HRVATSKA ELEKTROPRIVREDA

Non Technical Summary

Ombla Hydro Power Plant, Dubrovnik, Croatia

May 2011

QUALITY MANAGEMENT

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Remarks	Final			
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1 Introduction

Hrvatska Elektroprivreda d.d. (HEP d.d.) is the parent company of several subsidiaries within the HEP Group, a Croatian nationalised utility company involved primarily in electricity production, transmission and distribution but also heat supply and gas distribution. The company owns and operates several hydro power and thermal power plants (fired on a variety of fuels including oil, natural gas or coal) and associated transmission and distribution networks that supply energy to end users. Other businesses in the group are involved in a diverse range of activities that include waste management, energy efficiency, other renewables technologies, energy trading, training and even tourism and hospitality services.

HEP has proposed to construct the Ombla Hydropower Plant (Ombla HPP, the Project), a new 68 megawatt hydropower plant located underground at the head of the Rijeka Dubrovačka Bay near Dubrovnik in Croatia on the Adriatic coast. HEP prepared an Environmental Impact Assessment of the project in 1999. The Environmental Impact Assessment was approved by local authorities and HEP has received the necessary permits for the Ombla HPP project; the Location Permit and based on a preliminary design, the Principle Permit). HEP will obtain building permits for construction of the hydropower plant following final design and a permit to operate once construction has been completed. The project includes modernisation of Dubrovnik's water supply infrastructure to increase the quantity of drinking water but also to improve the quality of the water.

Now, HEP has approached the European Bank for Reconstruction and Development (EBRD) for financing. The project is thus subject to EBRD's 2008 Environmental and Social Policy, which requires an Environmental and Social Impact Assessment of the proposed project. EBRD has conducted an environmental and social due diligence assessment of the project and also supported the development of other documents that collectively comprise the Environmental and Social Impact Assessment: the 1999 EIA, supplementary materials, a Stakeholder Engagement Plan, an Environmental and Social Action Plan, and this Non-Technical Summary.

This document provides in a non-technical manner an overview of the proposed development plans for the Ombla HPP project in Dubrovnik, Croatia. It also summarises the findings of the environmental and social appraisal of the project and the review of Croatian Environmental Impact Assessment report, which was undertaken by HEP in 1999. The document also provides a summary of potential environmental and social impacts and other environmental and social issues relevant to the proposed activities. Appropriate measures to mitigate key adverse environmental and social effects that may arise during project construction and operation are also provided.

This NTS document and other materials will be placed in the locations shown below on 20 May. During a 120-day period beginning on 20 May, anyone can provide comments and recommendations on the ESIA and other aspects of the project. Comments can be made at public consultations to be held at the locations shown below, and may be submitted to the address below.

ESIA documents will be available for review during normal business hours at the following location:
HEP Proizvodnja d.o.o
Pogon HE Dubrovnik
Dr Ante Starčevića 7, 20000 Dubrovnik
Tel: 020 468 613

Meetings at which anyone can make comments will be held as follows:
HEP Proizvodnja d.o.o
Pogon HE Dubrovnik
Dr Ante Starčevića 7, 20000 Dubrovnik

The dates and times of public meetings will be announced at least three weeks before the meeting(s), and advertised in mass media in and around Dubrovnik.

For further information on this project, or to provide comments on the project or the ESIA, please contact:

Comments may be submitted to:	
Name	Contact information
Tomislav Paviša	Postal Address: Dr Ante Starčevića 7, 20000 Dubrovnik Phone: 020 468 613 Email: Tomislav.pavisa@hep.hr www.hep.hr

2 Description of the Proposed Development

The Ombla HPP will have an installed capacity 68 megawatt and comprises 4 power generating units for power. The proposed scheme is based on a classic equipment design. The prospective annual electricity generation is foreseen as 220 gigawatt hours at a 37% load factor (this is a measure of average power divided by the peak power). An engineering firm has already undertaken a feasibility study for the proposed project and a preliminary design has been completed. At this stage of the project, all the necessary permits that are required have been obtained. Further permits will be obtained during design and construction.

The Hydropower plant will utilise the groundwater from the more than 600 square kilometres large Ombla catchment area, which for most part is located in East Herzegovina and a part of Dalmatian hinterland as shown in Figure 1, which provides an indication of the scale of the area of the underground reservoir. At the feasibility stage, an alternative option was considered which located the dam on the outside of the cave. A high level assessment concluded that the overall environmental and social impacts of this alternative would be unacceptable.

