

Environmental and Social Data Sheet

Overview

Project Name:	Renewable Energy HPP Vranduk
Project Number:	2011-0180
Country:	Bosnia and Herzegovina
Project Description:	The project consists of construction and operation of a run-of-river, diversion type hydroelectric power plant (HPP) in Bosnia and Herzegovina (BIH) with a capacity of around 20 MW.
EIA required:	yes
Project included in Carbon Footprint Exercise ¹ :	yes (details for projects included are provided in section: "EIB Carbon Footprint Exercise")

Summary of Environmental and Social Assessment

The project, if located inside the EU, would fall under Annex II of the EU Environmental Impact Assessment (EIA) Directive. Based on national legislation the project was screened in by the competent national authority and an EIA was therefore performed. The ESIA documentation was submitted to the Ministry of Environment, the national competent authority, in June 2010 and received approval in March 2011.

According to the available ESIA documentation, the key adverse environmental impacts of the proposed project relate to biodiversity (flora & fauna), temporary increase of dust emissions, increased noise pollution, hydrology and hydrogeology; while the main social impacts are related to cultural heritage, land acquisition and limited resettlement, and general workplace and community safety.

The assessment work carried out by the promoter to date has resulted in an overall understanding of the environmental and social risks and mitigation measures required for a project of this nature however a number of gaps with respect to the Bank's environmental and social requirements have been identified. These mainly relate to the lack of a sufficiently detailed assessment of the following aspects: cumulative impacts, sedimentation, biodiversity baseline, impacts on the biological and hydrological regime, ecological flow and river basin management (in line with the EU Water Framework Directive). In order to fill such gaps an Environmental and Social Action Plan (ESAP) has been agreed with the Promoter, specifying the remaining actions required to meet the Lenders (EBRD and EIB) environmental and social (E&S) standards. The promoter will also need to develop and put in place an Environmental and Social Management system (ESMS) and regularly update an Environmental and Social Management Plan (ESMP) to manage and monitor the E&S impacts associated with Project construction, operation and maintenance. The ESMS and ESMP will be aligned to best practice principles. The Lenders will monitor that the ESAP is implemented properly and in a timely manner.

Overall and in the long-term, the project is expected to have several positive environmental and social effects. The project will increase the production of electricity from renewable

¹ Only projects that meet the scope of the Pilot Exercise, as defined in the EIB draft Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: above 100,000 tons CO₂e/year absolute (gross) or 20,000 tons CO₂e/year relative (net) – both increases and savings.

sources, partly alleviating BiH heavy reliance on coal for electricity production and thereby contributing to greenhouse gas emissions reduction. The project supports the country's objective of increasing the share of local, renewable energy sources in electricity production. In addition, the project will be the first large-scale HPP developed in BiH after more than 30 years and therefore will contribute to the creation of local employment and know-how in this field. Finally, the promoter will provide expert assistance to local community organisations in conjunction with project activities, such as the development of Management Plan for the national historic monument, Old Fortress of Vranduk. An agreement for the implementation of *Program on Friendly Environment* has also been signed between the promoter and Zenica Municipality to provide funding for 34 projects including construction of sports fields, water supply and roads for the local communities.

With the appropriate mitigation measures in place and the environmental and social contractual conditions placed on the project, the project is considered acceptable for Bank financing.

Environmental and Social Assessment

The Bosna River catchment is the largest individual catchment within BiH, covering 20% of the total area of BiH. It flows 271 km northward through central BiH and is a tributary of the river Sava which runs along the border between FBiH and Croatia, which is in turn a tributary of the River Danube. The Bosna river is a highly polluted river. Major upstream pollution sources in the project vicinity include a steel factory in the city of Zenica. Inadequate urban and industrial wastewater treatment plants and intensive agriculture are also key contributors to river pollution.

