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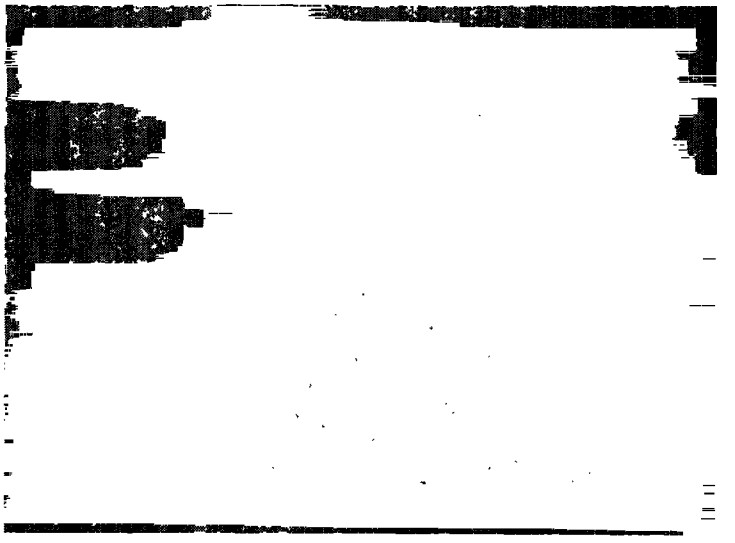
Bosnia and Herzegovina
Water Quality Protection Project
Environmental Assessment



Sarajevo, February 2005

GENERAL INFORMATION

This Study has been prepared on behalf of Ministry of agriculture, waterworks and forestry of Federation of Bosnia and Herzegovina.

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This Environmental Assessment study has been prepared for exclusive use by the Ministry of agriculture, waterworks and forestry of Federation of Bosnia and Herzegovina, and the World Bank. Information contained in this Study were correct at the time of its preparation. Minor changes may occur during the implementation of the Water Quality Protection project, however, such changes will not affect the conclusions of this Study as long as there are no changes to the sub-components of the main project.

The team assigned wishes to thank the persons responsible for this project at the City of Mostar and Municipalities of Odžak, Živinice and Trnovo for the help provided and understanding during the preparation of this Study.

EXECUTIVE SUMMARY

The ultimate goal of the Water Quality Protection (WQP) Project is to reduce the general pollution of the Neretva and Bosna Rivers, as parts of the Adriatic and Black Sea basins, resulting from releases of municipal wastewater. The sub-goals of the project are: a) preparation of a wastewater management improvement plan, b) establishment of a joint commission of BiH and Croatia for implementation, coordinated by Montenegro, and c) development and implementation of high priority capital investments in the water sector, with low financing.

As support to the GEF (Global Environmental Facility) Program, the WQP Project would address the environmental degradation of the Neretva and Bosnia Rivers, coordinate regional priorities, and develop a Wastewater Improvement Management Plan for Bosnia and Herzegovina (BiH). The Wastewater Improvement Management Plan should clarify the institutional framework for Wastewater Management; formalize the cooperation with institutions in Croatia and Montenegro; build a network of public and private institutions that are needed for effective wastewater management; and prepare the groundwork for innovative low cost wastewater treatment methods.

In support of the GEF Program, the WQP Project comprises the following components:

Component A
Action Plan for reduction of river pollution in BiH

Component B High priority investments
Mostar – first stage construction of a wastewater treatment plant, and main sewage collectors,
Odžak – reconstruction/rehabilitation of the existing sewage treatment plant and main collector, construction of an outfall pipeline,
Živinice – construction of a main sewage collector, and wastewater treatment plant
Trnovo – rehabilitation of the existing sewage treatment plant

Component C
Wetland conservation

Component D
Project management

Component E
Project implementation and replication

The following study represents the Environmental Assessment (EA) supporting the WQP Project, which on the basis of potential impact has been designated as a category A project. The EA has been prepared in strict compliance with both the requirements of BiH legislation and the World Bank operational policies and procedures (WB OP/BP/GP 4.01). Since these respective requirements are not identical, in order to reconciliate their differences, the EA study was prepared in accordance with the more stringent World Bank requirements, which

are not in discrepancy with the local requirements. This approach was approved by the Federal Ministry of Physical Planning and Environment of the Federation of Bosnia and Herzegovina, and the Study as such will be used during the completion of the procedure according to requirements of legislation in force in the Federation of Bosnia and Herzegovina (FBiH). Thus the World Bank Operational Procedure/Bank Procedure 4.01 on Environmental Assessment was used as a key reference during the preparation of the Study.

Any World Bank financed project involving resettlement components is subject to the World Bank Operational Policy (WB OP) 4.12 Involuntary Resettlement, revision April 2004, and Bank Procedure (BP) 4.12 of December 2001, which describe instruments and procedures for eliminating negative economic, social and environmental issues that may arise. This policy is triggered not only with physical relocation, but any loss of land resulting in relocation or loss of shelter, loss of assets or access to assets and loss of income sources and means of livelihood. No need for resettlement is expected within any of the four project components. If it is determined that any investment requiring land acquisition is to be made using other funds, the process that is outlined in this Study and the Environmental Framework Policy document must be followed.

Furthermore, WB OP 4.04 on Natural Habitats is triggered, aiming to ensure that the WB-supported infrastructure projects preserve and protect biodiversity and the wealth of natural habitats to the extent possible. This applies to the wetlands component which will be further identified during implementation.

In addition to this, WB OP 7.50 on International Waterways is also triggered since it applies to any water project involving the use or potential pollution of international waterways. This safeguard focuses on resolving issues related to a project's effects on international waterways. However, it specifically exempts from the notification requirement minor additions or alterations to existing schemes that will not adversely change the quantity or quality of water flows to other riparians. As these investments seek to improve the water quality of the waterways in the region, the project clearly meets this definition.

Chapter 2 of the Study provides a review of FBIH EA requirements with extensive description of procedures imposed by the secondary legislation, while Chapter 3 gives a brief review of WB EA requirements with a reference to the major WB safeguards applicable.

Another essential part of the Study represents Environmental Assessment for four sub-project areas in the form required by WB, and contains the necessary chapters addressing: description of project areas, baseline data, analysis of alternatives, identified environmental impacts, and environmental management plan.

The baseline data collected for the project locations include qualitative and quantitative parameters for each of the watercourses on which the project will have direct effect. The data provided depict recent mean measurement values. The frequency of the measurements and the scope of the analyses vary according to location, due to the characteristics or the usage of the watercourse and the area in general. Actual data should be obtained prior to the operational start up of the treatment plants.

Further chapters give an overview of the different project alternatives, as well as a consideration of possible environmental impacts, and propose a suitable environmental management plan to avoid or minimize them. Most short term impacts on the environment, i.e. immediate surrounding of the site, are expected to occur during the construction or future decommissioning activities. These impacts typically include traffic disruptions and congestion, dust, construction waste noise generation. No impacts on historical sites or cultural heritage objects are expected on the locations of the identified four project components. However, in case of Mostar, special precaution measures should be taken during the works in or around the old city area, where numerous significant structures are concentrated.

The project is expected to have a direct positive effect on the surface water quality, especially in the water bodies that have been the recipients of raw sewage. Due to a strong interplay of groundwater and surface water in karst areas, in case of Mostar component there will also be a positive effect on groundwater.

By diverting the sewage from open rivers and water courses, the general pollution in the water bodies will be reduced, hence significantly contributing to overall public health situation. In case of Trnovo component, the project is expected to directly help protect the drinking water source of Sarajevo and improve the drinking water quality, which will also have positive effect on the health of local population.

No negative impacts on natural environment are expected as a result of this project. By careful planning, as well as following the adequate mitigation measures recommended in this Study, the project is expected to have positive overall effect on the nature. Improvement of water quality in the watercourses concerned is expected, which will in turn help preserve and protect the biodiversity and ecosystems.

While different aspects of project alternatives have been considered, it is obvious that the negative environmental impacts of a "do nothing" alternative would be much greater than the impacts that may arise during the construction and the later operation of any of the facilities considered.

Within the project task of the Study preparation, two public consultations were organized for each of the identified four project locations on the following dates:

Location	First Public Consultation	Second Public Consultation
Trnovo	October 25, 2004	December 09, 2004
Živinice	October 26, 2004	December 09, 2004
Odžak	October 27, 2004	December 10, 2004
Mostar	October 28, 2004	December 10, 2004

Extensive documentation from these public consultations (minutes of meetings, with lists of participants) is given in the appendix, along with Environmental Clauses for Civil/Performance Works Contractors that will be used in further project implementation.

Based on this Study, it can be concluded that the overall long term positive effects of the investment at the four identified project sites exceed by far any short term, mostly minor

negative impacts related to facility rehabilitation and construction that may occur. This favorable ratio of the positive and negative effects will be enhanced even further by strict application of the mitigation measures recommended in this study.

For further investments yet to be identified during the project implementation, new Environmental Assessment studies will be based on this initial model Study.

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1 INTRODUCTION

The rivers of Bosna and Neretva are the main drainage systems in Bosnia and Herzegovina (BiH). The Bosna river basin (10,457 km^2 – project component Odžak, and indirectly components Živinice and Trnovo) represents the most populated and most developed area of the Federation of Bosnia and Herzegovina (FBiH). The Neretva and Trebišnjica river basin (10,110 km^2 – project component Mostar) is the second largest basin in BiH. The river of Željeznica (component Trnovo) is a tributary of the Bosna river located in the area of the Sarajevo city drinking water source, while the river of Spreča (component Živinice) drains into the lake of Modrac, which is the main water source for the whole Tuzla region, and the water from the lake finally drains through Spreča into the Bosna river.

The ultimate goal of the Water Quality Protection project (WQP) is to reduce the general pollution of the rivers of Neretva and Bosna, as parts of the Adriatic and Black Sea basins, due to municipal waste water releases. The project sub-goals are: a) preparation of wastewater management improvement plan, b) establishment of a joint commission of BiH and Croatia for plan realization, coordinated by Montenegro, and c) development and implementation of high priority capital investments in the water sector, with low financing.

As support to GEF (Global Environmental Facility) program, WQP would address the environmental degradation of the Neretva and Bosnia Rivers, coordinate regional priorities, and develop a Wastewater Improvement Management Plan for Bosnia and Herzegovina (BiH). The Wastewater Improvement Plan should clarify the institutional framework for Wastewater Management; formalize the cooperation with institutions in Croatia and Montenegro; build a network of public and private institutions needed for effective wastewater management; and prepare the groundwork for innovative low cost wastewater treatment methods.

The proposed project has the following five components:

Component 1: Wastewater Improvement Management Plan Preparation,

Component 2: Startup of the Wastewater Improvement Management Plan, including operating costs for 24 months,

Component 3: Implementation of a High-Priority, Low-Cost Capital Investment, as recommended by the Wastewater Improvement Management Plan,

Component 4: Project Management and Monitoring, and

Component 5: Institutional Support and Replication on other locations.

Activities within WQP will be coordinated by the Ministry of Agriculture, Waterworks and Forestry of the FBiH, i.e. its Project Management Team (PMT). The project will be implemented during the fiscal period 2005-2009. Locations of the four already identified project components are shown in Figure 1. The total investment package will substantially reduce wastewater discharges into these rivers on locations upstream of the main drinking water sources in the river basins. In this way the drinking water quality will be improved for a

significant percentage of population in the region, and contribute to improvement of their health. These investments will lead to substantial construction activities, which include construction of new or reconstruction of existing facilities. Therefore significant environmental impact is possible, and, in accordance with the World Bank Operational Policy, Bank Procedure and Good Practices – OP/BP/GP 4.01, this project is classified as A category project. According to TOR for this project, Environmental Assessment (Study) is to be made for the four project components, in compliance with the WB procedures, as well as local regulations. Based on an agreement with the Ministry of Physical Planning and Environment of the FBiH, this Study was prepared according to the WB requirements, which are more stringent and more comprehensive, and are not in discrepancy with the legal requirements of FBiH. This Study will then be used during the completion of the procedure according to the FBiH legislation.

For additional investments, which will be identified during the project implementation, appropriate environmental impact assessment studies will have to be prepared as a prerequisite to competition for financing. Such studies would be based on this initial model Study. More detailed information on this is provided in the complementary document EFP (Environmental Framework Policy) for this project.

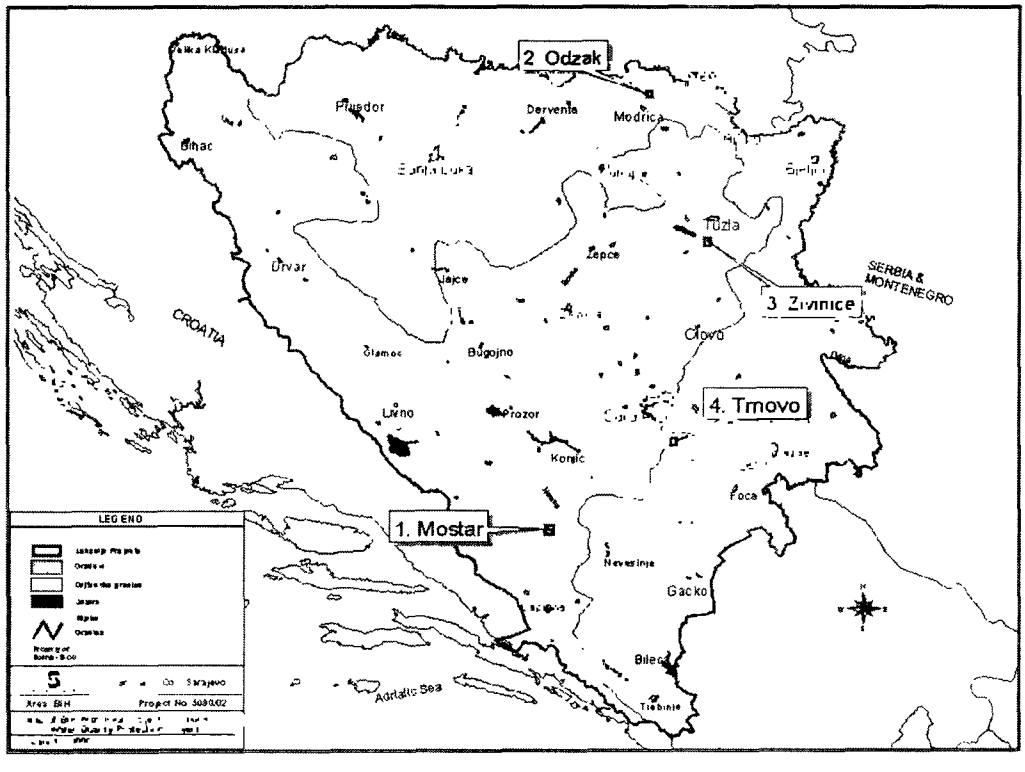

Figure 1 Project locations

1.1 Project Components Description

In support of the GEF Program, the WQP Project comprises the following components:

- Mostar – first stage construction of a wastewater treatment plant, and main sewage collectors,
- Odžak – reconstruction/rehabilitation of the existing sewage treatment plant and main collector, construction of an outfall pipeline,
- Živinice – construction of a main sewage collector, and sewage/wastewater treatment plant
- Trnovo – rehabilitation of the existing sewage treatment plant

The above order of the project locations does not reflect relative importance of the individual project components. It has been chosen in order to establish consistent designations and follow up – number 1 is used for Mostar, 2 for Odžak, 3 for Živinice, and 4 for Trnovo.