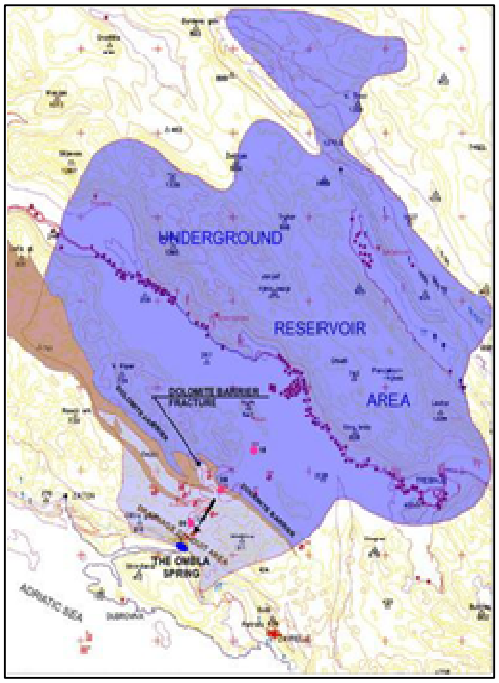


Figure 1: Underground Reservoir Area

The groundwater is today drained by underground rivers and channels in the mountain structure to the Ombla Spring and then into the Adriatic Sea via Rijeka Dubrovačka bay. The flow at Ombla averages 24 cubic metres per second (with a recorded range of 2.8 to 106 measured between, 1962 – 1990). At maximum capacity the planned turbines that will be used will utilise 60 metres per second. The Ombla spring flows over a weir to prevent mixing of sea water with the spring water. The Rijeka Dubrovačka flows for several kilometres before it runs into the sea and is subject to tidal influence.

The potential for power production will be established by sealing the channels and fissure in the limestone mountain and thus creating a “dam” which will form a “reservoir”. The power plant and associated structures will all be constructed inside the limestone mountain upstream of the Ombla Spring. Only the control building will be in open air. The power plant will be connected to an existing sub-station nearby.

Currently, the water from the Ombla spring is used for drinking water supply to the City of Dubrovnik. The city reportedly experiences temporary potable water quality problems in spring and fall seasons, when total suspended solids are present at higher than normal levels. In addition, the City of Dubrovnik expects increases in tourism development that will require additional potable water supply volumes to the city. Therefore, measures directed at improving the water supply, to be undertaken as part of this project, are expected to triple the capacity of water supply (from current 500 to 1500 litres per second) and improve its quality. As such, the Ombla HPP design will also include an intake of potable water from the underground reservoir. The water will supply potable water to the City of Dubrovnik which is located approximately 2 kilometres away from the proposed Ombla HPP location. The design of the scheme ensures that a new high level intake will significantly reduce the pumping and distribution costs of water supply to Dubrovnik. HEP are responsible for the build of the Ombla HPP and the Water Company is expected to operate and maintain it.

3 Environmental, Health, Safety and Social Review

Location of the Ombla HPP Scheme

The Ombla HPP will be located in the Rijeka Dubrovačka Bay near to Dubrovnik on the Adriatic coast of Croatia. An aerial photograph of the Ombla HPP and surrounding areas are shown in Figure 2 and Figure 3 below.