The project area of influence covers the project site and its facilities; ancillary infrastructure (mainly access roads), laydown areas for spoil and borrow pits. The spatial extent of potential project impacts is expected to be limited to the villages of Vranduk, Novi Vranduk, Beharinovac, Ponirac, Lučice, Koprivina, Varošište, Nemila and Hanovi, existing infrastructure (roads and bridges), existing businesses and proposed projects potentially affected by the project, and flora and fauna that rely on the Bosna River upstream and downstream of the project.

The project has also been granted a Preliminary Water Consent (PWC) and Location permit, and the promoter is in the process of applying for the Water Consent and the Water Permit. No construction permits for the project are in place yet which is normal at this stage as these permits are obtained on the basis of the detailed design that will be contracted as a part of the Supply and Installation contract.

Environmental and Social Issues

Although BiH has no clear national energy strategy assessing the energy needs of the country with the total number of HPPs planned for construction and their optimal location, the Bosna river catchment area has been studied with respect to its hydroenergy development since 1967 and the project has been identified as one of the priorities taking into account technical, economic and environmental considerations. The selected location and technical solution, elaborated in the project documentation was based on previous studies, knowledge of the area, realised investigations, boundary conditions and altitude limitations of the existing infrastructure.

Apart from above mentioned strategic studies no formal Strategic Environmental Assessment (SEA) for planning of new hydro projects in BiH and no Integrated Water Resources Management Plan for the Bosna river basin have been developed so far. However the promoter has been requested by the Government of the Federation of BiH to initiate activities on the preparation of this plan. As a similar plan would be required in the EU under the Water Framework Directive so for this reason a corresponding requirement for the preparation of Bosna river Basin Management study has been introduced as an undertaking by the Bank. The Bank will closely follow preparation of this study as a part of its project monitoring.

Cumulative impacts: Industrial activities and infrastructure construction in the Project vicinity which may have cumulative impacts with the project include the following:

- A landfill site on the left bank upstream between the dam and the existing local road will be reconstructed in order to provide access to the dam on the left bank of the river and which may have temporary cumulative impacts with laydown areas for spoil from excavations during the construction phase;
- The planned motorway corridor Vc to be constructed across the project site, and whose construction coincides with the construction schedule of the project;
- The planned Kovanici HPP on the Bosna River, approximately 10 km downstream from the project; and
- The planned Janjici HPP on the Bosna River, approximately 20 km upstream from the project.

The ESIA did not assess any likely significant cumulative impacts with the existing landfill site during construction in terms of waste. The ESAP requires the promoter to advise the EPC contractor to consider the potential for cumulative impacts when determining the locations for temporary laydown areas for excavated and other material. With regards the motorway project, the ESIA states that the Vranduk HPP will not directly affect the construction of the motorway. However, according to the FBiH Road Directorate, the Zenica-Nemila stretch of the motorway is anticipated to be constructed between 2015 and 2020 and therefore concurrent with the scheduled construction period and planned dredging of the downstream riverbed. There may be significant impacts in terms of traffic, noise and air quality as it is likely that the motorway will use the same access roads and similar heavy construction, vehicles and machinery. The carrying out of a cumulative impact assessment study of the motorway construction has been included in ESAP, as well as the traffic and noise impact assessments.

There are no existing HPPs in the upstream or downstream vicinity of the project although the promoter apparently has plans to develop both the Janjici and Kovanici HPPs on the same river. These are in the pre-planning stages and project details were not known at the time the ESIA for the project was undertaken. According to limited information available these HPPs are unlikely to affect water availability and hence, the functioning of the project.

Environmental Impact and Mitigation

Sedimentation: Sedimentation of the Bosna River resulting from the dam construction, dredging (construction and later maintenance dredging during operation), other earthworks and erosion of disposed excavated material is a potential significant impact that has not been clearly assessed in the ESIA. Avoidance and management measures will be included in the Construction Environmental Management Plan (CEMP) in accordance with the Water Consent (still to be obtained) so as to reduce sedimentation and water turbidity which would impact on water quality. Control of these sedimentation sources is defined in the project ESAP.