1.2 Environmental Impacts

The locations would include areas along the Neretva and Bosna Rivers. The Neretva River Basin drains the second largest area in BiH and is the only one of the four that discharges from BiH into the Adriatic Sea. The Neretva River, which originates in BiH and flows through Croatia for 20 km before entering the Bay of Mali Ston and the Adriatic, is of great economic importance to both countries. For BiH, it is a source of hydropower, drinking water and water for irrigation. For Croatia, the Bay of Mali Ston at its mouth is an important area for the production of oysters for local consumption and export. The Neretva Delta is a Mediterranean wetland of international importance as evidenced by its designation as a Ramsar Wetlands site. It is also a source of pollutants for the Adriatic and Mediterranean.

The Bosna River Basin covers the largest and the most developed area of the Federation part of BiH. The Bosna River flow begins in the territory of BiH and is around 250 km long, including the area from Vrelo Bosne (source of the scenic Bosna River) to the inter-state borderline at the mouth of the Sava River. The Bosna River Basin is the most populated region of BiH. The most developed regions in the country, in industrial terms, are found along this river. Wastewater from communities and industrial facilities – the concentrated polluters – discharges directly into the river, most of it without any treatment. The Bosna River, is a source of pollutants for the Danube river and the Black Sea, where it eventually drains.

1.3 Project Task of EA Study Preparation

This project task is aimed at preparing an Environmental Assessment (EA) study for category A projects in strict compliance with both the requirements of the BiH legislation and the World Bank operational policies and procedures WB OP/BP/GP 4.01. Since these requirements are not identical, it is not possible to completely meet them in all aspects at the same time. Thus

for instance, according to the World Bank requirements, due to the involvement of international waterways, as well as other issues, this project is classified as a category A project. On the other hand, current BiH legislation demands an environmental assessment of the equivalent extent only for wastewater treatment facilities of a capacity exceeding 50,000 equivalent persons, which would in this case apply only to Mostar component.

In order to reconcilliate these differences, the Consultant decided to prepare the EA study in accordance with the World Bank (user and financing organization) requirements, thereby indicating the extent of compliance with the available in the Federation of Bosnia and Herzegovina (FBiH) legislation in force. An additional momentum is the fact that there are several project alternatives for the Mostar component, whether with respect to the wastewater collection system or the wastewater treatment method, which is, according to FBiH regulations, subject to requirement for the preparation of a request for preliminary EA.

2 REVIEW OF BIH EA REQUIREMENTS

After signing of the Dayton Peace Accord, under its Constitution (Annex 4), Bosnia and Herzegovina (BiH) became administratively divided into two semi-independent entities: Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS). The existing institutional structure in Bosnia and Herzegovina does not include state-level institutions dealing with environmental issues. Under the Dayton Peace Accord, environmental issues are under the jurisdiction of each of the two entities. All government functions and authorities that are not explicitly entrusted to state-level institutions under the Constitution, are to be governed on the Entity levels. This implies that, laws on environmental protection and waste management are passed separately in both entities. Therefore, institutions in charge of environmental protection have been established on the entity level (and cantonal level in FBiH).

2.1 Existing Institutional and Legal Framework Regulating Water Issues

Relevant Institutions at the FBiH Level

-
- Federal Ministry of Agriculture, Waterworks and Forestry
- Federal Ministry of Physical Planning and Environment
- Ministry of Energy, Mining and Industry
- Public Enterprise Adriatic Sea Basin Area
- Public Enterprise Sava River Basin Area

Relevant Institutions at the Canton Level

- Ministries of Construction, Physical Planning and Environment
- Ministries of Agriculture, Waterworks and Forestry
- Ministries of Reconstruction and Development
-
- (precise names of the ministries in some cantons deviate from this scheme)

Relevant Institutions at the Municipal Level

- Communal Services Department
- Municipal Enterprises (Utility Companies)
- Waterworks and Sewage Utilities (sometimes part of Municipal Enterprises)
- Vodoprivreda – local subsidiaries of the Federal Waterworks Utility

Interentity Water Management Coordination Commission

The Water Management Coordination Commission is responsible for the work coordination of the entity ministries in charge of water issues, aiming at resolving any discrepancies in the water management sector. The Commission deals with the following issues:

- International contracts regarding water management;
- International waterways;
- International water management projects;
- Cooperation with the the Republic of Croatia and Federal Republic of Yugoslavia on the water related issues;
- Harmonization of present and future regulations on water management;
- Harmonization and monitoring of water quality standards;
- Harmonization of solid waste disposal programs – protection of water resources;
- Harmonization and control of work of laboratories in charge of water quality monitoring and watercourse categorization;
- Construction and reconstruction of water management facilities on the, and in proximity of the interentity entity line;
- Facilities divided by the interentity line;
- Harmonization of water management plan documents for facilities divided by the entity line;
- Gathering and exchange of data (interentity and international); and
- Harmonization of plans for flood protection and other extreme situations.

2.2 Legal BiH Framework Relevant to the WQP Project

Constitution of The Federation of Bosnia and Herzegovina

The Constitution of FBiH was passed at the first session of the FBiH Assembly on March 30, 1994, and has since been amended three times: on July 23, 1994 (amendment I), on June 5, 1996 (amendments II to XXIV), and on May 8, 1997 (amendments XXV and XXVI).

The Constitution establishes the distribution of competencies between the Federation and its cantons as follows:

- The Federation is in charge of general economy and energy related, fiscal and land use policies (Art III.1, b, f and I);
- The Federation and the cantons are jointly responsible for public health, environmental policies, tourism, and use of natural resources (Art III.2) - in these fields, the powers of the Federation and the cantons can be executed "jointly or separately, or by the Cantons in coordination by the Federation Government" (Art III.3.1); and
- The Cantons are in charge of all matters not explicitely assigned to the Federation (Art III.4.1); matters likely to concern the water sector are public services, local land use, local energy production facilities, and cantonal tourism. Each canton may confer some of its responsibilities to the municipalities in its territory (Art V.2).

Water Law of FBiH (Official Gazette of FBiH, No.18/98)

This Law regulates the water management issues, including the management of waterworks facilities, use of public water wealth, and water protection. According to the provisions of this Law, the following waterworks documents are issued aimed at ensuring appropriate water management:

- waterworks requirements (stipulations),
- waterworks consent,
- waterworks (water management) permit, and
- waterworks orders.

A waterworks consent must be obtained for facility construction or reconstruction activities and changes to technology applied, if this may cause permanent or temporary changes in the water quality or quantity. This also refers to construction and reconstruction of sewage systems and water treatment plants. Any facilities which were granted the Ministry's waterworks consent must also obtain a waterworks (water management) permit. Construction or reconstruction permit can only be issued with prior waterworks consent by the Ministry. New Water Law of FBiH has meanwhile been drafted, however, it is not in force yet.

Water Protection Law (Official Gazette of FBiH, No. 33/03)

This Law has been passed and published in the Official Gazette of FBiH, however, it is not in force yet. It has been prepared within EU PHARE Program and it addresses all water management issues, including the protection of aquatic and eco systems. This Law also regulates wastewater releases and compensations (charges) for activities which may alter water quality or quantity. Along with this, Article 23 of this Law specifically limits the use of herbicides and nutrientsm while Article 31 specifies the minimum bilogical rate of flow. This Law introduces the category of water management agreement, and defines inspection and monitoring procedures. However, specific secondary legislation to this Law is still missing and needs to be developed.

Law on Physical Planning (Official Gazette SR BiH No.13/74, 9/87)

The physical planning of FBiH, regulated by this Law, ensures planned use, protection and management of the FBiH territory. Apart from physical plans (plans for FBiH, individual canton, groups of two or more cantons, areas of special features, the cities of Sarajevo and Mostar), the Law on Physical Planning also defines "urbanism" plans and detailed physical plans (regulatory plans and urbanism projects). These documents specify and prioritize the spatial use of land surfaces (whereby borders of construction, agricultural or forestry land are determined), whether for dwelling, works, recreation, sports or tourism purposes, but also address the issues of nature and cultural heritage protection, environmental protection measures, special protection zones, zones of reconstruction and rehabilitation, and the communal (municipal), traffic, waterworks and energy sector infrastructure. Construction of buildings or facilities is subject to approval according to physical planning documents, special regulations and provisions, and "urbanism" consent.

Environmental Protection Law (Official Gazette of FBiH, No. 33/03)

This Law is separately considered in Section 2.4 – EA Policy of the BiH Legislation.

Law on Utility Activities (Official Gazette of SR BiH No. 20/90)

This law regulates "utility activities of special social interest" (Article 1), such as:

- Water production and distribution through water supply networks, up to and including the users' water consumption meters (Article 2/1/1);
- Purification and evacuation of wastewater (Article 2/1/2); and
- Storm water drainage (Article 2/1/12).

Law on Agricultural Land (Official Gazette of FBiH, No. 2/98)

This Law defines "the notion, management, protection and setting up of agricultural land" (Article 1), and delegates the responsibilities over these activities to cantons and municipalities. It also contains provisions regarding the water sector, essentially concerning the creation of agricultural land by construction of irrigation systems (Articles 48 to 52).

Article 21 of this Law prohibits discharges of dangerous and harmful material onto agricultural land in quantities that can affect the productivity of agricultural land or the quality of agricultural products, as well as inappropriate usage of mineral and organic fertilizers, herbicieds and pesticides.

Regulation on Maximum Permitted Quantity of Harmful and Dangerous Substances in the Soil and Methods of Monitoring (Official Gazette of FBiH, No.11/99)

This regulation defines the harmful and dangerous substances, including sludge from wastewater treatment, and the treshold concentrations for various soil types. Furthermore, it provides methods of sampling and monitoring organic and mineral waste, pesticides and herbicides concentrations.

Since all of the project componens identified so far are located on the territory of FBiH, the legislation of Republika Srpska (RS) are not applicable. Should further project components be included, the legal framework of RS should be additionally considered if these are to be implemented on the administrative territory of RS.

Relevant Cantonal Laws

Along with previously listed federal laws and regulations, the following cantonal laws should be taken into account:

- Environmental Protection Law of the Herzegovina-Neretva Canton (Official Gazette of HNC, No. 07/2004)

- Law on Physical Planning of the Herzegovina-Neretva Canton (Official Gazette of HNC, No. 04/2004)
- Law on Utility Services of Herzegovina-Neretva Canton (Official Gazette of HNC, No. 04/2004)
- Law on Physical Planning of Posavina Canton (Official Gazette of PC, No. 05/1999)
- Decision on constructions and activities, which can significantly impact the environment of the Posavina Canton (Official Gazette of PC, No. 05/00)
- Nature Protection Law of the Tuzla Canton (Official Gazette of TPC, No. 07/97 and 03/99)
- Environmental Protection Law of the Tuzla Canton (Official Gazette of TPC, No. 07/97)
- Law on Waters of the Tuzla Canton (Official Gazette of TPC, No. 07/97 and 03/99, Official Gazette of TC, No.13/99)
- Physical Planning Law of the Sarajevo Canton (Official Gazette of SC, No. 13/99 and 19/99)

2.3 International Water Sharing Agreements

The governments of the Republic of Croatia and Bosnia and Herzegovina have signed, on 11.07.1996 in Dubrovnik, "The Agreement Between the Government of The Republic of Croatia and Government of Bosnia and Herzegovina on Arrangement of Water Management Relationship". Through this, the signing parties have decided that the following agreements and accords become immediately effective between the signing parties:

I. "Social agreement on joint utility/municipality activities on pollution prevention and water quality enhancement in the Neretva river basin and Adriatic Sea region of the mouth of Neretva", Official Gazette SRBiH No. 39/81
II. "Agreement on the manner and conditions of the arrangement and water use in the Trebižat river basin", Official Gazette SRBiH No. 9/82
III. "Accord on the manner of construction and establishing the resources for construction, manner of arrangement and utilization of sites, and site management in the Trebižat river basin", Official Gazette SRH No. 16/82.

The consultant has established that there are frequent contacts between the institutions in charge of water management in Croatia and BiH, as well as that there are join committees addressing issues of common interest trough Vodoprivreda Mostar.

2.4 EA Policy of BiH Legislation

Environmental Impact Assessment procedure in FBiH is regulated by the Federal Law on Environmental Protection (Official Gazette of FBiH, No. 33/03) and its Regulation on facilities subject to obligatory EIA, and facilities which may be constructed and operated only with a valid environmental permit (Official Gazette of FBiH, No.19/04). The whole EIA procedure is managed by the Federal Ministry of Physical Planning and Environment (FMPPE), while responsible cantonal institutions participate in the procedure as well. Based on FMPPE's judgement and in accordance with the above legislation, the procedure includes some or all of the following elements:

PRELIMINARY EIA

The investor submitts a request for preliminary environmental impact assessment to FMPPE. The request contains the following appendices:

- Project description with information on location, purpose and size of plant or facility,
- Description of measures for prevention, abatement or, if possible, remediation of significant adverse effects,
- Data required for identification and assessment of basic environmental impacts,
- Description of project alternatives and the alternative chosen,
- Excerpt from the physical plan of the area, and
- Non-technical summary.