Figure 2: Geographic location of Ombla HPP site, Croatia

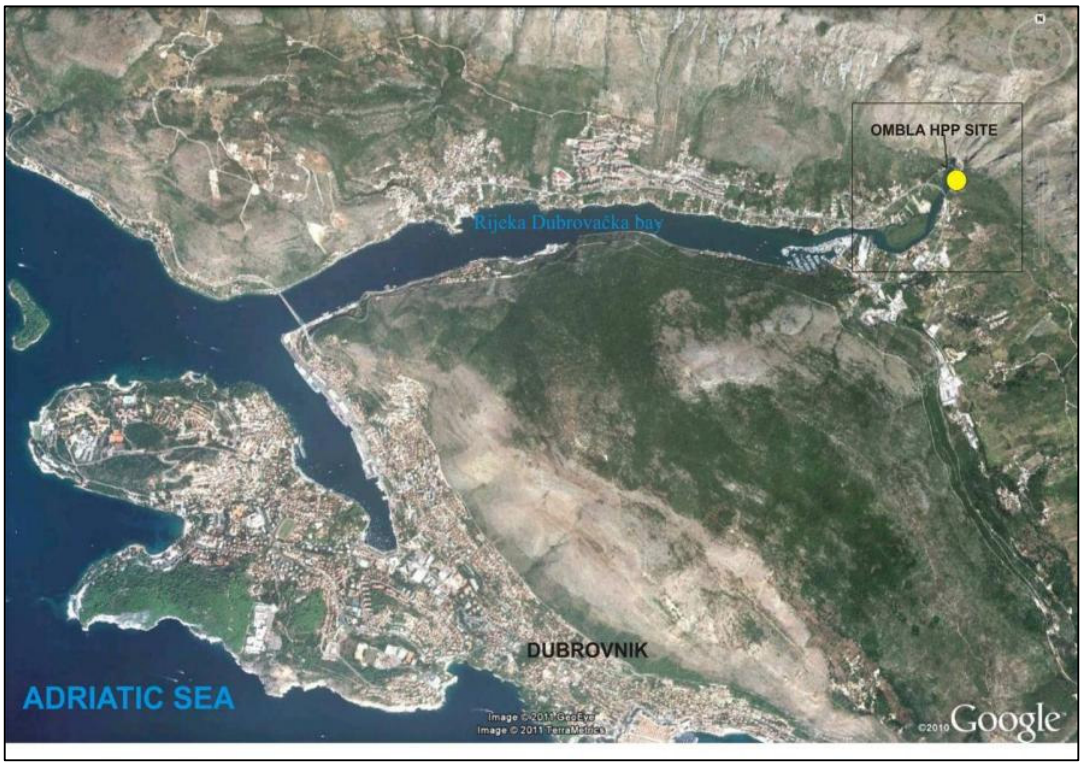
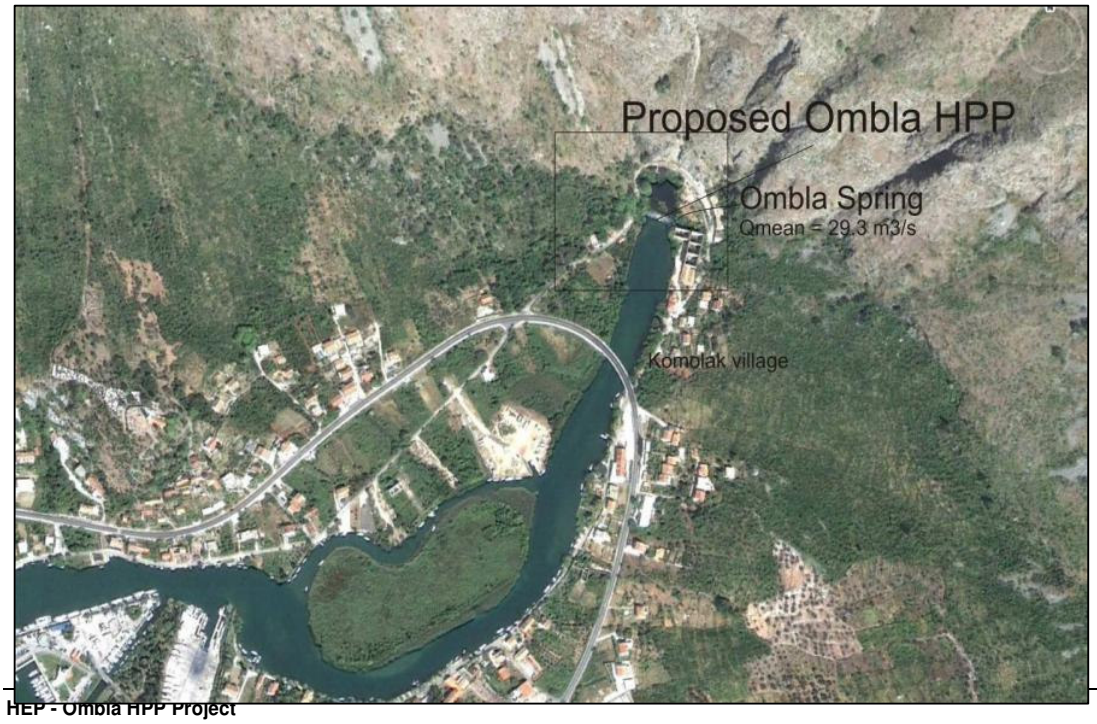


Figure 3: Location of the proposed Ombla HPP near village of Komalac, Croatia



Key Elements of the ESIA

Several documents collectively make up the ESIA. The Non-Technical Summary is described above, while the other documents are described here.

