also be applied by EU Member States as a set of good practices, to national road transport infrastructure, not included in the trans-European road network that was constructed using Community funding in whole or in part. Directive 2008/96/EC requires the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, the management of road network safety and safety inspections by the Member States.

### ***Directive on Renewables***

*Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC* establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy and for the share of energy from renewable sources in transport. It requires the EU to fulfil at least 20% of its total energy needs with renewables by 2020 – to be achieved through the attainment of individual national targets. All EU countries must also ensure that at least 10% of their transport fuels come from renewable sources by 2020. According to this Directive Each Member State shall adopt a national renewable energy action plan. The national renewable energy action plans shall set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020.

This Directive also lays down rules relating to statistical transfers between Member States, joint projects between Member States and with third countries, guarantees of

origin, administrative procedures, information and training, and access to the electricity grid for energy from renewable sources.

### **3.4 Applicable National, EU and International Standards and Guidelines**

#### ***ISO 14001:2004 Environmental Management System***

ISO 14001:2004 specifies requirements for an environmental management system to enable a company to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the company subscribes, and information about significant environmental aspects. It applies to those environmental aspects that a company identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria. This certification also confirms that the company takes into account the applicable laws governing the issues related to environmental protection, ensures the improvement of its environmental management policy, and ensures that the requirements of this standard apply to all activities. EP BiH currently does not hold ISO 14001:2004.

#### ***ISO 9001:2008 Quality Management Standard***

ISO 9001:2008 specifies requirements for a quality management system where a company:

- needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and
- aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

EP BiH holds the EN ISO 9001:2008 issued by TÜV NORD CERT GmbH on April 10, 2013 (first certification in 2010) and valid until March 14, 2016.

#### ***OHSAS 18001 Occupational Health and Safety Management Systems***

The OHSAS 18001 standard is internationally accepted as a method of assessing and auditing occupational health and safety management systems. Developed by leading trade and international standards bodies, it provides a framework for organisations to instigate proper and effective management of health & safety in the workplace. By having a clearly defined management system in place to identify and control health and safety risks, organisations are able to minimise risks to their workforce and visitors or external contractors on their premises. The standard will enable organisations to put in place processes for continually reviewing and improving occupational health and safety. EP BiH holds the BS OHSAS 18001:2007 issued by TÜV NORD CERT GmbH on April 10, 2013 and valid until April 10, 2016.

### ***EU Occupational Safety and Health (OSH) Strategic Framework 2014-2020***

*EU Occupational Safety and Health (OSH) Strategic Framework 2014-2020* identifies the key challenges and strategic objectives for health and safety at work, presents key actions and identifies instruments to address these. The Strategic Framework identifies three major health and safety at work challenges: improving implementation of existing health and safety rules; improving the prevention of work-related diseases; taking into account the ageing of the EU's workforce. It proposes to address these challenges with a range of actions under seven key strategic objectives: further consolidating national health and safety strategies; providing practical support to small and micro enterprises to help them to better comply with health and safety rules; improving enforcement by Member States by evaluating the performance of national labour inspectorates; simplifying existing legislation to eliminate unnecessary administrative burdens; addressing the ageing of the European workforce; improving statistical data collection; and reinforcing coordination with international organisations (such as the International Labour Organisation (ILO), the World Health Organisation (WHO) and the Organisation for Economic Co-operation and Development (OECD)) to contribute to reducing work accidents and occupational diseases and to improving working conditions worldwide.

### **3.5 ICOLD Standards**

The International Commission on Large Dams (ICOLD) is a non-governmental international organization which provides a forum for the exchange of knowledge and experience in dam engineering. BiH is a member of ICOLD with Bosnia-Herzegovina Committee on Large Dams. ICOLD sets standards and guidelines to ensure that dams are built and operated safely, efficiently, economically, and are environmentally sustainable and socially equitable. Below are listed some of most relevant guidelines and bulletins:

- **Dam Safety – Guidelines – 59:** This Guideline on dam safety was developed because dam incidents with severe consequences had given rise to general concern about the safety of dams, and indicated the necessity for a formal safety approach. An increasing number of dams is being built in countries with little or no tradition and experience in dam engineering. This guideline contains a formalization of safety considerations and summarized safety requirements that should be part of the necessary transfer of technological know-how to these countries.
- **Dam and Environment - Bulletins 65 and 66:** These Bulletins present a number of cases related to impacts on environment and local communities caused by the dam construction.
- **Integrated flood risk management – Bulletin 156:** The purpose of this Bulletin is to give guidance in integrated flood risk management to people assigned technically or managerially with the task of flood management and control. The Bulletin aims to describe the fundamental knowledge needed for flood management according to the current state-of-the art and to provide help in selecting the most appropriate design and implementation strategy, based on basin-specific characteristics and the framework of integrated flood risk management. According to this Bulletin prerequisites for all flood management are the understanding of flood characteristics and how to calculate both the magnitude and frequency of floods. Equally essential are the understanding of

the impacts of floods, both negative and positive, and how to quantitatively and qualitatively evaluate these. The knowledge of flood characteristics and impacts is a fundamental input to the risk analysis, which forms the basis for integrated flood management.

- **Small dams: Design, Surveillance and Rehabilitation – Bulletin 157:** This Bulletin was prepared as a guide for small dam owners, engineering, Government agencies, developers and contractors who are in charge with the design, construction, operation, maintenance and safety of small dams. Design criteria and typical features for small dams are generally different from those for high dams, so the risk may increase and corresponding accidents may cause significant victims.

#### 4 LITERATURE AND REFERENCES

- Agriculture Strategy of the Municipality of DonjiVakuf 2008-2015, Municipality of DonjiVakuf, 2008
- Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2014; Federal Hydrometeorological Institute of BiH, 2014
- BiH in Figures 2014, Agency for Statistics of BiH, Sarajevo, 2015
- Central Bosnia Canton in Figures 2014, 2015, Institute for Statistics of FBiH
- Central Bosnia Canton in Figures 2014, Federal Institute for Statistics, Sarajevo, 2015
- CLIMVAT/CROPWAT Data base, Food and Agriculture Organization of the United Nations (FAO)
- Counting Traffic on Main Road in FBiH in 2013, Public Company Roads of FBiH, Sarajevo
- Demography 2013, Agency for Statistics of BiH, Sarajevo, 2014
- Development Plan of the Municipality DonjiVakuf 2013-2018, Municipality of DonjiVakuf, 2012
- Drešković, N., Đug, S., Stupar, V., Hamzić, A., Lelo, S., Muratović, E., Lukić-Bilela, L., Brujić, J., Milanović, Đ., Kotrošan, D. (2011), NATURA 2000 u BosniHercegovini, Centarzaokolišnodrživirazvoj, Sarajevo. pp. 456.
- Epidemiological Surveillance of Infectious Diseases in Federation of Bosnia and Herzegovina for 2011, 2012, 2013, 2014, Institute for Public Health of FBiH
- FBiH in Figures 2014, Federal Institute for Statistics of FBiH, Sarajevo, 2015
- Freyhof, J., S. Weiss, A. Adrović, M. Čaleta, A. Duplić, B. Hrašovek, B. Kalamujić, Z. Marčić, D. Milošević, M. Mrakovčić, D. Mrdak, M. Piria, U. Schwarz P. Simonović, S. Šljuka, T. Tomljanović & D. Zabrc (2015): The Huchen Hucho hucho in the Balkan region. Study Series within the Campaign “save the blue heart in Europa); prepared for euronatur and RiverWatch.
- Gender and Employment in BiH: A Country Study, International Labour Office; Bureau for Gender Equality, Geneva, 2011
- Geokarta, Geomorphology Map of Yugoslavia 1:500 000, Union of Geographical Societies, 1992
- Geological Contributions for Investigation of the Seismicity of the Bosnia and Herzegovina Region, Seismology Institute of BiH, 1974
- Health Statistics Annual for FBiH 2013, 2014, Institute for Public Health of FBiH
- Health Statistics Annual of FBiH 2013, 2014, Institute for Public Health of FBiH
- Household Budget Survey in BiH 2007, Agency for Statistics of BiH, Sarajevo, 2008
- Household Budget Survey in BiH 2011, Agency for Statistics of BiH, Sarajevo, 2013
- Hrvatović, H., Identification and Evaluation of Geological Hazard-Earthquake, 2010
- Hydrology Study of Surface Water of Bosnia and Herzegovina, Vrbas River Watershed Area, Book 2 VS Daljan, Sava River Basin District Agency, Sarajevo, 2012
- Hydrology Study of Surface Water of Bosnia and Herzegovina, Vrbas River Watershed Area, Book 3 VS Han Skela, Institute for Water Management JSC Sarajevo (Zavodzaodoprivredud.d. Sarajevo), Sarajevo, 2012
- Kottelat, M. and J. Freyhof (2007): Handbook of European freshwater fishes. Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany
- Labour Force Survey, Agency for Statistics of BiH, Sarajevo, 2013