FMPPE discloses the request with the appendices to other authorities in charge (other ministries, cantonal and municipal governmental institutions, etc.) and stakeholders for review and provision of comments and objections within 30 days from the date of the request submittal. The purpose of preliminary EIA is to inform the public (institutions, NGO, residents) in the project intended, who in turn contribute with their suggestions to the definition of EIA contents and extent, as well as in the selection of the most appropriate project alternative and mitigation measures. Should preliminary EIA reveal serious obstacles for project implementation, FMPPE decides to stop and dismiss the procedure. If on the other hand there is positive feedback for a project, within 30 days from expiry date of the period given for provision of comments and objections, FMPPE issues a decision on the preparation of an EIA Study.

EIA STUDY

FMPPE reaches (issues) a decision on the preparation of EIA Study (Article 59 of the Law), with the following specifications:

- EIA Study contents, based on preliminary EIA
- List of institutions or companies accredited for EIA Study preparation
- EIA Study evaluation fee .

The contents of the EIA Study are defined by the Federal Regulation on facilities subject to obligatory EIA, and facilities which may be constructed and operated only with a valid

environmental permit. When defining the contents, FMPPE takes into account the results of the preliminary EIA for each individual case. This is described in more detail in the EFP (Environmental Framework Policy) dokument for this project, which complements this report.

PLANTS, FACILITIES AND ACTIVITIES WHOSE EIA REQUIREMENT IS SUBJECT TO FMPPE'S EVALUATION

In this regulation FMPPE provides a list of plants and facilities, which undergo individual evaluation concerning the EIA requirement. If such individual evaluation shows that no EIA is required, FMPPE issues the environmental permit based on the documents already submitted. When evaluating the EIA requirement, FMPPE takes into account individual project characteristics (plant/facility size, waste generation, pollution, etc.), project location and environment sensitivity, as well as characteristcs of potential impacts (impact extent, probability, etc.). Conditions for exepmtion of a project from the EIA procedure are described in the EFP document.

EIA STUDY APPROVAL

FMPPE approves an EIA Study after public consultations. The decision on approval or rejection of an EIA Study is reached and issued within 30 days from the completion of the Study evaluation. EIA Study does not get approval if substantial environmental impacts are likely, if the project is not in accordance with the interentity Environmental Protection Program, entity environmental protection strategies and National Environmental Action Plan, or international environmental requirements.

Based on Decision on EIA Study approval, the investor is granted environmental permit for the plant or facility. Environmental permit and EIA Study are used to obtain further "urbanism" consent and construction permit.

PROJECTS WHICH MAY HAVE TRANSBOUNDARY ENVIRONMENTAL IMPACTS

When the preparer of a EIA Study learns that a project will probably have substantial impact on the environment odf another entity or another state, he/she is obliged to include a separate chapter in the Study on such an impact or impacts. FMPPE then forwards a notification to the other entity or state, containing the plant or facility description, and the details on the involvement of the other entity or state in the procedure. If the entity or state decides to take part in the EIA procedure, FMPPE discloses the special separate chapter of the EIA Study with other relevant data to the entity or state, consults the entity or state, and allows involvement of the public of that entity or state.

2.5 Public Participation and Access to Information During EIA Procedure

According to Article 36 of the Law on Environmental Protection, FMPPE must ensure participation of interested public in the EIA procedure (preliminary EIA and EIA Study), as well as in the procedures of issuing environmental permits for plants and facilities.

FMPPE organizes public consultations in a place close to the project location, announcing them 15 days in advance. The outcomes of the public consultations are taken into account when making the final decision. In case of projects with possible transboundary environmental impacts, FMPPE must allow participation of public representatives from the other entity or state.

2.6 Monitoring

2.6.1 Monitoring Within Procedures of Issuance of Other Permits

FMPPE participates in the procedures of granting "urbanism" consent, whereby it checks whether the circumstances have been changed compared to those during EIA procedure, as well as whether the provisions of the EIA Study and Envirnmental Permit have been satisfied.

The authority in charge will not grant "urbanism" consent or other consents necessary for projects subject to obligatory EIA, if the application is not complemented by the environmental permit.The same applies to application for construction permit.

2.6.2 Special Control Regime

Plants, facilities and activities requiring EIA are subject to special control system. The control is conducted by means of:

- Establishing whether special obligations or provisions on the plant, facility or activity have been met,
- Estabishing whether the provisions of the environmental permit have been satisfied,
- Notifying the ministry in charge on safety status and accidents prevention plan prior to construction and operation of the plant or facility,
- Making a registry of plants/facilities and pollutants,
- Regular inspections, and
- Ordering remediation measures to prevent environmental pollution.

2.6.3 Selfmonitoring

Plant or facility operator must conduct selfmonitoring of the emissions, and notify the ministry in charge on the results. The operator is also obliged to report without delay any extraordinary situation which significantly impacts the environment, and provide all data and information meeting the reporting requirements.

2.6.4 Monitoring by Specialized Institutions

A plant or facility operator is obliged to arrange check up of the plant/facility compliance with the legal requirements. This check up is performed every three years by an authorized specialized institution, unless otherwise stipulated by the environmental permit or by another regulation. The operator must remove the deficiencies identified and inform ministry in charge on the actions taken.

2.7 Expropriation of Property

If it is determined that any investment requiring land acquisition is to be made using other funds, the following FBiH legislation should be taken into account:

- Law on Expropriation, (published in the Official Gazette of SRBiH, no. 12/87),
- Amendments to the Law on Expropriation, (published in the Official Gazette of SRBiH, no. 38/89).

This Law on Expropriation with its amendments will be in force in FBiH until new legislation is developed and ratified by the entity government. The process of expropriation is specified in detail through this Law, along with the requirements for such a process, compensation, substitution, partial or complete expropriation, etc. This includes provisions according to which the owner of a property subject to expropriation should:

- be provided alternate and corresponding housing, if the expropriated property was used for residential purposes,
- be provided with nearby housing and access to farmland, if required,
- if the expropriated land is an orchard, vineyard, farmland or forest the owner shall be compensated for the market value of the land and the crops or wood that could be yielded from the land,
- if the expropriated property was used for commercial activities, then the owner will be provided with alternate commercial facilities suitable for such activities.

The expropriation procedure is described in more detail in the EFP document.

3 REVIEW OF WORLD BANK EA REQUIREMENTS

The World Bank's environmental assessment policy is described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. Environmental Assessment (EA) is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations. EA evaluates a project's potential environmental risks and impacts in its area of influence, examines project alternatives, identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts, and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible.

EA takes into account the natural environment (air, water, and land), human health and safety, social aspects (involuntary resettlement, indigenous peoples, and cultural property), and transboundary environmental impacts, as well as country-specific overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects.

The Bank classifies the proposed project into one of four categories (A,B,C or FI), depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. A project, as is the case with the WQP project, is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. For a Category A project, the borrower is responsible for preparing a report, normally an EIA (or a suitably comprehensive regional or sectoral EA) that includes, as necessary, elements of the other instruments referred to in paragraph 7 of the WB OP 4.01. For all Category A projects, during the EA process the borrower consults project-affected groups and local nongovernmental organizations (NGOs) regarding the project's environmental aspects and takes their views into account. The borrower is also obliged to disclose relevant material in local language in a timely manner prior to consultations.

All World Bank financed projects involving resettlement components are subject to the World Bank Operational Policy (WB OP) 4.12 Involuntary Resettlement, revision April 2004, and Bank Procedure (BP) 4.12 of December 2001, which describe instruments and procedures for eliminating negative economic, social and environmental issues that may arise. The policy is triggered not only with physical relocation, but any loss of land resulting in relocation or loss of shelter, loss of assets or access to assets and loss of income sources and means of livelihood. No need for resettlement is expected within any of the identified four project components. If it is determined that any investment requiring land acquissition is to be made using other funds, the provisions of WB OP/BP 4.12 must be satisfied. The overall objectives of this policy are the following:

a. Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs.
b. Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.
c. Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.

OP 4.12 suggests the following three categories of persons for eligibility for compensation and assistance:

a) Those who have formal rights to land (including customary and traditional rights recognized under the laws of the country). These persons are provided with compensation for the land they lose, and other assistance in accordance with the policy.
b) Those who do not have formal rights to land at the time the census begins but have a claim to such land and assets-provided that such claims are recognized under the laws of Bosnia and Herzegovina or become recognized through a process identified in the resettlement plan. These persons are provided with compensation for the land they lose, and other assistance in accordance with the policy.
c) Those who have no recognizable legal right or claim to the land they are occupying. These persons are provided resettlement assistance in lieu of compensation for the land they occupy, and other assistance as necessary.

The resettlement procedure is additionally described in the EFP document, which is part of the Operational Manual for this project. Should a need for land expropriation, restriction of access to property or resettlement arise in connection with the project implementation, both the WB OP 4.12, rev. April 2004, and the FBiH legislation requirements must be met. This is explained in more detail in the EFP document. Chapter 4 of this report shows the differences in the WB and FBiH requirements, and provides recommendations for their reconciliation.

Having in mind the natural wealth and resources available, as well as the fact that Neretva is an international waterway because it flows through BiH and Croatia before discharging into the Adriatic Sea, the World Bank Operational Policies 4.04 - Natural Habitats and 7.50 - Projects of International Waterways are also generally applicable to this project.

Operational Policy 4.04- Natural Habitats seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present). Specifically, the policy prohibits Bank support for projects which would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are either:

- legally protected,
- officially proposed for protection, or
- unprotected but of known high conservation value.

In other (non-critical) natural habitats, Bank supported projects can cause significant loss or degradation only when there are no feasible alternatives to achieve the project's substantial overall net benefits and acceptable mitigation measures, such as compensatory protected areas, are included within the project

WB OP 7.50 on International Waterways applies to the following project types:

- hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects involving the use or potential pollution of international waterways
- detailed design and engineering studies of above project types.

The World Bank requirements are additionally explained in the EFP document complementing this Study.

4 IDENTIFICATION OF VARIANCES IN BiH AND WB REQUIREMENTS, AND RECOMMENDATIONS FOR THEIR RECONCILIATION

Differences between the requirements of FBiH leigislation and the World Bank policies pertaining to Environmental Assessment preparation and property expropriation or resettlement due to a project implementation, as well as recommendations for their reconciliation, are shown in the following tables:

Table 4-1 Environmental Assessment

ISSUE	World Bank (Category A Projects)	FBiH Legislation	Recommendation for Reconciliation
EA Procedure	In accordance with the World Bank EA requirements for category A projects (TOR)	It is apparent that both request (application) for a preliminary EIA and full scale EIA study are required for the Mostar component , however, a request is also to be filed with the Federal Ministry for all other project components, following which the Ministry may exempt these individual components from parts of further procedure procedure.	Meet the WB requirements, which are more stringent, which according to Federal Ministry of Physical Planning and Environment (memo # 03/02-23-4-1597/04-1 of 08.11.2004) is not in discrepancy with the local requirements. Upon formal approval of the Project the Ministry will process the request submitted by the investor, whereby this Study will be used.
Public Consultations	Two public consultations are required for each project component	Public consultations must be organized for all components which have to undergo the EIA procedure based on Ministry's judgement.	Proceed in accordance with the WB requirements, which are more stringent. When announcing public consultations, comply with the timing requirements of the local legislation. Upon formal approval of the Project the Ministry will process the request for preliminary EIA submitted by the investor.

ISSUE	World Bank (Category A Projects)	FBiH Legislation	Recommendation for Reconciliation
Documents Required for First Public Consultation	EA preparation task review (EA TOR)	Request for preliminary EIA (submitted by he investor), with the following contents: -Project description with information on location, purpose and size of facility -Description of possible significant impacts on the environment. -Description of mitigation measures for the impacts identified -Description of alternatives -Non-technical summary -Excerpt from physical plan for the area	Meet the WB requirements, which are more stringent, which according to Federal Ministry of Physical Planning and Environment (memo # 03/02-23-4-1597/04-1 of 08.11.2004) is not in discrepancy with the local requirements. Upon formal approval of the Project the Ministry will process the Request submitted by the investor, whereby this Study will be used.
After/Result of the First Consultation		A decision on the EIA preparation is reached by the Ministry within 30 days from the expiration of the suggestions/complaints period, specifying the following issues: - List of accredited EIA conducting companies or agencies - EIA appraisal fee - Contents of the EIA study	Meet the WB requirements, which are more stringent, which according to Federal Ministry of Physical Planning and Environment (memo # 03/02-23-4-1597/04-1 of 08.11.2004) is not in discrepancy with the local requirements. Upon formal approval of the Project the Ministry will process the Request submitted by the investor, whereby this Study will be used.
	EA study contents: -Executive summary -Policy, legal and administrative framework	EIA study contents: Exact contents are specfied by the Ministry based on the preliminary EIA (article 59 of the Law), however, the	Even though the WB and BiH requirements for the E(I)A study contents are similar, the WB requirements are more stringent. Therefore the WB requirements should be

ISSUE	World Bank (Category A Projects)	FBiH Legislation	Recommendation for Reconciliation
	- Project description - Baseline data - Environmental impacts - Analysis of alternatives - EMP (Environmental Management Plan), including mitigation measures, monitoring plan, institutional strengthening and training, implementation schedule and cost estimates, minutes of public consultations.	following general contents can be assumed: -Non-technical summary - Comprehensive project description with information on location, purpose and size of facility - Description of environment - Description of possible environmental impacts - Detailed description of measures for mitigation or minimization of environmental impacts - Description of alternatives and the alternative selected	meet for all four project components. In addition to this, an excerpt from the physical plan of the given area is to be provided. In accordance with the agreenment with the Ministry, study prepared in this ways will be used later for the local E(I)A procedure.
Second Public Consultation	Required for all four project components.	Required if decided by the Ministry.	Organize second public consultations for all project components, following which the Study will undergo approval procedure by the authorities resposnible.