Environmental and Social Action Plan (ESAP)

As part of the environmental and social due diligence evaluation, a wide review was conducted of corporate HEP environmental, health, safety and social management arrangements. Although HEP is fully compliant with national Croatian law and the best practices which EBRD requires, a number of areas for improvement were identified. From the overall review, an Environmental and Social Action Plan (ESAP) has been developed which lists key actions to ensure these improvements can be implemented and include mitigation measures discussed above. This ESAP is being disclosed for public comment; key mitigation measures are described below. .

Stakeholder Engagement Plan (SEP)

HEP has prepared a Stakeholder Engagement Plan (SEP) for the Ombla HPP Project. The SEP will guide HEP in communicating with people, institutions and any other stakeholders who may be affected by or interested in the implementation of HPP Ombla Project. HEP has assigned a social liaison officer, who will be responsible for keeping open dialogue with stakeholders groups and local public. This ESAP is being disclosed for public comment. At any time before and during construction and operation, any stakeholder will have a chance to raise any concerns, provide comments and feedback about the Ombla HPP project. All such comments and grievances from people will be accepted, processed and answered by HEP in a timely manner.

Resettlement Action Plan (RAP)

The project will require a land acquisition of approximately 5 hectares. The land areas will mostly be used for the construction of two access roads connecting the location of the Ombla spring and tunnels. The plots of land to be acquired are mostly unused, with the exception of some small gardens and an orange orchard located along the Ombla river right bank. In total, 129 land plots belonging to approximately 84 owners will need to be acquired by HEP d.d. for acquisition. In addition, HEP will need to acquire some private property structures, located nearby the Ombla spring. In order to ensure that all individuals and households affected by the Project receive a level of compensation for their land and assets, HEP has developed a Resettlement Action Plan (RAP). The RAP was approved by HEP Management Board and will serve as a basis for implementing the land acquisition process for the HPP Ombla Project. Implementation of RAP will enable all individuals and households affected by the Project attain a standard of living similar to and, if possible, better than the existing one. The RAP will be disclosed to those whose land may be affected.

Key Features

Key environmental features and sensitive locations from a social perspective in relation to the site include:

- The Ombla HHP site including location of the hydropower plant and associated equipment and the immediate mountainous areas with cave systems will be located in a proposed designated Natura 2000 site due to several species in the area including species of bats, fish and molluscs.
- The Chapel of Annunciation is in close proximity to the site and is viewed as a cultural heritage site.
- Several houses are near the site on access roads to the site and people who live in the houses or on the land would be affected by the project.

Actions will be taken to protect these sensitive areas including the development of a Resettlement Action Plan (RAP) that has been completed as part of this project. This document has been designed to mitigate the negative impacts of land acquisition and displacement and to set out the entitlements of the different categories of affected households and businesses.

There are no other reported protected or designated habitats (such as nature reserves), cultural heritage sites (such as churches and monuments), archaeological sites (such as finds), rare species or indigenous people's sites located in close proximity to the site. In addition, there are no other potentially sensitive receptors such as forests, resorts, and

recreation or tourist establishments in close proximity to the site. There are other protected sites in the wider area that include Rijeka Dubrovačka and Močiljska cave. At the time the 1999 EIA was developed, there were no difficulties in obtaining and compiling information for the study.

The Ombla area is a Category C tourist area – i.e. with limited tourism activities. At present, the marina serves mainly residents of Dubrovnik. However, there are plans for the marina to be expanded to include additional berthing for luxury yachts, in which case it will most probably also serve tourists. This, together with the city's plans to build a walking path and the creation of green areas (parks) around the HPP after it is constructed, could contribute to a higher tourism rating of the area in the future.