- Macroeconomic Indicators for Municipalities in FBiH for 2010, 2011, 2012, 2013, 2014, Federal Development Planning Institution
- Meteorological Yearbooks 1985- 2014, Federal Hydrometeorological Institute of BiH
- Meteorological Yearbooks 2010, 2011, 2012, 2013, 2014, 2015, Federal Hydrometeorological Institute of BiH
- Milanović, Đ., Brujić, J., Đug, S., Muratović, E., Lukić Bilela, L. (2015), Vodič kroz tipove staništa BiH prema Direktivi o staništima EU, Prospect C&S s.a. Brussels, Belgium. pp 186.
- Mrakovčić, M., Brigić Andrea, Buj Ivana., Čaleta, M., Mustafić, P., Zanela, D. (2006): Crvena knjiga slatkovodnih riba Hrvatske, Ministarstvo kulture, Državni zavod za zaštitu prirode, Republika Hrvatska
- National Human Development Report 2013: Rural development in BiH: Myth and reality. United Nations Development Programme (UNDP) in BiH, Sarajevo, 2013
- National Human Development Report-Social Inclusion in BiH, Sarajevo, United Nations Development Programme (UNDP) in BiH, Sarajevo, 2010
- Pedologic Map of Social Republic of Bosnia and Herzegovina, Geodetic Institute in Sarajevo, 1980
- Poljoprivredno-prehrambeni fakultet Sarajevo (2008), Ribolovno-gospodarska osnova za područje Srednjobosanskog kantona
- Preliminary Design of the Regional Sewage Collector of Gornji Vakuf/Uskoplje-Bugojno-Donji Vakuf, Institute for Water Management JSC Sarajevo for the Sava River Basin District Agency, Sarajevo, 2007
- Preliminary Results of the Census of Population, Households and Dwellings in Bosnia and Herzegovina 2013, Agency of Statistics of BiH, First Release, No.1/2013, Sarajevo, November 5, 2013
- Projekat šumskih i planinskih zaštićenih područja Broj: BA-FMPAP-TF091919-CQ-21-S-12/FBIH, Izrada crvene liste ugroženih biljaka, životinja i gljiva u Federaciji Bosne i Hercegovine; Knjiga 3 CRVENA LISTA FAUNE FEDERACIJE BOSNE I HERCEGOVINE, Nacr. izvještaja – Prijedlog, Sarajevo, 2013.
- Results of analysis of the microbiological and physico-chemical characteristics of the water from the River Vrbas for the period 2007-2013, Sava River Basin Agency, 2015
- Review of Malignant Neoplasm in 2012, 2013, Institute for Public Health of FBiH
- Seismological Map for the Period of 500 years (1:1,000,000), Seismologic Community of Yugoslavia, Belgrade, 1987
- Social Inclusion Strategy of BiH, Council of Ministers BiH, Sarajevo, 2010
- Socially Excluded in BiH, Today and Tomorrow, Program of EU EIDHR for BiH, Tuzla, 2010
- Socio-economic Indicators by Municipalities in FBiH in 2014, Federal Development Planning Institution, Sarajevo, 2015
- Spatial Basis for the Spatial Plan of FBiH 2008-2028, Federal Ministry of Spatial Planning, 2010
- Spatial Plan of Central Bosnia Canton 2005-2025; Ministry of Spatial Planning, Reconstruction and Return, 2005
- Spatial Plan of Central Bosnia Canton 2005-2025; Ministry of Spatial Planning, Reconstruction and Return, 2005
- State of Environment Report of Central Bosnia Canton 2015-2025, Ministry of Physical Planning, Construction, Environmental Protection, Return and Housing Affairs, 2014