Table 4-2 Expropriation and Resettlement

Issue	World Bank OP/BP 4.12 Requirements	FBiH Requirements	Recommendation for Reconciliation
Avoidance or Minimization of Resettlement/Land Acquisition	*Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs*	The legislation does not define the mechanisms for avoidance or minimization of expropriation, but specifies activities for which land can or cannot be expropriated. Land or facilities cannot be expropriated without officially designated "general interest" for the land or facility, made according to the urbanism and physical plans for the area.	The WB requirement is prerequisite - the borrower (expropriation beneficiary) must consider all viable project alternatives prior to filing his requests in accordance with the legal procedures of the given Entity.
Categorization of Compensation Eligibility	According to WB OP 4.12, there are 3 categories of persons in terms of compensation eligibility: a) Those who have formal rights to land and are entitled to compensation for the land they use and other assistance; b) Those who do not have formal rights to land at the time the census begins but have a claim to such land and assets, provided that such claims are recognized under the laws of BiH or become recognized through a process identified in the resettlement plan, and are entitled to compensation for the land and other assistance; and c)Those having no recognizable legal right or claim to the land they occupy, but are entitled to resettlement assistance.	There are no groups or classifications of people affected by expropriation. The people affected are referred to as "owners" and they are compensated for expropriation of their housing, commercial facility or land, whether it is agricultural, an orchard, field with crops or even forested.	The WB requirement must be met.

Issue	World Bank OP/BP 4.12 Requirements	FBiH Requirements	Recommendation for Reconciliation
Informing Stakeholders and Public Participation/ Consultations	*Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.*	After a claim for expropriation has been submitted to the Municipality, the Municipal authorities inform the owner and call for a joint meeting of both parties in the presence of Municipal authorities that shall conduct and oversee the expropriation procedure. In case of incomplete or partial expropriation, the municipal office must inform the owner about his/her right to request complete expropriation.	Entity legal requirements must be met, but the borrower should approach and consult the property owners during all expropriation stages.
Compensation Determination	*Displaced persons should be provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project. Furthermore, the policy offers cash compensation as an alternative, or residential housing alternatives.*	Compensation is determined based on the market value of the expropriated land or facility. Compensation for expropriated land is based on the type of land and the benefits that the owner could have received (agricultural land, orchards, forestry, etc.). Alternate real property and/or cash payment are usual compensation (latter is common for minor land acquisition).	Compensation determination must be in compliance with the Entity legal requirements. Having in mind the minor extent of possible expropriation, Entity governments should assure smooth processing by the municipal offices in charge or regular courts without delays.
Assistance to Resettled Parties	*Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.*	No specific assistance is prescribed other than compensation offered for land and facilities, and related losses of income or housing.	The borrower should meet the WB requirement in addition to compliance with the compensation mechanisms defined by the Entity Laws.
Right of Appeal	*Appropriate and accessible grievance mechanisms are established for displaced persons and host communities.*	Expropriation procedure can be terminated by the beneficiary, or by both parties together. All expropriation annulment procedures are conducted by the same Municipal authority that was involved in the initial process. If no agreement is reached, then the parties will take their case in front of the regular court.	Property owners and/or persons subject to involuntary resettlement must be given the right of appeal during and after the processing.

Issue	World Bank OP/BP 4.12 Requirements	FBiH Requirements	Recommendation for Reconciliation
Monitoring of Processes	Resettlement Plan is prepared by the Borrower for specific projects and issues. For other issues a Resettlement Policy Framework should be made. These documents are available and serve for monitoring and implementation overview processes. The Borrower is responsible for adequate monitoring and evaluation of the activities et forth in the resettlement instrument. Upon completion, the Borrower conducts an after assessment to determine whether the defined objectives of the resettlement instrument have been met.	No monitoring procedures are prescribed.	The municipal offices in charge are responsible for the monitoring and implementation according to the Entity Law. Their work is monitored by the Entity Governments. The Borrower is responsible to create and update the Land Acquisition Plan while the PMT follows up the entire process and ensures compliance with the WB requirements.

5 DESCRIPTION OF PROJECT AREAS

5.1 Mostar

Mostar is the largest city on the banks of the international waterway, the Neretva river. The city is situated in the Mostar valley which stretches along both sides of the Neretva river, while this Study focuses on the area which spans from Salakovac to Buna alongside the river. The length of this area is some 25 km, while the width of the valley ranges from 1 km to 5 km at the widest location.

5.1.1 Water Management Issues in the Mostar Region

Within the section from Salakovac to Buna area, Neretva has right-side tributaries Radobolja and Jasenica, while its left-side tributary is the combination of the Buna and Bunica rivers. The Lištica river flows into the right side of the Jasenica river after being tunneled and channeled from the swamp area, i.e. wetland of Mostarsko blato.
Aside from the listed tributaries of the Neretva river, there are significant water springs in the Salakovac area, including the Studenac spring, all of which are located within the Mostar valley. Upstream from Salakovac is the artificial water accumulation of the Salakovac Hydropower plant and dam, while another water accumulation is located in the region of Bijelo polje, that is the Mostar Hydropower plant accumulation. Another significant hydrological feature of the Mostar valley is the groundwater, which feeds from the Neretva riverbed, the HPP Mostar accumulation and the runoff from the hills at the edges of the valley. In addition to this, occasional torrents occur along the hillsides of the Mostar valley.

The area of the Neretva basin, up to the city of Mostar is approximately 4,000 km^2 in size, with an average elevation of 1,030 m above-sea-level (the measured values range from 57 to 2,228 m a.s.l.). The average annual flow rate of Neretva in Mostar is 202 m^3/s. The highest flow rate of 2006 m^3/s was registered prior to the construction of the dams and water accumulations (constructed on the 15.12.1952).

Downstream of the Mostar valley within the Neretva basin is the Nature Park Hutovo Blato, while in the adjacent Republic of Croatia, the protected areas include the delta of the Neretva river and the mouth of Neretva into the Adriatic Sea.

Significant releases of industrial wastewater into Neretva had occurred until the year 1991. In the upper valley area one of the major polluters was the textile industry located in Vrapčići. In the central part of the valley the most polluted wastewater had been released from the bauxite mine, a number of car-wash and repair shops, from the parking lot and garage of the Autoprevoz transport company, and from the winery-distillation plant. In the southern part of the valley, the biggest polluter was the metal processing plant «Soko», the aluminum factory and a cow farm. At present, most of the listed polluters are either not working or are operating with significantly reduced capacities.

The wastewater is currently released from the textile industry plants, production of alcoholic beverages, and other smaller plants, including runoff and wastewater from agricultural areas with a pesticide content. Specific measurement data on wastewater releases are not available. In addition, there is no data on how many plants and processes conduct preliminary treatment of their wastewater prior to the release into the sewer system, but within the scope of this task, it is assumed that the industrial wastewater shall undergo preliminary treatment in order to make the pollutant content equivalent to the maximum pollutant concentrations of the municipal wastewater. The Neretva river within Mostar is ranked as II class, while during lower

water levels, which are frequent during the summer months, the quality is degraded to III class. Even though the hydropower plants upstream from Mostar are required by law to manage and regulate the water level above certain minimum limits, they often fail to do so, which leads to a relative increase of pollutant concentrations in Neretva.

Solid waste management is yet another issue within this region. Most of the solid waste is transported to and disposed of at the Uborak landfill in Bijelo polje. However, due to the existence of two different collection companies, and a number of other issues, the question of solid waste arises as one of the environmental concerns. In the greater Mostar area, in the less urban areas along the banks of Neretva, a substantial number of wild dumpsites are producing leachate which finds its way to the groundwater in this exceptionally permeable karst area. The issue of wild dumpsites would need to be adequately resolved through the means of inspections and communal enforcement agents, as the sanitary landfill needs to be the final disposal site for all solid waste generated in the area.

Within Neretva itself and its tributaries downstream of Mostar, a rather extensive biodiversity is present. Various species of fish (salmonidae, cyprimidae, eel, and crabs), frogs, water snakes, water turtles, resident birds and migratory birds, and substantial number of plant species are present. In the riverbanks and wider area traces of architectural and historical monuments have been discovered, within Mostar, Bačevići, Potoci, Biograci and even further downstream in Čapljina. Some 40 km downstream from Mostar is the Natural Preserve Hutovo Blato, while the area of the Neretva Delta into the Adriatic Sea is located some 50 km downstream from Mostar. Both Hutovo Blato and the Neretva Delta are wetlands of regional (Mediterranean) significance, and, according to the Ramsar Convention, they formally belong to areas of global importance.

5.1.2 Landscape, Population and Climate

The north region of the Mostar valley, covering an area of approximately 40 km^2 upstream from the city of Mostar, some 10-12 km long, more precisely from Salakovac (approximately 105 m above sea level) to Vrapčići (80 m above sea level), is called Bijelo polje. It is located on the right river bank of the Neretva, encompassed by steep hills of Raška gora, whose slopes drop from the height of 600 m above sea level to some 70-80 m above sea level towards the Neretva river. On the left edges of Bijelo polje are the hills of Rujišta, Pločno, and Velež. Some of the settlements located on the left riverbank are Olović, Željuša, Lišani, Potoci, Livač, Kuti, Vrapčići, Prigrađani and Podgorani, while Bučići, Vojno, and Raštani are located on the right riverbank.

The central portion of the Mostar valley, with an area of some 20 km^2, stretches at a length of 7 km along the Neretva river, from 80 m above sea level in Vrapčići to approximately 50 m above sea level just downstream from the city. This portion of the valley stretches out on the right riverbank of the Neretva, and follows the valley of the Radobolja river. Radobolja river springs in the Kazan area and measures some 5,5 km in length to its mouth into the Neretva river. The central portion is bordered by the hills of Podružja, Žepuča, and Mikuljača (654 m above sea level), Keveljavača, Orlovac and Hum (436 above sea level), and on the east side by the hills of the Velež mountain (1,969 m above sea level).

The south portion of the Mostar valley takes up an area of 45 km^2 and is located downstream of the city of Mostar, starting from an elevation of 50 m above sea level and dropping to 30 m above sea level at Buna river and Buna settlement. The entire stretch of this portion is some 8 km long. This portion of the valley represents the Mostar Polje, which is surrounded by the hills of the Varda (331 m above sea level), Ruišta (341 m above sea level) and Biorina (344 m above sea level), and by the hills of Podvelež (700 m above sea level) on the left side. This

area encompasses the settlements of Tatar, Rodoč, Ulog, Gornja Jasenica, Donja Jasenica, Bačevići, Kočine, Ortiješ, Buna and Blagaj.

According to the data given in the project design documents on expansion of the sewer network and construction of the primary and secondary wastewater treatment plant, the city of Mostar had some 126,000 inhabitants before 1992. Currently, the population is 105,000, with only 50,000 persons connected to the collection network. The rest of the wastewater is released directly into the Neretva river at more than 30 different locations (Mostar "Wastewater study – demographic and socio-economic study").

Table 5-1 Population data for Mostar, based on the "Municipality data" – Federal Institute of Programming and Development, March 2004

Municipality	Area	Settlements	Population	Elevation above sea level
Mostar	1,175 km²	64	105,357	65 m

Table 5-2 Wastewater releases from point sources encompassed within the City of Mostar Protection Program, according to the "Framework Waterworks Basis – Sarajevo, 1994"

Settlement	Recipient	Wastewater (PE)		Total
		Municipal	Industrial	
Mostar	Neretva	113,283	132,100	245,383

According to the demographic report for the years 2002 through 2032 made within the sewer collection project during the period 2001-2003, the population of Mostar over the years was as follows:

- 1948 - 51,823
- 1961 - 72,452
- 1991 - 126,628

Based on the population data, the required treatment plant was assigned the capacity of 250,000 population equivalents (PE).

Mostar valley is geologically made up of conglomerates of gravel and sand with higher or lower clay content. Further, some coal is present. The permeability of the stated layers ranges from $K=10^{-1}$ to 10^{-3} m/s. The hills within the valley are made up of strongly karstified limestone rocks. The structure and level of karstification have limited the amount of surface water and runoff. Storm torrents occur only during the times of heavy precipitation, while the rest of the water runs off through the permeable ground layers.

The Mostar valley is categorized as an area of 9th degree of seismic activity, based upon the MCS (Merrcali – Cancani – Sieberg) scale.The prevailing climate is Mediterranean with average monthly temperatures depicted in the following table:

Table 5-3 Average Recorded Monthly and Annual Temperatures for Mostar region, °C

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	T_{ave} annual
4.8	6.6	9.6	13.3	17.9	21.5	24.7	24.2	20.4	15.3	10.1	6.2	14.6

The total monthly and annual precipitation (l/m^2) is given in the following table:

Table 5-4 Average Monthly and Total Annual Precipitation for the Mostar region, l/m2

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	P_{annual}
165	148	150	127	102	78	43	74	96	151	200	179	1,513

As shown in the table above, annual precipitation is rather high, but almost half of the annual precipitation occurs in the first, second, eleventh and twelfth month of the year. The precipitation intensity is high, in particular during short-term rains, which may lead to occasional flooding within the city, as well as occurrence of storm torrents.

5.1.3 Preliminary Project Design for the Expansion of the Sewer Collection Network and Construction of Primary and Secondary Wastewater Treatment Plants

One of the most significant problems in Mostar is the lack of municipal infrastructure, typically in the areas of smaller, private houses. It is estimated that only some 30,000 inhabitants (less than 1/3 of the population) are connected to the wastewater collection system. The capacity of the existing sewer collectors is insufficient, while the septic tanks are still widely used. So far, there have been no organized and systematized approaches to developing a collection network within the city of Mostar. Neither of the two major parts – riverbanks of Mostar have a complete collection system, but act as two separate systems made up of more separate sub-units. Within the existing system, stormwater is not separated from wastewater.

An additional issue to be addressed is the practice of direct releases of untreated wastewater into the Neretva river and its tributaries at 30 locations, not including the leachate from numerous wild dumpsites in the immediate vicinity of the river.

One of the aims of this project is to protect the Neretva river as an international waterway, with its ecosystems, including the protected swamps (wetlands) Hutovo Blato and the Neretva Delta, which would also help improve the public health situation.

The project would encompass the following activities:

- construction of a dual collector system in the inner city area with an interceptor at each of the riverbanks,
- installation of an inverse siphon for transporting the entire wastewater load to one side of the river,
- installation of local collection systems with approximately 13 smaller pumping stations (8 on the left and 5 on the right riverbank) for transportation of wastewater from lower elevations, nearby the river, to the main collection system,
- installation of the wastewater treatment system in the northern area of the Mostar valley based on the oxidation ditch treatment (whereby alternatives with lagoons for natural maturing and reduction of microbiological content, with or without chlorination/dechlorination, and wetlands were considered as well),
- Installation of a main pumping station for the transport of raw wastewater to the corresponding wastewater treatment unit listed above.

In the selection of the listed alternatives, which would offer a more "decentralized" approach to the project, a number of other alternatives have also been considered. Project implementation has been foreseen in 5 phases:

Phase I (2005) – construction of the collection mains with overflows, installation of a pumping station and the primary treatment plant, construction of the unit for disinfection of wastewater prior to the release into the Neretva river, all in the central section of the Mostar valley.