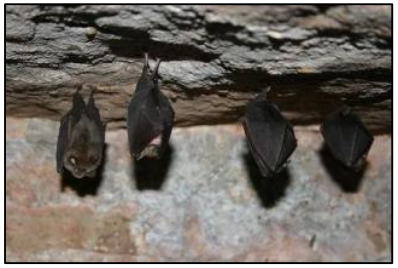
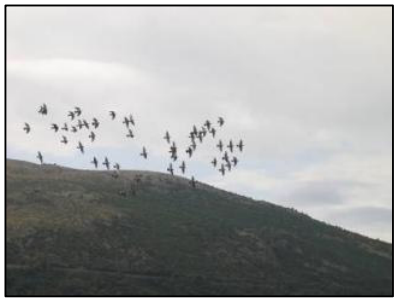
Potential Impacts and Mitigation Measures

The assessment of potential impacts presented in the 1999 EIA has followed a standard methodology which considers the sensitivity of the existing environmental features and the magnitude of the likely impacts to determine the significance of the impacts. The 1999 EIA and the EBRD's environmental and social diligence evaluation determined the project could have negative impacts on environmental resources and on people if they are not controlled carefully. Therefore, Croatian authorities and the EBRD will require HEP to implement many actions ("mitigation measures") to prevent, reduce, or mitigate impacts on people and the environment. A summary of key impacts and mitigation measures have been identified, and they are summarised in Appendix A.

Overview of Potential Impacts and Mitigation

Resource	Potential Impact / Issue of Concern	Mitigation
Climate and Air Quality	 Construction will cause some temporary impacts on air quality, including fugitive dust and emissions from vehicles. No adverse impacts on local climate and air quality are likely to occur during operation.	- When needed, access roads will be sprayed with water to reduce dust - All vehicles carrying spoil and all stockpiles will be kept covered. -All vehicles will be switched off when not in use to reduce the emission of pollutants. Engines of motorised equipment and vehicles will be well-maintained in order to reduce emissions. 
Geology, Geohazards and Soils	Construction should not cause landslides or other slope stability problems. During operation, there is the potential for the creation of more permeable zones in the rock that could result in the seepage of water through the rock. The risk of earthquakes in the Dubrovnik area is very low.  Increased levels of soil erosion during construction. A primary concern with storm water runoff from a construction site is the loss of soil and the impact of soil on water quality.	- HEP has conducted pre-construction surveys of slope stability. Slope stability will be monitored using survey landmarks. - An Emergency Response Plan will include plans for dealing with earthquakes or landslips during construction and operation. - Soil erosion will be minimized by the use of good housekeeping practices and erosion and sediment control best management practices--silt fences along all waterways, straw bales, check-dams, seeding).  - Soil erosion control plan will be developed and implemented during construction and operation.
Surface Water and Groundwater	*Surface Water flow:* The working regime of HPP Ombla will have no negative influence on water levels in the Dubrovnik River. It is possible that the effect could be positive, as a result of reducing the current extreme flow variations. During operation, a minimum biological flow will be released, sustaining	A pre-construction water monitoring programme will be undertaken to establish the existing conditions. The following elements will be monitored: • Groundwater levels (in progress) • Groundwater quality (Dubrovnik Water Authority is monitoring) • Surface water flow • Surface water quality