Impact on the biological and hydrological regime of the Bosna river: Implementation of the project will alter the current biological and hydrological regime of the Bosna river at the project site, in particular within the section downstream of the dam. These changes are due to the introduction of a barrier to the natural flow of the Bosna river and the diversion of the majority of its waters in the winding stretch in the Vranduk-Nemila canyon with a length of approximately 6.7 km. The significance of likely impacts on flora and fauna are based on an assessment of the expected nature, extent, duration, and intensity of potential impacts as well as of the probability of the impacts occurring. The closest protected sites to the scheme are forested mountainous areas in the vicinity of the town Žepče, approximately 30 km downstream of Vranduk, and the natural landscape area Bristicak near Zenica, approximately 10 km upstream of the Project site. The scheme will not have an impact on either of these sites owing to the small footprint of the scheme and the distance of the project to these sites. Upstream of the dam, the project will submerge an area of approximately 5.3 ha of land, of which only 0.027 ha consist of natural shrubs and trees. Even though this area might be Annex I Habitat (of the EU Habitats' Directive 92/43/EEC) it is highly unlikely that the loss of

this small amount would have an impact on the structure and function and integrity of the ecosystem. Downstream of the dam, the reduction in flows may result in some loss or changes to the composition of riparian vegetation, which may also include Annex I Habitat. The assessment whether and how much Annex I Habitat may be lost downstream of the dam due to the reduced water flow is included in the studies required under the ESAP. However, it is anticipated that the riparian vegetation is unlikely to be highly water dependant, owing to the steep valley form. If Annex I Habitat is to be affected, appropriate mitigation and compensation will be required so as to ensure no net loss of biodiversity. In order to protect terrestrial fauna during the construction phase of the Project, the Environmental Permit requires that vehicles deployed for the scheme are to avoid movements beyond existing roads and this requirement will be included in the CEMP and for the operating phase of the project.

Biodiversity assessment: A desk study for fish has been carried out for the project in the ESIA using data on fish populations in the Sava river catchment, obtained by field research in 2006 and 2007. Despite the fact that the Bosna river is highly polluted, several *Cyprinidae* species (Minnow Family) were identified as being present downstream from the project, but these are not protected species. However, the sampling locations were not specified and as the river stretch between Zenica and the Sava River is very long there is no certainty of what type of fish species are present up and downstream of the project location. In the past, the river has also been known to be a migrating ground for salmonids, such as trout and grayling, which require cleaner water. As the life-span of a HPP can be up to 100 years, it is likely that future improvements of the water quality of the Bosna river may result in other species returning to the Bosna River. The Bank considers the information provided in the ESIA on likely impacts on fish species to be insufficient to allow for an assessment of impacts or significance to be concluded and it has therefore required that a full aquatic study be carried out and that its conclusions be taken into account in the final design and recommendations form part of an adaptive management plan. The Bank also received excerpts from a Fishermen Baseline Study for Zenica-Doboj Canton prepared by Faculty of Agriculture and Food Sciences University of Sarajevo in April 2012. This study is an updated catalogue of fish in Bosna river and its tributaries in the project zone and may serve as an additional source of information for the aquatic study required.

The ESIA proposes the addition of a fish ladder for fish movement and migration over the dam structure. This is also a requirement of the environmental permit. The Bank met representatives of the Association of Fishermen USR Bistro from Zenica and discussed the effectiveness of the suggested fish ladders. The Bank has required, as a part of ESAP, that further studies be undertaken by an independent expert prior to the tendering of the Supply and Installation Contract to confirm any requirements, in particular for protected species and for the long-term sustainability of the river system and to provide sufficient background information for main design

The ecological minimal acceptable flow (EMF): The EMF of 14 m³/s has been calculated based on the provisions included in the national Law on Water which was applicable when the ESIA was undertaken and the preliminary design developed and considers minimum mean monthly flows based on available flow data from 1955 to 1991. The Bank has some concerns about the accuracy of the data used as it is >20 years old. Water use and water management practices in the area may have changed significantly over the last 20 years. It is also unclear whether any changes in the hydrological regime may have occurred over the last 20 years have been taken into account. Both the EMF calculations and the Vranduk HPP design have used the same baseline data.