Phase II - (2008) – expansion of the existing collection system, installation of local collectors, construction of a secondary treatment unit, and construction of a sludge processing facility within the central section of the Mostar valley; this phase would practically complete the works commenced in Phase I, including the construction of oxidation ditches, final clarifiers, sludge pumping stations, sludge thickening units, sludge drying beds, pumping stations for re-circulation and introduction of mobile equipment for sludge treatment; in addition disinfection (most likely chlorination) is foreseen, but this is not specified within the documents.

Phase III (2011) – construction of the collection system, local collection network and treatment plant for the south section of the Mostar valley.

Phase IV (2014) - construction of the collection system, local collection network and treatment plant for the north section of the Mostar valley.

Phase V (2017) – expansion of the treatment plant in the central section of the valley.

A final decision has not yet been made regarding the most favored choice of the above listed alternatives for primary treatment, nor has the technological scheme of the mechanical/biological process been specified.

When bringing about the final decision on the most favored alternative, special attention needs to be paid to the conditions that would be prevailing during the plant operation, and the changes that would occur in the areas surrounding the plant, as it is going to be located within, or in the near proximity of the urban area. Unpleasant smells, noise and vibration need to be kept at a minimum, as suggested in Chapter 9 - EMP, in order to decrease the public annoyance and nuisance.

5.2 Odžak

The city of Odžak is located in the northernmost portion of BiH, in the vicinity of the Bosna river. The geographical location of the city is at 18°20' east longitude and 45°01' north latitude, with the elevation of 97 to 102 m above sea level. The central, urban core takes up an area of 95 ha, and is primarily used as a residential zone, while the wider urban area takes up some 700 ha and is designated as an industrial or commercial zone.

5.2.1 Water Management Issues in Odžak and Vicinity

The entire area of Odžak represents the lowest lying terrace of the Bosna river, the borders of which are set by the courses of Bosna and Sava rivers. This terrace takes up an area of some 100 km^2, with the elevation of 88 to 105 m above sea level, and is criss-crossed by a number of drainage canals. On the western side of Odžak is the canal Svilaj – Potočani which collects storm water (runoff from hills) from the Srnava settlement, and farther on through Potočani – Vrbovac – Donji Svilaj, finally discharging this water into the Sava river. From lower Svilaj to Prud settlement, along the Sava embankment, the canal Srnotača collects water from the transversal canals of Kosjerača, Kamenica, Berek, and Bukovica, taking it further to the Starača swamp and then into the Sava river. Starting from Odžak, Srnava canal stretches toward the settlements of Ivankovići, Novo selo, Donjani, and ends in a natural depression close to the Neteka settlement. This canal serves as the main urban runoff canal for Odžak. It drops from 102 m above sea level in Odžak to some 93 m above sea level at its final point.

Considering the low permeability of the ground, and the relatively low naturally occurring slopes, the canals described above are necessary for drainage of storm-water and runoff, and flood protection. This is a very important segment of water management, as over 20 bigger or smaller settlements are located on this river terrace.

Table 5-5 Population data for Odžak, based on the "Municipality data" – Federal Institute for Programming and Development, March 2004, and "Population Census 1991

	Area	Settlements	Population		Elevation above sea level
			2004	1991	
Odžak	158,4 km^2	13	15,969	30,651	102 m

According to the data presented in the project design documents, current population of Odžak is 9,377, while only some 5,000 are connected to the sewage system. According to the "Framework Waterworks Basis" from 1994, releases from point sources encompassed in the protection program (above 5000 PE, and municipal centers) for Odžak Municipality, are given in table 5-5.

Table 5-6 Wastewater releases from point sources according to the "Framework Waterworks Basis", Sarajevo 1994

Recipient	Settlement	Wastewater (PE)		
		Municipal	Industrial	Total
Bosna river	Odžak	20,383 PE	50 PE	20.433 PE

In addition, the same document states that treatment capacity of 25,000 PE is required for Odžak, while the percentage of pollution within the basin was assumed to be 90%. Furthermore, proper wastewater treatment is listed as a top priority for Odžak, while the lack of a collection, drainage and treatment system for wastewater in this area is also stressed. The aim of a wastewater treatment plant is to protect the surface and ground water sources of the water supply area, and prevent their contamination. The proposed solution includes completion of the existing, partially constructed treatment plant as a preliminary step. The following step would be to assess the need of a biological treatment process within the plant. The project design documents also list the needs of the Posavina region for irrigation, as presented in Table 5-7.

Table 5-7 Irrigation needs of Odžak – Posavina region, "Framework Waterworks Basis", Sarajevo, 1994

Annual gross needs (m^3/ha)	Area (ha)	Required water volume ($x10^6$ m^3)	Water source
3,700	6,000	22.2	Bosna river

The flow of Bosna river upstream of Odžak, at the Modriča profile is measured to be $Q_{ave.year.}$=182 m^3/s (mean annual rate of flow), while the basin area to the same profile is $P_{area.}$= 10,427 km^2. The overall water quality ranking according to the established categories in the Odžak area is given in Table 5-8.

Table 5-8 Overall water quality ranking at Bosna – B14 profile, downstream of Modriča, "Framework Waterworks Basis", Sarajevo, 1994 (NC= no category)

Established category	Measured category ranking					Qualification
	1985	1986	1987	1988	1989	
3	4/NC	4	NC	3	3-4	Non-satisfactory

5.2.2 Landscape and Climate

The river terrace on which most of the Odžak municipality is located can be described as a slightly sloped flat surface, directly exposed to precipitation and runoff which is then channeled, as described previously.

The climate is of a moderate continental type, with the presence of fog around the water courses in the fall, winter and spring time. Average monthly and annual temperatures in the wider Odžak area (measured at the station in Modriča) are given in the following table:

Table 5-9 Average Recorded Monthly and Annual Temperatures for Odžak region – Modriča station, °C

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	$T_{av.ann.}$
-0.9	0.6	6.0	10.5	15.7	19.3	20.1	19.9	15.9	10.6	6.0	1.1	10.4

Data on monthly and annual precipitation is given in the following table.

Table 5-10 Average Monthly and Total Annual Precipitation for the Odžak region – Modriča station, l/m2

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	P_{ann}
61	52	62	76	76	100	95	70	69	54	79	77	871

This area features predominantly acidic soil of a non-carbonate type, with predominant forests of different types of oak on the soil that has been strongly influenced by groundwater and frequent flooding. The issue of wastewater in Odžak has also been addressed earlier than 1991, while the first collector was constructed in 1973. The mixed collection system with the wastewater treatment plant was eventually constructed, while recently a reconstruction and expansion plan has been completed.

One of the important characteristics of the wider Odžak area is the fact that the general population uses the groundwater as a water supply, through the means of water wells. Hence, the proper collection and management of storm-water and wastewater in this area has an extreme significance.

5.2.3 Project Design for the Expansion of the Sewer Collection Network and Reconstruction of the Wastewater Treatment Plant

The existing wastewater collection system is used for both, storm-water and municipal wastewater. The wastewater treatment plant has been constructed just prior to the recent war, southeast of the city of Odžak. This treatment plant comprised mechanical treatment, and was of a designed capacity of 10.000 PE, but was never put in operation, just like the sewer collector to the plant. According to the design documents, the effluent was to be released into the river of Bosna through a collector, which was also not completed. During the war, the wastewater treatment plant was devastated, which has resulted in the current situation where wastewater is led through the main collector and an open canal outside the city, to a natural, gravelled natural depression of Neteka, in the vicinity of the Bosna river. On this location, as a result of the wastewater being released, a swamp has emerged. In addition, the local solid waste disposal site is very close to the swamp, which further complicates this issue. The main collector is frequently clogged due to sedimentation of suspended solids, while the amount of sediment and sludge within the collection network is already high.

The city of Odžak has approximately 9,400 inhabitants, while slightly more than half of them, i.e. some 5,000, are connected to the sewage collection network. The only two industrial facilities which have recently been operational are Vuntex – textile factory, and Omerbašić d.o.o. – processing of fruits and vegetables (the latter has recently been shut down), with a negligible amount of pollution of some 40 PE. Even the total pre-war industrial wastewater load in Odžak of some 1,530 PE was not deemed significant. The future degree of industrial revitalisation and activities in Odžak is uncertain, and therefore the associated future industrial wastewater releases also can not be clearly identified.

Due to the topographic characteristics of the area (flatland with a minimum slope of the collector, which in some cases was by mistake installed even with a reverse slope) the gravitational flow of wastewater and storm-water is difficult. Sewage is ultimately released through the main collector onto a naturally occuring depression in the immediate vicinity of Bosna river.

Following the war, reconstruction and new construction of residential and housing units within Odžak was conducted intensively. As a result, the number of connections to the wastewater collection system, and the number of storm-water drains have increased, leading to frequent overloads of the collection system, and overflows of the system. Yet another problem is the inability to connect the borderline areas of the municipality to the wastewater collection network.

Following the wastewater treatment plant rehabilitation, the project also includes rehabilitation of the sewage collection system in the central section of the city (including correction of the improperly sloped pipes) and extension of the network in the greater Odžak area. Municipal and industrial wastewater will thereby be separated from storm-water, and the latter shall be released into the Srnava canal without treatment. As a result, the collection system shall have a greater capacity for receiving industrial and municipal wastewaters, along with the storm-water from the central section of Odžak, which can not be collected in any other manner other than through wastewater collection systems. Since stormwater is currently not separated, further separation of industrial and municipal wastewater is financially not feasible for the time being. It is important to note that different alternative solutions have been analyzed in the decision-making process regarding the reconstruction and expansion of the wastewater treatment and collection in Odžak.

Along with the other segments to be constructed or reconstructed within the project, a pump station shall also be installed in the wastewater collection system, which would be operated at times of collection network overload.

Prior to the war, the designed capacity of the plant was deemed as adequate until the year 2030, which has remained unchanged under current conditions. The devastated plant is missing a compressor station, bar grate, sand trap equipment, electrical wiring, furniture, doors and locks, sanitary items etc. The plant has been neglected and partially filled with waste. The water supply is functioning. The spiral pumps have sustained some damage, which is not substantial. The construction of the buildings is in fair shape and can be easily reused. The project design documents recommend forming two different lines, one for "municipal wastewater" and the other for "storm-water".

Municipal wastewater line would include:

- Spiral pumping station for primary lifting of wastewater
- Compressor station for blowing compressed air into the sand trap (within the pumping station)
- Automated bar grid (also within the pumping station)
- Aerated sand trap

Storm-water line shall include:

- Pumping station for primary lifting of water (spirals, electrical motors and concrete foundation have never been constructed and installed)
- Automated bar grid
- Drainage canal (to be constructed separately)

Aside from mechanical treatment, different alternatives for introduction of additional, biological treatment have been analyzed in accordance with the original, pre-war main project design

(part of the project that was never implemented). The alternative chosen was the one with a process of separate aerobic sludge stabilization. Parts of the activated sludge biological treatment unit are:

- Aeration tank with in-depth aeration (the pre-war design planned surface aeration)
- Stabilization tank (aerobic sludge stabilization)
- Secondary settlement tank
- Sludge thickening silos
- Pump stations for re-circulation and transport of excess sludge
- Sludge drying beds

In addition to this, a collector is going to be constructed for the effluent transport from the plant to the recipient, which will reportedly require land expropriation.

The plant control buildig has been significantly damaged and devastated. The basic infrastructure is missing, including laboratory equipment and furniture, as well as the control panel itself. The transformer station has also been completely devastated.

The works planned include waste removal, removal of excess vegetation, site clearing works, cleaning out the sludge and vegetation from the Srnava canal, construction of asphalt roads, other construction works, electrical works, painting and varnishing, and other furnishing works.

5.3 Živinice

Živinice is located approximately 1 km south of the city of Tuzla, southeast from the Modrac lake. River Oskova runs through the city, while upstream from Živinice stretches Gostelja, its tributary. Downstream of Živinice, the river of Oskova flows into the Spreča river, which flows in to the Modrac lake. On the opposite side, Spreča leaves Modrac lake and flows towards Doboj, where it ultimately flows into the Bosna river.

5.3.1 Water Management Issues in Živinice and Vicinity

Throughout its history, Živinice and the entire surrounding region has had sporadic, i.e. discontinuing water supply, hence remains of the previous water supply systems and flood protection segments can still be found. With the industrial and commercial development of the region, coupled with the increase in population, water demands also rose, especially towards the end of the 19th and early 20th century. Government had organized research of the water supply issues, and had formed meteorological and hydrological station. City water supply, sewage and water protection systems had also been constructed. After 1945 more attention has given rise to organizations and utilities that deal with water supply requirements in a cross-cutting and multidisciplinary approach. However, the increased use of water in industrial processes has led to the increased level of pollution of waterways. As a result, a study was developed that clearly stated and analyzed the water supply needs in the entire BiH, with an emphasis on the Bosna river basin. A waterworks basis document for the Spreča river stressed the need to form a water accumulation for industrial water supplies, and this resulted in a decision to form the lake of Modrac.

Table 5-11 Data for the Dam and Accumulation Modrac on the Spreča River – Cadastre of Accumulations – Energoinvest, Sarajevo 1982, and "Dams in Yugoslavia – ICOLD Dubrovnik, 1971

Basin Area		1.944 km^2
Average Annual Precipitation		964 mm
Average Flow (20-year flow)		15.5 m^3/s
Annual runoff		489 km^3
Specific runoff		8.0 l/s/km
Minimum measured flow		0.65 m^3/s
Maximum measured flow		367 m^3/s
Flood waters 0,1%		1.000 m^3/s
Accumu-lation	Level of natural slowing down	1. phase 200.0 m above sea level
		2. phase 203.5 m above sea level
	Minimum water level required for power production	190.6 m above sea level
	Total volume of the accumulation	1. phase 100 km^3
		2. phase 183 km^3
	Volume used for power plant	1. phase 88 km^3
		2. phase 171 km^3

	Area of the accumulation	1. phase 1.700 ha
		2. phase 2.375 ha
	Maximum depth of the accumulation	17.0 m
Dam	Height	33 m
	Length at the dam crown	205 m
	Concrete volume	19 x 10^3 m^3
Users	Elektroprivreda Power Plant Tuzla	1 m^3/s
	Industry	0.95 m^3/s
	Biological minimum	4.7 m^3/s
Users, as planned for 2000	Elektroprivreda. Power Plant Tuzla	2.5 m^3/s
	Industry	1.5 m^3/s
	Water supply to settlements	1 m^3/s
	Water management minimum	4.7 m^3/s
	Total	9.7 m^3/s

5.3.2 Landscape and Climate

The Spreča river basin borders with the Majevica mountain (966 m above sea level) to the north, and to the southeast, south and southwest with the mountains of Javornik (1,021 m above sea level), Konjuh (1,328 m above sea level) and Ozren (917 m above sea level).