Resource	Potential Impact / Issue of Concern	Mitigation
	the aquatic ecology. *Groundwater flow:* Installing the grout curtain will change the way groundwater flows inside the mountain *Surface Water and Groundwater Quality:* Impacts on surface water and groundwater quality will be negligible. Some sedimentation may temporarily occur during high flows. The presence of dissolved oxygen will not change from the existing levels and there will be no adverse effect on microbiology and microbiological properties of the Ombla waters.	During construction, measures will be implemented to protected surface waters. • Temporary settling basins will be used to ensure that no silty or polluting effluent is discharged to water. • A grout curtain will used to limit increased water turbidity. • The 1999 EIA required concrete lining to be applied to the riverbed to reduce the additional inputs of sediments in the water. Other options will also be considered • Dredging of riverbed will be minimised as far as possible, and work will be undertaken so as to minimize any impacts if dredging is necessary. • A plan to control erosion and sedimentation using best international practices will be developed and implemented. • During construction, measures will be implemented to prevent / reduce / control impacts to groundwater and surface water as a result of spills of fuel, lubricants and other chemicals. • Fuels and oils will be stored in bunded containers with 110% capacity. • Drip-trays will be used for all vehicles or machinery containing fuels or oils. • A designated bunded refuelling location will be identified • Spill kits will be distributed near to fuel and oil storage and refuelling locations. The spill kit will be large enough to cope with size of spill that may occur.
Water Supply	No adverse impacts on drinking water quality are predicted. During operation, the drinking water supply volume will increase from present pumping capacity of 360 l/s up to 1,500 l/s. Thus the capacity of fresh water supply in the tourist area of Dubrovnik will be significantly increased and will reduce the pumping and distribution costs of water supply to Dubrovnik. During natural drought situations and as a result of increased future water demand, there is a risk of water supply shortage.	The following measures will be taken to ensure the security of the drinking water supply. • A Sanitary Water Protection Zone to protect the drinking water will be created in accordance with the rulebook on the determination of sanitary protection zones of springs. • Water will be pumped from the Ombla spring to water treatment works for mechanical treatment to reduce suspended sediment concentrations. • The existing pumping station will be retained.
Ecosystems and Flora & Fauna	Construction could damage or kill vegetation around Ombla Spring. Construction could damage or kill the aquatic ecology of Ombla Spring Soil erosion and subsequent deposition into Rijeka Dubrovačka could damage fish and habitat.	Pre-construction ecological surveys will be undertaken for the following, and suitable mitigation implemented where necessary: • Terrestrial ecosystems • Aquatic ecosystems • Protected species (including bat species and the *Proteus anguinus* (Cave

Resource	Potential Impact / Issue of Concern	Mitigation
	If any work is to be done in Vilina cave or any other caves bats could be driven away by the activity construction in or near caves Disturbance in Vilina cave affect could five species of protected bats *(Rhinolophus hipposideros, Rhinolophus ferrumequitnum, Rhinolophus blasii, Myotis blythi* and *Miniopterus schreiberis).*  Construction in or near caves sytems / river could damage or kill the, *Proteus anguinus* (Cave salamander) which (according to local inhabitants) is present in the cave part of the Ombla spring. This species is listed as being 'vulnerable' on the IUCN Red List of threatened species.  Construction could disturb the bird species using the Dubrovnik River channel island.  The operational stage will have no negative impact on terrestrial or aquatic habitat.	salamander). • Birds Develop an Ecosystem Protection Plan following the ecological surveys. Plan to cover construction and operational phases. A screening exercise will be undertaken, in accordance with the EU Habitats Directive, to determine the potential for impacts on the species and habitats that have been identified for designation under the Ombla Natura 2000 site. Additional surveys (as noted above) and analysis will be undertaken in support of the screening exercise. Ecological monitoring will continue during construction and the early stages of operation to permit early awareness of any potential impacts on flora and fauna, allowing mitigation to be put in place as required. All work in the Vilina cave will be undertaken in the winter months to avoid impacts on bat species using it as a maternity roost. At the end of construction, disturbed areas of terrestrial habitat will be re-vegetated with native grass and shrub species.
Noise	Construction equipment could cause loud noises. Blasting could disturb local communities.	Noise levels on site will be monitored before and during construction to establish whether construction noise levels are excessive. This early awareness of any potential noise impacts will allow mitigation to be put in place as required. There will be no night time construction activities. Blasting will be avoided where possible. Where blasting is necessary, it will