In order to fulfil Bank's requirements, the project must retain an EMF that is sufficient to meet the needs of downstream water users and biodiversity. Neither tourism nor related activity, such as kayaking, take place on the Bosna River in the Project vicinity and the water is not used as drinking water. However, there is no data contained within the ESIA that considers the water use requirements on the river stretch with the EMF downstream of the dam, such as for irrigation purposes. The promoter has not provided the data on water resource users downstream of the dam or been able to advise whether the EMF would be sufficient to meet their needs and general biodiversity requirements. The Bank has required that the promoter

undertake, as a part of ESAP, a more detailed analysis of the EMF that also takes into account the specific requirements of downstream water resource users. The conclusions of this analysis shall be taken into account in the final design. In addition, the promoter should develop a rating curve to define the correlation between the water flow and water elevation/depth of the Bosna River at the project site following dam gate closure, install sensors for continuous measurement of water elevation/depth in the river stretch immediately downstream of the dam and use the resulting data to ensure that the EMF is continuously maintained.

Environmental and Social Management Systems

The Construction Environmental Management Plan (CEMP) will need to be developed by the EPC contractor, approved by the promoter, the PIU consultant and the Bank and be in accordance with the conditions included in the Environmental Permit, and Water Consent. This requirement must be included in the project tender documentation and incorporated into the appointed EPC contractor's contractual obligations. The promoter will establish a team supervising the development and implementation of the CEMP and other environmental management plans. The supervisory team will include an environmental expert and will also monitor the implementation of health and safety requirements. PIU consultant with sufficient international experience will assist the promoter in this respect. For the operational phase the promoter has committed to develop all management plans for the prior to obtaining the Operation Permit and in accordance with the relevant legislation in BIH. The ESAP includes clear requirements for an adaptive management approach that allows operations to be adjusted as needed to reduce any observed impacts on biodiversity or downstream impacts. The actions include a series of plans to control potential impacts during construction (traffic, occupational health and safety, erosion control, waste management, etc.) as well as an assessment of the aquatic ecosystem to verify the conclusion of the ESIA that the project would have no significant adverse impacts operational plans and actions. The ESAP also requires detailed hydrologic and sediment modelling and management to protect river integrity, construction of a fish ladder if feasible, independent verification that ecological minimum flows are adequate to preserve biodiversity in the downstream river. The promoter will develop and implement a plan to manage any unexpected impacts on the nearby Vranduk Fortress and any other cultural heritage resources. In addition, filling of the reservoir would require one household to be relocated and other private land to be acquired from private landowners. The promoter will implement a Resettlement Policy Framework to guide resettlement and land acquisition and ensure that all losses by landowners and land users are properly compensated or replaced.

The Promoter has obtained ISO 14001 accreditation for its generating facilities, but not for its corporate management structure. An environmental and social management system (ESMS) will need to be developed prior to construction and regularly updated to manage environmental and social aspects and impacts associated with project construction, operation and maintenance. The ESMS will be based on the key principles of the ISO14001:2004 and Occupational Health and Safety Advisory Services (OHSAS) 18001. The promoter will submit annual reports that provide details on the implementation of each ESAP requirement and on compliance with the Bank's Requirements. The Bank will also audit performance at least once during construction and again within a year of commissioning.

Any mitigation and monitoring measures identified as a result of further surveys will be included in the project CEMP and ESMS. The ESAP includes sufficient requirements to avoid or mitigate potentially significant adverse impacts.

EIB Carbon Footprint Exercise

The project will not result in significant GHG emissions from methane as a result of anaerobic digestion of submerged vegetation. The reservoir will not be very deep and the resident time of the water in the reservoir is limited. It appears that only a small area of vegetation will be covered by the increased water level in the reservoir and vegetation shall be cleared prior to filling the reservoir. Hence, GHG emissions can be expected to be minimal, if any.