The geological base of the dam is made up of serpentinite (magmatic rocks). The geological base of Majevica is traced back to the Cenozoic – Paleocene – Quternary period, while the base along Spreča is traced back to Neogenic period (Tektonika – Dr. I. Sokolić). The entire broader Tuzla region has been tectonically active through almost entire Cenozoic period, while the sedimentation phases were interrupted by phases of intensive tectonic activity and errosion. As a result, this area is rather suitable for research of geological history of Cenozoic period, and the different ground forming processes and mechanisms therein. Upon conducting research in the field, the measured sliding within the Spreča basin is believed to be a result of very recent activity. However, the rock mass as a whole has been more elastic rather than plastic over the time, and the deformities are very minor. The edges of the deep crevices are covered with layers that are of Tertiary age, which are elbow-bent, with wave-like crumples. The complex structure in the region of the Tuzla basin has been formed at the end of Tertiary and Quartiary period, while the frequent earthquakes indicate that this tectonic process is not yet completed.

The climate is of a moderate continental and semimountainous type. According to the data from the Meteorological station in Tuzla, the average monthly and annual temperatures are as follows:

Table 5-12 Average Recorded Monthly and Annual Temperatures for Živinice region, °C – Tuzla Station

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	$T_{a.e\ ann}$
-0.7	1.7	5.7	10.4	14.8	17.7	19.3	18.9	15.4	10.6	5.6	0.9	10.0

Monthly and total annual precipitation for Živinice is given in the next table.

Table 5-13 Average Monthly and Total Annual Precipitation for the Odžak region – Modriča station, l/m2 Tuzla station

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	P_{ann}
64	59	66	82	99	120	101	90	69	60	76	78	964

5.3.3 Population, land use and type, forests and mineral resources in the Spreča basin

Based on the population count from 1991, the population of the Živinice region amounted to 54,653. Prior to the war, this municipality was above-average of the Republic BiH with regards to population density. Hence, the average population density from 1991 amounted to 188 inhabitants/km^2 while the average population density for BiH was 85 inhabitants/km^2.
One of the major influences to the varied population densities is the death and birth rate of the population at a given time period. Up to the beginning of the war, sudden and significant shifts occurred within the municipality with regards to the demographics and the social-economic and educational factors. In the time period from 1948 until 1991 the population count had almost tripled. In 1948 the predominant activities in the area were agriculture and cattle-raising, while in 1991 an insignificant percentage of population was active in these fields. In the last decade prior to the war one of the biggest population shifts had occurred, from rural areas to urban areas, as a result of sudden industrialization in the socialistic period.

Table 5-14 Population Data for Živinice Municipality, Federal Institute for Programming and Development, March 2004

	Area	Number of Settlements	Population	Elevation above sea level
Živinice	291km^2	29	52,616	217 m
Banovići	185 km^2	19	28,820	333 m
Kalesija	201km^2	28	34,931	256 m
		Total	116,367	

Živinice municipality takes up an area of 29,100 hectares, while the biggest percentage of the land is agricultural (37.9%), and forested (49.9%). Breaking down the types of agricultural land, the biggest percentage of total agricultural land is the plowed fields with the area of 8,003 ha (72.6%). The next category are the meadows with 1,392 ha (12.6%) and the pastures and orchards with 803 and 827 ha respectively. Most of the forested areas are comprised of general woodwaxen trees, oak, and hornbeam – beech.

Most significant mineral resources within the Živinice municipality are the coal mines. Begining of coal extraction in Đurđevik, Višća and Bašigovci dates back to the first half of 20th century, while extraction of lignite coal in Majevica – Dubrave was started some 10 years ago. These mines produced approximately 2,3 million tons of coal prior to 1991, mostly for the needs of the Tuzla power plant, while currently they only produce approximately one fifth of that amount. The total underground reserves of coal are estimated at 60 million tons, and those of

lignite at 100 million tons. Apart from coal mining, surface mines of limestone are becoming increasingly important because of production of material used in the local construction industry (S. Gračanica, Podgajevi, Višća, Maline, etc.). Another significant resource is the quartz sand which has appeared as a result of coal mining at the Brnare mine. This resource could be a potential base for the development of industry in Živinice, as it can provide a replacement capacity, i.e. alternative to coal mining.

5.3.4 Project Design for the Expansion of the Sewer Collection Network and the Construction of a Wastewater Treatment Plant

Upstream from the Modrac accumulation, some 700,000 population equivalents – PE, release wastewater from three relatively bigger settlements with developed industrial and agricultural activities - Živinice, Banovići, and Kalesija. Živinice is the settlement which is the closest to Modrac, and hence can be considered as a priority for constructing wastewater collection and treatment systems. The major aim of this project component is to protect the Modrac accumulation.

Živinice municipality currently has approximately 47,500 inhabitants, while only 22,000 are connected to the wastewater collection system. Through the means of this project, an additional 32,000 inhabitants would be connected to the system, along with another 40 l/s (7,000 PE) of industrial wastewater. Wastewater (municipal and industrial – wood processing, slaughterhouses, milk farms, etc.) are currently released into the Oskova river at three different locations (Oskova flows into Spreča river, on which Modrac accumulation is locted, while Spreča flows farther on into Bosna river).

The wastewater collection system of Živinice serves for multiple sources, thus the future wastewater treatment plant (WWTP) will have to process municipal wastewater, storm-water and industrial wastewater (wood processing Konjuh, poultry slaughterhouse Kokodžada, cattle slaughterhouse, Autoprevoz transport company, health institutions, smaller commercial and trade shops, all estimated to have maximum wastewater releases of 40 l/s). The issue of separation of stormwater and municipal wastewater will need to be resolved in the future, outside the scope of this project.

Table 5-15 Wastewater Loading for Cities by the Modrac Accumulation,"Framework Waterworks Basis for BiH" - Sarajevo, 1994. Cities are shown with corresponding population equivalents

	Municipal Wastewater (PE)	Industrial Wastewater (PE)	Total (PE)
Živinice (Oskova river)	14,817	2,000	16,817
Kalesija (Spreča river)	5,917	12,450	18,367
Banovići (Turija river)	15,867	2,050	17,917
Đurđevik (Gostelja river)	6,117	125	6,242
Total	59,343 PE		

The following activities are planned within the project documentation:

i. Expansion of the wastewater collection system
ii. Construction of an automated treatment plant with a capacity of 40,000 PE, including mechanical and biological treatment within the following units:
    1 Pre-clarifier
    2 Bar grate
    3 Pump station for raising wastewater
    4 Fine sieves
    5 Aerated sand-traps, grease-traps
    6 Aerated lagoons
    7 Sludge sedimentation tank, flow meter for treated effluent
    8 Chlorination station and tank, using NaOCl (Sodium hypochlorite) including a chlorine dozer
    9 Pumping station for recycled sludge and excess sludge
    10 Sludge thickening silos and sludge drying beds

Standard biological treatment with activated sludge is included, while different alternatives have been analyzed prior to the final decision making. An activated sludge process can later be expanded to include a unit for preparation and dosage of three-valent iron for phosphorus removal. Processing and stabilization of waste sludge includes aerobic stabilization processes, thickening and centrifuge (with or without using released gases for power production), followed by disposal on agricultural land or landfill. The plant shall include a control laboratory unit for analyses of influent, effluent, and efficiency of individual plant units.

During the plant design development, it is important to have in mind the flooding tendency at this location, in particular with respect to the plant load increase, prevention of sludge dissipation with torrents, and plant access in such cirumstances.

The first phase includes construction of a collector network (3+1, including collection and transport of wastewater to the treatment plant site at the mouth of Oskova into the Spreča river).

The works planned include earthwork, (excavation, filling in, sand embankments, site clearing / vegetation removal), setting concrete, installation works (fences, units, processes etc.), masonry, painting, hydro-insulation, furnishings (doors, windows), plumbing, floor-setting, etc.

5.4 Trnovo

Trnovo municipality is located some 25 km south of Sarajevo. The wastewater treatment plant is located between the M18 road (Sarajevo – Trnovo) and the Željeznica river, within FBiH, some 200 m from the entity (FBiH – RS) division line.

5.4.1 Water Management Issues in the Trnovo Region

The spring of river Željeznica is located west of Trnovo, while from Trnovo it flows towards northwest, that is towards the Sarajevo Polje where it flows into the Bosna river. The Željeznica basin belongs to the Black Sea catchment area, and borders in its upstream area with the Neretva basin of the Adriatic Sea catchment, while to the east it borders with the Drina river basin, which is also in the Black Sea catchment area.
Željeznica springs are located at the foot of the Treskavica – Barice mountain, with the elevation of 2,079 m above sea level, at the precise location of Mala Orlica at 1,100 m above sea level. Željeznica flows from the spring through the settlements of Godinje and Turovi, and finally into Trnovo. Its tributaries in Trnovo area are Širokarica stream and Lukavac stream. At approximately 2.7 - 3 km downstream of Trnovo, Željeznica receives another tributary, that is the Trebečajski stream, followed by the Crna Rijeka river, which flows from the direction of the Jahorina mountain (1,909 m above sea level). Downstream of Trnovo at a distance of some 6 km is the accumulation basin of the Bogatići HPP, while at a distance of 10 km downstream of Trnovo Željeznica receives another tributary, Bijela Rijeka river. Further downstream, Željeznica flows through the Krupačke Stijene canyon by the Krupac settlement, and then enters the Sarajevo valley close to the Vojkovići settlement, at 520 m above sea level.

Even though Željeznica river, from its source to Trnovo, has an elevation drop of 260 m over 7.5 km of its course length, and has features of a torrent, it does not carry significant amounts of solids to form river deposits, while its tributary Crna Rijeka river brings in greater amounts of solids, especially from the solid waste disposal site located on the right riverbank alongside the road. Parts of sludge and deposit remain in the accumulation of the Bogatići HPP, while the rest is flushed out and carried farther downstream. The Bijela Rijeka river, which also shows features of a torrent, brings in greater amounts of sediment.

One of the most significant issues are the illegal solid and construction waste dumpsites in the Željeznica basin, and the quarry in Krupac which is the source of dust and sludge that is deposited farther downstream, between the Željeznica riverbed and the main road Sarajevo – Trnovo. In the event of flooding, much of the waste and sediment from the riverbed is transferred to the water supply area of Sarajevsko Polje, which can rather negatively impact and clog the gravel soil layers, as is the case with small-diameter, dustlike limestone particles.

The river of Željeznica, at the measurement profile identified as "Z-1 mouth" has been assigned Second Category quality, while the measurement results between 1985 and 1989 have yielded the following results:

- 1985 – 4 NC (No category)
- 1986 – 3
- 1987 – 3
- 1988 – 3
- 1989 – 3-2, but not satisfactory

The basic project design from 1967 plans the construction of a number of accumulation lakes and hydropower plants in the Željeznica river basin, as follows:

Table 5-16 Planned Accumulation Lakes and Hydropower Plants in the Željeznica River Basin, Basic Project Design – 1967

	Units	HPP Ilovica Željeznica	HPP Krupačke stijene Železnica	HPP Crna Rijeka	HPP Bijela Rijeka
Catchment area	km^2	179	320	93	110 3
Average Annual Flow Q_g	m^3/s	3.74	6.43	2.02	2.62
Annual runoff	hm^3	118	203	64	83
Specific runoff	l/s/km	20.9	20	21.7	-----
Minimum flow	m^3/s	0.35	-----	0.21	0.30
Maksimum flow	m^3/s	162	-----	78	-----
Evacuation of Flood Waters	m^3/s	282	483	152	222
Normal rise height	m above sea level	810	607	887	670
Volume of Accumulation	km^3	35	21	70.9	40.5
Dam type and height	m	Fill-in	Concrete, gravitational	Concrete, arch	Fill-in and clay
		60	45	105	74.5
Length at crown	m	79	19.6	298	260
Basic project design	year	1967	1967	1967	-----
Concept design	year	1967	-----	1966	1982
Purpose		HPP	Water supply, HPP	HPP, Water supply	Water supply

Of the plants listed above, HPP Crna Rijeka and Bijela Rijeka were primarily intended for water supply, while one solution included transporting the water from Crna Rijeka to Bijela Rijeka through the means of a hydrotechnical tunnel. A concept design was made for Bijela Rijeka HPP in 1982 which was revised later on, while designs for Crna Rijeka are still being considered.

5.4.2 Landscape and Climate

The Željeznica basin borders with large mountains that are covered with snow for most of the year. Other than the listed Treskavica and Jahorina, there is also the Bjelašnica mountain (2,067 m above sea level), as well as a significant portion of the catchment with the elevation above 1,000 m above sea level.

Geologically, the tectonic construction of the location features areas and belts characteristic to the surrounding mountain range of the northwest-southeast disposition, which belongs to the Dinarids. The areas and belts date back to the geological Mesosoic period.

The climate in this area is submountaineous and mountaneous with average temperatures given in the following table:

Table 5-17 Average Recorded Monthly and Annual Temperatures for Trnovo, °C

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	$T_{av\ ann}$
-0.9	1.5	5.1	9.4	14.1	16.9	18.9	18.5	15.1	10.4	5.3	0.3	9.6

The total monthly and annual precipitation (l/m^2) is given in the following table:

Table 5-18 Average Monthly and Total Annual Precipitation for Trnovo, l/m2 – Meteorological station Sarajevo

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	P_{ann}
74	69	73	77	85	95	88	74	73	80	97	88	967

According to the data on Municipalities (Federal Institute for Programming and Development, March 2004), Trnovo has the population as given in the table below:

Table 5-19 Population data for Trnovo, based on the "Municipality data" – Federal Institute for Programming and Development, March 2004

	Area	Number of Settlements	Population	Elevation above sea level
Trnovo municipality	338,4 km^2	56	839	816 m

5.4.3 Project Design for Rehabilitation-Reconstruction of the Wastewater Treatment Plant

According to the main project design from 1991, Trnovo municipality had 6,991 inhabitants, while the population of actual settlement of Trnovo was 2,099. Industry within Trnovo prior to the war included a carpet factory, lumber mills and a chair factory. Currently, only one of the lumber mills is operational, with a reduced capacity, while the carpet factory is expected to commence with work. At this time, the settlement of Trnovo has approximately 1,500 inhabitants, while the population of Trnovo and surrounding areas is predicted to rise to 3,100.