Resource	Potential Impact / Issue of Concern	Mitigation
		be undertaken during daylight hours only and the number of explosions per day will be minimised.
Waste Management	No adverse waste management effects are predicted.	To ensure that building materials are managed efficiently, waste is disposed of legally, and material recycling, reuse and recovery is maximised, a Construction Site Waste Management Plan will be developed, with the aim of having the majority of waste re-used or recycled. During construction and operation, all waste will be segregated and stored in labelled containers, including office-based waste. All hazardous waste accidents and incidents will be reported. Dredge spoil and tunnelling spoil will be managed to avoid any impacts. The appropriate containment and disposal of wastewater will be undertaken during construction and operation. All sanitary and storm water will be collected and delivered to the waste water treatment works in Dubrovnik.
Cultural Heritage	The ruins of the Chapel of Annunciation is located in near the proposed construction work and could be further damaged by equipment or workers. No other adverse effects on cultural heritage are predicted. 	During construction, the Chapel of Annunciation will be protected from vibration caused by mining, grouting and transportation. Following construction, the Chapel of Annunciation will be renovated under supervision of the Institute for the Protection of Monuments and Cultural Heritage in Dubrovnik. In advance of construction, archaeological investigations will be undertaken in Vilina cave to identify the likely presence of archaeology or artefacts. During construction, an archaeological watching brief will be employed to prevent destruction or theft of found objects and building remains with scientific or material value.
Tourism	No adverse effects on tourism are predicted, particularly as construction traffic is predicted to be less than 15 trucks per day. HPP operation may attract more tourists to the area.	A traffic management plan will minimize any potential for impacts on roads.
Visual Landscape	HPP will have negligible visual impacts, since all operational facilities and equipment will be underground once constructed.	Temporary facilities such as labour camps, trade facilities and storage will be located in the Komolac industrial zone. It is likely that the concrete plant in Dubac will be used for crushing and mixing of concrete. Should another location be proposed by the contractor, this will be controlled and supervised by the state inspection office. The route of new hillside access roads in uninhabited areas will follow the existing terrain configuration to reduce visual impacts.

Resource	Potential Impact / Issue of Concern	Mitigation
Socio-economics	One formal weekend cottage and one informal partly constructed building will have to be acquired for the project, as well as 129 land plots belonging to approximately 84 owners – approximately 5ha of land. Another weekend cottage may be affected as the surrounding land will be acquired and the owner may request that the cottage is acquired by HEP as well. Positive impacts on local economy are likely, including secured energy source, secured water supply, opening of additional work places and the possibility for tourism development.	The Stakeholder Engagement Plan (SEP) will be used as a framework for completing consultation activities and project disclosure including the identification of potential stakeholders, methods used for consultation activities and the records to be kept. The grievance mechanism will be explained to stakeholders. A written land acquisition plan for the project has been developed. No individuals / households or organisations affected by the project will suffer economic losses and those that are affected will receive a level of compensation for their land and assets that will enable them to attain a standard of living similar to and, if possible, better than their existing one. The adverse impacts of land acquisition and displacement will be mitigated using the Resettlement Action Plan (RAP).
	Additional temporary employment opportunities for local public	The construction contractor will be encouraged by HEP to provide additional temporary employment for local people during the construction period HEP and its contractor will provide realistic information on employment opportunities, with transparent hiring practices. The contractor will advertise for all positions and will pay at least national average wages for comparable positions
Traffic Management	Increased traffic during construction will not have an impact on existing traffic load on the Adriatic Highway. No adverse effects on traffic during operation are predicted. The existing roads to Ombla will be improved as a result of required road widening.	A Traffic Management Plan will be produced. Traffic will not exceed 15 trucks per day and access roads will be three metres wide with widening for vehicle bypass.
Occupational Health & Safety	Workers could be hurt or killed in underground works or when working around heavy equipment and vehicles above ground	HEP will have overall responsibility for all its contractors' activities during construction. All contractors will produce Occupational Health & Safety Plans. All workers involved in construction, operation and / or maintenance will undergo health & safety training. Safe working conditions will be provided on-site including 

Resource	Potential Impact / Issue of Concern	Mitigation
		requirements for all workers to use personal protective equipment. Regular audits of contractors will be conducted to ensure compliance with health & safety regulations and standards.
Public Health & Safety	No adverse effects on public health & safety are predicted.	A Health & Safety Plan will be developed for the project which will include the local community. HEP will require contractors to implement procedures to protect public health and safety, including implementation of traffic management plan for all drivers and equipment operators (speed limits, training, etc.), distributing public notices of construction operations near areas open to the public. The project team will explain to the local community how the dam will be built and what safety measures are in place to ensure that the dam will not burst. Public health & safety will be ensured by: • Avoiding potential accidents with construction equipment and vehicles by notifying local communities • Placing warning signs along the perimeter of construction areas • Confining construction activities to daylight hours • Employing a team of security personnel.
Transboundary issues	Some trans boundary issues of the project have been identified, including availability of drinking water, risk of groundwater pollution from drainage of untreated sanitary wastewater on the Bosnia and Herzegovina part of the Ombla river catchment and potential pollution of groundwater from Grabovica waste disposal site located in the Croatia part of the catchment.	An agreement has been made with the Government of Bosnia and Herzegovina and series of conditions have been established to manage the trans boundary issues.