Based on an estimated electricity production of 96 GWh/year, emissions savings are expected to be 121 kt/year of CO₂ equivalent. For the annual accounting purposes of the EIB Carbon Footprint, the project emissions will be prorated according to the EIB lending amount signed in that year, as a proportion of project cost'.

Social Assessment

Although an ESIA has been prepared for the project, a self-standing social impact assessment was not required under FBiH law. Further due diligence has therefore been done by the Bank to complement the social elements that are already included in the ESIA.

Primary adverse social impacts associated with construction and operation of the project relate to (i) noise, blasting, vibration and community disturbance impacts, (ii) cultural heritage (primarily through visual impacts and potential temporary reduction in tourist visits); (iii) land acquisition and associated (minor) economic and physical displacement that will occur due to flooding of the reservoir and construction of new roads; and (iv) general workplace and community safety.

The total area that will be affected by land acquisition consists of approximately 80,000m² made up of 126 land plots that belong to the cadastral municipalities of Vranduk, Nemila, Banlozi and Donja Gračanica. Most of these are government owned (either water land or forest land) with some being privately owned. This will be verified through the survey activities which will determine the precise number of affected persons and nature of impacts. A Land Acquisition and Compensation Framework has been prepared by the promoter, based on which a specific Resettlement Action Plan will be developed following completion of a census. The ESAP also includes provisions to reduce impacts on tourism at the nearby Vranduk Fortress.

The ESIA has identified the Vranduk fortress as a nearby cultural heritage sites that needs special attention. While the fortress is not expected to be physically affected by the project, the project will have a significant visual impact on the surrounding cultural landscape. In addition, the noise and congestion during the construction phase may reduce the number of tourists that visit the locations. Given this, a Management Plan is being prepared for the protection and maintenance of Old Town Vranduk. The Plan will include measures for continuous monitoring by an authorised organization for protection of cultural-historic heritage as well as maintenance and promotion of this important national monument.

In terms of the positive social impacts of the project, approximately 1500 temporary jobs are expected to be created during the construction phase of the Project and 15 jobs in the operational phase. The intention is to hire as many local workers as possible. A one-off Program on Friendly Environment has been signed between EPBiH and Zenica Municipality to provide funding for 34 projects (including the construction of sports fields, water supply and roads for local communities) in the municipality with a budget of approximately KM 1.5 million. In addition, during the operational phase, the project will pay concessions to the Municipality of Zenica as well as the canton and the national government. The breakdown of payments within the municipality, and therefore the amount of money that is given to Vranduk will be decided by the Municipality of Zenica. These will be in the form of one-off lump sum payments and also annual payments for a concession period of 30 years.

Public Consultation and Stakeholder Engagement

Public consultation, in the form of public hearings, is required by FBiH law for the Preliminary Water Consent and for the ESIA prior to the issuance of the Environmental Permit. Public hearings were carried out in September 2009 and November 2010. The last public hearing was carried out as part of the ESIA approval process and was arranged by the Federal Ministry of Environment and Tourism (MoET). Further public consultation was required by EBRD and it is considered to be sufficient to comply with the Bank's own E&S standards.

The stakeholder engagement and public consultation carried out to date has been documented in a Stakeholder Engagement Plan. This document lists all known stakeholder groupings and outlines a set of future stakeholder engagement activities. To date, no stakeholders have expressed concerns about potential impacts.

The ESIA and Preliminary Design were presented to the attendees at the public hearing held in November 2010. A Non-Technical Summary (NTS) was published by the Federal MoET along with the EIA on its website for 30 days from 18 October to 16 November 2010, in accordance with the Law on Environment. The ESIA package – inclusive of the EIA, revised NTS, Stakeholder Engagement Plan, and Environmental and Social Action Plan (ESAP) – was disclosed on the Promoter's website (<http://www.elektroprivreda.ba/eng/page/environment>) on 14 May 2013. The link to the ESIA has also been published on the EIB website.