The existing wastewater collection system of Trnovo is of a separated type, but higher quantities of wastewater have been observed during heavier rainfall, which indicates a possible damage to the piping within the system, groundwater seepage into the municipal wastewater collection system, or illegal connections of the stormwater drains to the municipal collection system. Efforts to repair damaged pipes are already being made within the scope of regular maintenance works.

The collection network was constructed in 1985 and reconstructed in 1999, with the main collector (Φ400 mm) leading the wastewater to the treatment plant. This plant was planned to treat not only the municipal wastewater, but also the pre-treated effluent of the carpet factory (the remaining industrial branches were not connected to the collection system). The main collector was designed for a load of 1440 m^3/day. The treatment plant was designed with the

capacity of 5,000 PE, and was operated from 1991 until 1992, while it was devastated during the war. There is no supporting infrastructure (electricity, telephone connection, water supply, parts of the fence) and the equipment was mostly stolen (especially electrical equipment). The basic concrete construction has been kept, which is still water-proof (portions of the plant are filled with wastewater; the first step will be to remove this water and sedimented sludge). The pipelines, both those leading to the plant, and those within the plant, are clogged up, while the spiral pump, bristles, skimmer, and sludge pump remained at the plant, but the degree of damage and their potential repair requirement still needs to be assessed. The basic construction of the command building has been maintained as well.

The purpose of reconstruction – rehabilitation is the protection of the Željeznica basin upstream from the Sokolovići - Sarajevsko Polje water supply area. Željeznica is one of the major tributaries of the groundwater aquifer in the area of Sokolovići water source, and has an important impact on the total groundwater balance in Bačevo and Konaci. It is essential to ensure constant infiltration of water from Željeznica to the groundwater aquifer, which is one of the reasons why the Crna Rijeka accumulation needs to be constructed. In addition, it is necessary to protect the entire basin of the accumulation, the Crna Rijeka watercourse downstream from the dam, and the river of Željeznica. All these measures would ultimately result in protection of water quality in the Sarajevsko Polje area.

According to the design recommendations, the wastewater collection system and treatment plant of 5,000 PE capacity could be expanded in the future. The design also includes treatment of pre-treated industrial wastewater from the carpet factory, and municipal wastewater from the nearby settlements. "Conditions for disposal of wastewater in the Trnovo collection system with the purpose of protecting the canal network, workers safety and the treatment process" have also been developed and recommended. The proposed treatment of municipal wastewater (with a small share of industrial wastewater) and sludge include the following segments:

- pre-treatment of wastewater – fine grate and sand-trap (PISTA system)
- biological treatment of wastewater in a compact system – activated sludge method with suspended growth (simultaneous aerobic stabilization of excess sludge)
- sludge treatment – gravitational thickening of sludge and sludge drying beds

The technological scheme of the plant (classical mechanical and biological treatment with active sludge, simultaneous stabilization of sludge – Monoblock) includes the following:

- influent collector
- spiral pump for primary elevation of wastewater with a "grate room"
- arch bar grates
- circular sand-trap of Pista type (sand removal by "mammoth" pump)
- flow measurement canal
- biological treatment lagoon with "mammoth" rotor-scrubbers (surface aeration)
- regulatory overflow
- secondary clarifier
- pump stations for re-circulation and transport of excess sludge
- effluent collector to Željeznica river
- silos for excess sludge
- sludge drying beds

The biological tank and clarifier represent units of a "compact system". The bio-aeration tank shall work with surface aeration, while other alternatives have been considered within the decision making process, including diffusion, that is submerged aeration.

The proposed process brings up issues of disinfecting the effluent. Microbiological pollution shall be reduced partially through biological treatment, but disinfection of the effluent is still required, as the effluent shall be released into the watercourse upstream of the water source area in Sarajevsko Polje. Control within the Bogatići HPP is also required, as the accumulation frequently gets filled with sludge that is further released downstream.

Apart from the treatment plant, reconstruction shall include a command building with a laboratory for control of influent and process efficiency (primarily the biological treatment), compressor station, and transformer station. The activities identified include demining, removal of vegetation, construction of a gravel acess road and sludge drying beds, repair of fencing, construction of a gate, clearing out the pipelines by means of clean pressurized water, rehabilitation of the pipelines, waste removal, smaller construction works, corrective construction works, installation, masonry, metal cutting, floor setting, furnishing, glass-cutting, painting and varnishing, plumbing, roofing and electrical works.

5.5 Project Location Maps

Figure 2 Mostar

Figure 3 Mostar

Figure 4 Odzak

Figure 5 Živinice

Figure 6 Trnovo

6 BASELINE DATA

The baseline data collected for the project locations include qualitative and quantitative parameters for each of the watercourses that the project will be directly affecting. The data provided depict most recent mean measurement values. The frequency of the measurements and the scope of the analyses vary according to location, due to the characteristics or the usage of the watercourse and the area in general. Actual data should be obtained prior to the operational start up of the treatment plants.

6.1 Classification of Water Courses

According to the Law on Waters (Official Gazette FBiH 18/98), the surface waters in FBiH are classified within four quality classes. This classification is used when determining the possible releases into the watercourses, or the uses of the water within the watercourse in question. The general characteristics of each water quality class are given below:

Class I Water, disinfected or not, that can be used for drinking and in the food industry, or, in case of surface waters, that can be used for breeding sensitive fish species (salmonides).

Class II Water which can be used, in its natural state, for bathing and recreational activities, water sports and leisure, and for breeding other types of fish (ciprinides), or water that can be used for drinking and in the food industry after standard treatment methods (coagulation, filtration, disinfection etc.).

Class III Water which can be used for irrigation, and following standard treatment methods, can be used in the industries other than food industry

Class IV Water that can be used for other uses only after a proper treatment

This classification has been established through the Decree on the Classification of the Inter-republic Waterways, International Waterways, and the Coastal Sea of Yugoslavia in 1978. The same classification has been transferred to the above-mentioned Law on Waters of Federation of Bosnia and Herzegovina in 1998. The parameters used in the categorization of waterways are given in Table 6-1 on the next page.

Table 6-1 Parameters for establishment of water quality

Item	*Indicator*	*units*	*Class I*	*Class II*	*Class III*	*Class IV*
1.	Dissolved Oxygen, minimum quantity (not applicable to groundwater and lakes)	mg/l	8	6	4	3
2.	Oxygen saturation saturation super - saturation	%	 90 to 105 -	 75 to 90 105 to 115	 50 to 75 115 to 125	 30 to 50 125 to 130
3.	BOD_5 at 20° C	mg O_2/l	2	4	6	20
4.	COD_5 from $KmnO_4$	mg O_2/l	10	12	20	40
5.	Saprobity index according to Liebmann (not applicable to lakes and groundwater)		Oligosapro-bic	Mesosapro-bic beta-alpha	Mesosapro-bic alpha – beta	
6.	Degree of biological activity (applicable solely to lakes)		oligotrophic	Moderately eutrophic	-	-
7.	Suspended solids	mg/l	10	30	80	100
8.	Total solids: surface water groundwater in karst areas non-karst areas	 mg/l	 350 350 800	 1000 1000 1000	 1500 1500 1500	 1500 - -
9.	pH		6.8 – 8.5	6.8 – 8.5	6.0 – 9.0	6.0 – 9.0
10.	Visible waste material		None	None	None	None
11.	Noticeable color		None	None	Slight	-
12.	Noticeable odor		None	None	Slight	-
13.	MPN coliform bacteria water course for bathing	/l	 2000 -	 100,000 20,000	 200,000 -	 - -
14.	Toxic matter, changes in temperature or other indicators of hazard		Must not exceed threshold values in any of the categories			
15.	Level of radioactivity		Calculated according to a formula			

According to the Decree of the Waterways Categorization (Official Gazette SRBiH 42/67), the waterways considered in this Study are classified in the following way:

Bosna River:	Class
a.) from the source to the mouth of Željeznica river	I
b.) from the mouth of Željeznica to the mouth of Miljacka river	II
c.) from the mouth of Miljacka to the mouth of Sava	III

Spreča River:	
a.) from the source to the Modrac Lake accumulation	II
b.) Modrac Lake accumulation	II
c.) from Modrac Lake accumulation to the mouth of Bosna river	III

Sava River:

a.) from the mouth of Una river to the mouth of Bosna river	II
b.) from the mouth of Bosna river to the mouth of Tolisa river	III
c.) from the mouth of Tolisa river to the mouth of Drina river	II

Neretva River:

a.) from the source to the settlement Ulog	I
b.) from settlement Ulog to the border (Metković, Croatia)	II

This classification of water courses has been established in 1967, and is still in use despite changes the polluters in the basins. According to this classification, the Bosna river is of the class I from its source to the mouth of the Željeznica river. Beyond the mouth of Željeznica, degradation of water quality occurs, and further downstream the Bosna river turns into a class III water course. At the point where the Bosna river enters the international water course of the Sava river, and downstream, the quality of the latter is degraded from class II to class III, while downstream of the mouth of the Tolisa river the quality of the Sava river is improved to the class II level.

The Spreča river upstream of the lake of Modrac, as well as the lake of Modrac itself, are classified a class II water courses. The Spreča river downstream of the lake, however, is a class III water course directly affecting the Bosna river quality, into which it ultimately drains.

Therefore one can conclude that the quality of the Sava river is being directly affected by the degraded quality of the Bosna river. The Bosna river quality degradation is caused by direct municipal and industrial wastewater releases, but also by its severely polluted tributaries, including the rivers of Željeznica and Spreča river.

As far as the Neretva river is concerned, it is of highest quality from the source to the Ulog settlement, located at a distance of a few kilometers from the source. Farther downstream the river of Neretva flows through Glavatičevo and Konjic settlement. Beginning from the latter, within the next 200 km of length the Neretva river is ranked a class II water course, all the way down to the border with Croatia in Metković. However, between the cities of Konjic and Mostar, the Neretva river is visibly polluted with municipal and industrial wastewater releases. On the other hand, within the same river section there are four hydropower plants with own water accumulations, where waste and pollutants settle down to some extent. During the summer months, with elevated temperatures and decreased flow, the quality of the Neretva river drops to class III downstream of Mostar. However, in the course of the river downstream of the city of Mostar, there are a number of natural cascades, where aeration of the river occurs, improving its quality. This section of the Neretva river is also rich in summer filamentous algae, which increase the levels of dissolved oxygen, causing improvement of the Neretva river quality.

It is important to note that this old classification of water courses does not fully correspond to the actual situation, and some adjustments would probably need to be made based on new examinations. The cities and settlements have meanwhile increased in size, the climate has changed to some extent, while the industrial activities and the resulting pollution have dropped after the recent war.