- State of the Environment Report in FBiH, Federal Ministry of Environment and Tourism, Sarajevo, 2010
- State of the Environment Report of Bosnia and Herzegovina 2012, Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, 2012
- Statistical Yearbook for FBiH 2014, Federal Institute for Statistics, Sarajevo
- Strategy of Development of the Municipality of Donji Vakuf for the Period 2005-2015, Municipality of Donji Vakuf, 2005
- Study on Environmental Impact Assessment for Construction of Express Way A1, from the Bridge of River Raec, Interchange “Drenovo” to Gradsko (Junction with Highway A1), LASOY DOO, 2013
- The Main Prevention Plan for Flood Protection of the Federation of BiH, Part C9: Vrbas River-DonjiVakuf Area, 2008
- Traffic Counting on Main Roads of FBiH -Occasional Automatic Counter No. “527” on Main Road M5, Public Enterprise FBiH Roads, 2014,
- Update the Basis of the Water Resources Management of the Vrbas River Basin, Module 1 – Water Resources Management – Final report, COWI AS, 2013
- Update the Basis of the Water Resources Management of the Vrbas River Basin, Module 2 – Hydropower Development Study– Final report, COWI AS, 2013
- Update the Basis of the Water Resources Management of the Vrbas River Basin, Module 3 – Integrated Water Resources Management Report– Final report, COWI AS, 2013
- U.S. Fish & Wildlife Service <http://www.fws.gov/endangered/what-we-do/critical-habitats.html>
- Vuković, T., Ivanović B. (1971): Slatkovodne ribe Jugoslavije, Zemaljski muzejBosne i Hercegovine, Sarajevo
- Vulnerability Study of FBiH, Federal Ministry of Spatial Planning, 2008
- Water Management Elaborate for BiH (1995)
- Water Management Strategy of the Federation of BiH 2010-2022, Federal Ministry of Agriculture, Water Management and Forestry, Sarajevo, 2010
- Water Resource Management Basis of the Vrbas River Basin, Energoinvest JSC Sarajevo and Institute for Water Management JSC Sarajevo, 1987
- Wipplinger, B. (2014): The Mesohabitat Evaluation Model Applied at an Austrian and Iberic River. Master Thesis at the University of Natural Resources and Life Sciences, Vienna.
- Women and Men in BiH, Agency for Statistics of BiH, Sarajevo, 2013

## ANNEX 2 – PROJECT INFORMATION FLYER

In 2010, the Government of the Federation of Bosnia and Herzegovina (FBiH) in order to ensure the long-term electric power declared the public interest and accession to the construction of priority power facilities in the Federation of Bosnia and Herzegovina (Official Gazette FBiH 8/10) including the HPP Babino Selo. JP Elektroprivreda of Bosnia and Herzegovina d.d. Sarajevo (EPBiH) thus initiated the previous activity for the construction of HPP Babino Selo,<sup>53</sup> on the River Vrbas in the Municipality of Donji Vakuf in the locations of Krivača (Local Community Vrbas) and Babin Potok (Local Community Babin Potok). Preliminary basic parameters for HPP Babino Selo are installed capacity of approximately 5.12 MW and possible annual energy production approximately 24 GWh.

Why is needed hydropower?

- Increasing the supply of electric energy from renewable energy sources aimed at reducing carbon dioxide emissions, air pollutants and other factors that cause climate changes, in line with European legislation and the Strategic plan and program development of the energy sector F BiH
- Insurance reliable and quality supply of electric energy in the Federation BiH, improve better living standards in F BiH
- Creation of employment opportunities during construction, operation and maintenance of hydropower plants

Current status of the project

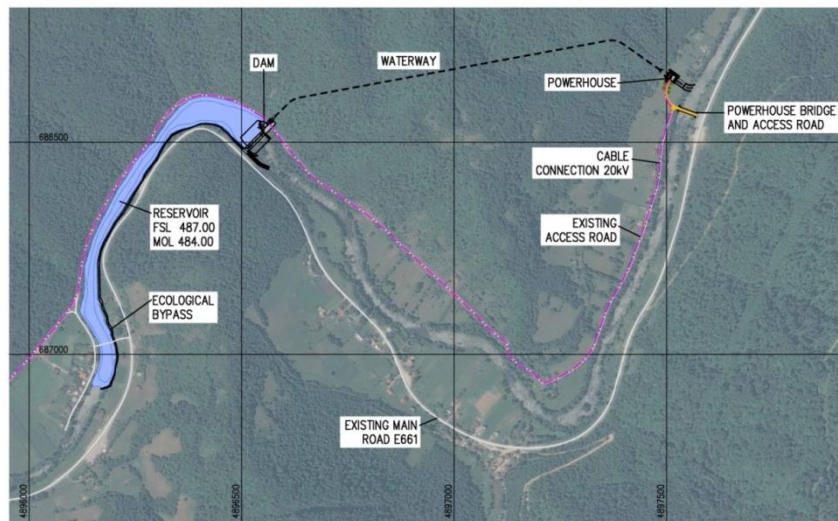
On the basis of the previously investigated possibilities of exploiting the hydro potential of the River Vrbas in studies developed in 1987 and 2013, EPBiH initiated the preparation of a Feasibility Study with investigating geological and geotechnical works, with the support of the European Bank for Reconstruction and Development. An integral part of the Feasibility Study is the Environmental and Social Impact Assessment (ESIA) prepared in two phases:

- § phase 1 (Environmental and Social Scoping Study), and
- § phase 2 (ESIA Report)

The completion of the entire Feasibility Study is expected at the end of 2016.

Selected technical solution for HPP Babino Selo

As part of the Feasibility Study several different alternatives for HPP Babino Selo have been analyzed, and Alternative "1Aa" has been selected on the basis of technical, economic, financial, environmental and social criteria as the most favourable solution.



Project Layout of the Selected Alternative - Alternative "1Aa"<sup>54</sup>

HPP Babino Selo is a run of river hydropower plant, diversion type and would consist of the following components:

- § a dam located in a naturally formed "V" shape gorge at the slopes of the Gradina Mountain. The maximum height of the dam is only 9.50 m above bed level to avoid flooding of the surrounding area, as well as to avoid the flooding of the main road M5 (E661). The dam type is a rubber weir on a concrete bottom slab. Length of

<sup>53</sup> In case of FSL – full supply level

<sup>54</sup> FSL – full supply level; MOL – minimum operational level

the dam is approx. 99 m and contains a fish path to secure the possibility of fish migration. On the right side of the dam a small turbine is located to provide ecological acceptable flow set by law.

- § a small reservoir with a length of 900 m and a total volume of 147,798 m<sup>3</sup>. The water level will remain within the existing river bed of the River Vrbas, and the backwater of the reservoir will end at the wooden bridge in the Krivače settlement. The hydraulic investigations show that there will be no negative influence on the backwater; therefore no measures are necessary to be undertaken.
- § an intake structure (water intake) on the left bank of the river Vrbas
- § a pressure tunnel in total length of 989 m
- § a powerhouse located at the flood plain downstream of the dam location on the left side of the river Vrbas in Babin Potok; in the powerhouse 2 turbines will be located.
- § an ecological bypass (for discharge of environmental flow),
- § an underground cable connection to the 20 kV network at Donji Vakuf
- § a bridge across river Vrbas near the powerhouse
- § a short access road to the location of the powerhouse

### Project impacts

During the entire project duration, EPBiH will meet all relevant local environmental and social standards as well as international best practices.

Potential environmental and social impacts of the project have been considered in the Scoping Study and include impacts on: hydrological regime of the Vrbas River downstream of the dam and water intake, water quality and physical, chemical and biological characteristics of water ecosystem, migration of ichthyofauna, possible occurrence of geodynamic processes, visual characteristics of the landscape, level of ambient noise during construction, traffic and transportation, sport and recreation, current use of land and land value. The above listed impacts will be analysed in detail in the ESIA Report, and adequate prevention and mitigation measures will be proposed for all impacts.

### Public consultations and contact information

EPBiH has adopted a Stakeholder Engagement Plan which identifies the key stakeholders and ensures that stakeholders are informed about the project, as well as offered the opportunity to express their opinions and concerns. The Plan also provides a grievance mechanism to be used throughout the entire project life cycle for submitting complaints, concerns, enquiries and comments.

All project documents will be available in local (Bosnian) language as follows:

- on the website of EPBiH ([www.elektroprivreda.ba](http://www.elektroprivreda.ba))
- on the website of the Municipality of Donji Vakuf ([www.donji-vakuf.ba](http://www.donji-vakuf.ba))
- in printed versions in the premises of EPBiH at the address: Vilsonovo Šetalište 15, 71000 Sarajevo

EPBiH will hold consultative meetings in accordance with the Stakeholder Engagement Plan, and stakeholders will be notified of the planned meetings at least 2 weeks in advance.

### Contact information for enquiries and grievances:

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