6.2 Other General information

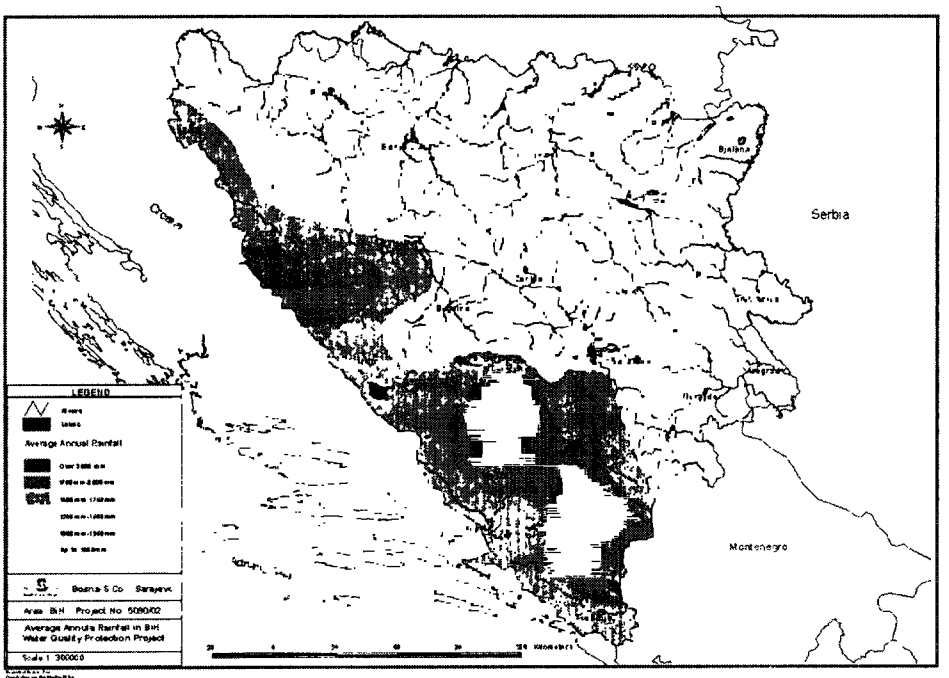

Figure 7 Mean Annual Precipitation

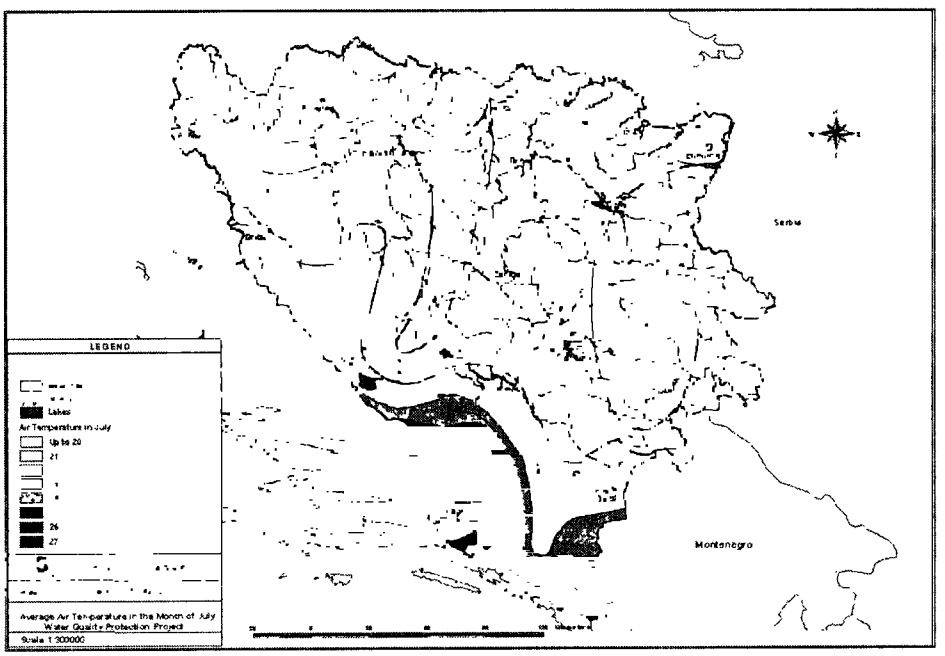

Figure 8 Average July Air Temperatures in °C

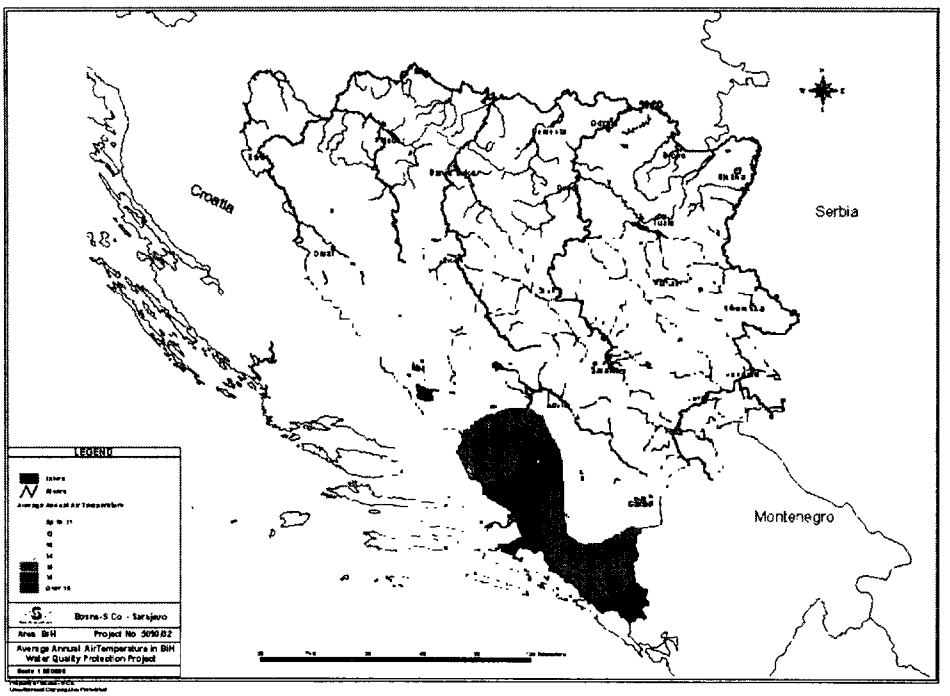

Figure 9 Average Annual Air Temperatures in °C

6.3 Baseline data for project areas

The baseline data for each of the locations was collected from existing studies and analyses, or obtained from monitoring stations conducting measurements on each of the watercourses, which are also used as drinking water sources.

6.3.1 Baseline data for Mostar

Mostar is located in the area of Bosnia and Herzegovina of specific karst topography. This karst area is made up mostly of carbonate rocks, whose layers and cracks provide for very complex interactions between surface waters and groundwater. The river of Neretva is the major natural landmark of Mostar, as well as of this area of the country. Neretva is the source of potable water, irrigation water, but also the main recipient wastewater, industrial effluents, pesticide and fertilizer runoff and various other pollutants in the region. Table 6-2 provides for data on the Neretva river measured at 4 different monitoring stations.

Table 6-2 Characteristics of Neretva River Flow

River	*Measurement Profile*	*Watershed Area A (km^2)*	*Average flow Q (m^3/s)*	*Specific flow ($l/s/km^2$)*	*Minimum daily flow ${}_dQ_{95}$ (m^3/s)*	*Minimum monthly flow ${}_mQ_{95}$ (m^3/s)*	*Flood water $Q_{1\%}$ (m^3/s)*
Neretva	Ulog	222	10.2	45.94	0.190	0.35	203
Neretva	Konjic	1288	60.0	46.59	7.83	9.24	1169
Neretva	Mostar	4331	202	46.64	23.4[1]	32.8	1830
Neretva	Zitomislici	5782	233	40.29	-	-	2179

There are five hydropower plants on the river of Neretva, with a total useful water volume of the accumulations of 781.4 million m^3. Regulation by means of dams and accumulation releases allow for Neretva flow control downstream from the city of Mostar to the mouth of Neretva at the Adriatic Sea.

Elevated summer temperatures have an effect on the flow, evaporation and water quality. Figure 1 depicts the actual average monthly temperatures during the course of the year, plotted against the corresponding average monthly flow. The result of the regulated flow (from lower depths of the accumulation reservoirs) is that water temperatures now have a narrower range of variation than previously in the natural conditions (higher temperatures in the summer and lower in the winter time).

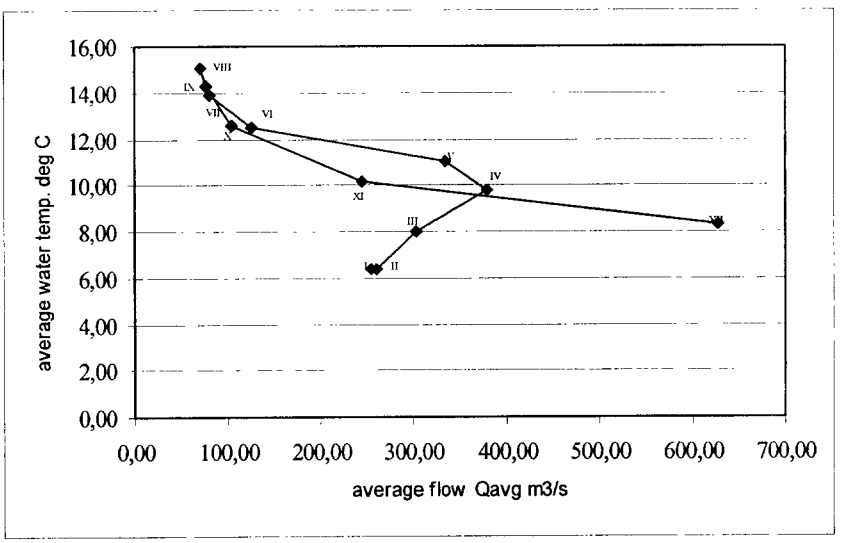

Figure 1: River Neretva average water temperature vs. average monthly rate of flow

The available water quantity primarily depends on the amount of precipitation in the area. Since the precipitation regime in this area is irregular, so is the quantity of water that is available. The percentage-wise monthly distribution of precipitation in the Mostar area is given in Table 6-3:

[1] The minimum flow through the hydropower plant Mostar needs to be at least 50 m^3/s Hence the minimum flow through the Žitomislići gauging station should exceed this minimum released from Mostar.

Table 6-3 Monthly precipitation distribution percentage

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
10.4	10.0	8.3	8.4	5.8	4.8	3.1	4.5	6.7	10.2	13.7	14.1

This indicates that the autumn-winter period accounts for 65.1% of the annual precipitation in the area while the springtime accounts for 22.2% and summer 13.7%. Apart from having a significantly lower precipitation rate during the summer months (vegetative period), the average temperatures are rather high in this region. The average annual temperature amounts to 14.8 °C, while the average temperature during the month of July is 25.8 °C.

Evaporation of water from the ground surface in the Mostar area is relatively low, due to a high infiltration into the soil. At the same time, the evaporation from free water surfaces in the given circumstances of local temperatures, wind and air humidity is much higher. Although the amount of evaporation depends on the local climate, it is estimated to be approximately 1240 mm per annum. Monthly evaporation figures are shown in Table 6-4.

Table 6-4 Evaporation from water surface

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Mm evap.	42	59	95	115	153	156	186	175	112	70	45	32	1240
%	3.4	4.8	7.7	9.3	12.3	12.6	15.0	14.1	9.0	5.6	3.6	2.6	100

The water quality has been monitored in this area. The major parameter for which the water was tested was the bacteriological analysis. It is important to point out that the water has a much higher bacterial content during the summer, when the river flow is significantly lower and when the water temperature is higher than it is during the colder periods of the year. It is important to note that even in this case the water quality satisfies the requirements for irrigation purposes. This data is provided in Table 6-5.

Table 6-5 Bacteriological analysis of TMT and Neretva rivers

(bold figures indicate values exceeding the national legislation tresholds)

	Total no. of bacteria/ ml	***MPNB Coli /100ml***	***MPNB E.coli / 100ml***	***Flow m^3/s***	***Water temp.°C with corresp. flow (1999)***
River Neretva - station Zitomislici					
21.6.2000	9 400	9 000	340	59,2	13/113
6.9.2000	9 000	**34000**	2 800	62,7	14.4/99
15.2.2001	110	2100	200	256(2000)	6.8/279
27.6.2001	3 400	**48 000**	1 800	60.4 (2000)	12.8/90.1
17.9.2001	4 500	**20 000**	8 000	60.4 (2000)	14.6/71.2
FBiH Standard*	N/A	Maximum 10 000	N/A	N/A	N/A

**Decree on Classification of Waterways - see pages 59 and 60; specific requirements are set by the design guideline tresholds, issued by the Federal Ministry of Agriculture, Waterworks and Forestry for individual plants in accordance with the Water Law of FBiH.*

The Neretva river, despite the pollution and releases from the cities and settlements, and the hydropower plants has a rather rich biodiversity. Twenty five fish species have been identified within the course of the Neretva, while 7 species are found on the IUCN Red List, and four are listed as Protected by the Bern Convention. The dominant fish species are listed below in Table 6-6:

Table 6-6 Dominant Fish Species in Neretva*

Location	***Fish Species***	***Notes***
Upper Neretva	River Trout, *Salmo trutta,* Adriatic Trout, *Salmothymus obtusirostris oxyrhynchus* European grayling, *Thymallus Thymallus*	Coldwater species
Middle Neretva	River Trout Adriatic Trout Dalmatian nase, *Chondrostroma kneri*	Coldwater species Coldwater species Warmwater species
Lower Neretva	Dalmatian nase, Rovella, *Rutilus rubilio* Chub, *Leuciscus svallize*	Warmwater species

** source: MWH , Mostar Urban Environment and Water Quality Plan, 2003.*

In addition to the biodiversity within the Neretva river itself, it is important to note the existence of the Natural Preserve, Hutovo Blato. This preserve is rich in eel and carp, as well as some 310 identified bird species that are either resident or migratory.

The following figures correspond to water quality measurements conducted on the Neretva river in and around the city of Mostar during the last couple of years. The data received comes from three different monitoring stations, i.e. Raštani, Mostar downstream, and Žitomislići. A number of different parameters were measured at each of the stations. As data points, certain monitoring stations have been operational for a longer period of time. The average values obtained are given in table 6-7 on the next page:

Table 6-7 Water Quality Measurements - Neretva River

(bold figures indicate values exceeding the national legislation tresholds)

Parameter	*Unit*	*BiH stan-dard**	*Rastani*		*Mostar downstream*		*Žitomislići*	
Year			***2000***	***2001***	***2000***	***2001***	***2000***	***2001***
Flow Rate	m^3/s		92	107.16	102.25	-	209.03	-
Temperature	°C		13.0	12.15	10.15	12.68	12.63	7.81
Ph		6.8-8.5	7.6	7.93	7.9	7.85	7.92	7.81
Suspended Solids	mg/l	30	2.25	1.65	2.65	2.48	2.8	2.77
Total Solids	mg/l		-	142	-	177.4	-	184.2
COD	mg/l	12	8.413	9.21	**14.2**	11.27	10.34	10.92
Dissolved Oxygen	mg/l		10.2	10.82	9.98	9.72	10.67	10.28
Saturated O_2	%		99.97	87.8	96.83	93.4	104.7	99.72
BOD_5	mg O_2/l	4	1.38	1.4	1.17	1.49	1.54	1.89
$KmnO_4$	mg O_2/l		0.85	1.66	1.12	2.45	1.25	2.09
Total N	mg/l		0.63	0.64	0.44	0.72	0.58	0.00
NH_3-N	mg/l	0.1	0	0	0.00	0.00	0.00	0.00
NO_2-N	mg/l	0.05	0.0063	0.0062	0.1	0.0067	0.007	0.007
NO_3-N	mg/l	10	0.38	0.41	0.375	0.42	0.523	0.483
Chlorides	mg/l		7.08	6.9	6.6	7.0	7.29	6.92
Sulphates	mg/l	0.05		6.12	-	6.44	-	6.54
PO_4-P	mg/l						0.02	0.14
Total P	mg/l		0.11	0.08	0.02	0.22		
Ca-$CaCO_3$	mg/l		131.32	138.31	140.23	132.9	151.35	142.42
Mg-$CaCO_3$	mg/l		31.76	28.22	32.4	30.25	32.78	33.50
Alkalinity	mg/l $CaCO_3$		-	126	-	186	-	185
Total bacteria	/1ml		1658	670	16467	4783	15557	2885
Most probable coli number	/100 ml	10 000	4367	2207	**19100**	**63000**	**15683**	**17100**
Most probable E. coli number	/100 ml		176	218	13233	4917	6954	4426
Hg	mg/l	0.001		0.0000		0.0000	0.000	0.000
Pb	mg/l	0.05		0.00285		0.00285	0.00742	0.00305
Mn	mg/l							
Cd	mg/l	0.005		0.0008		0.0023	0.00222	0.0017
Fe	mg/l	0.3		0.0010		0.0020		0.0010
Zn	mg/l	0.2		0.0026		0.0035	0.01919	0.0178
Cr	mg/l	0.1		0.0000		0.000	0.00094	0.000

**Decision on Maximum Concentrations of Dangerous Substances in Inter-Republic and International Waterways and Coastal Waters of Yugoslavia (Official Gazette of SFRJ, 08/78); specific requirements are set by the design guideline tresholds, issued by the Federal Ministry of Agriculture, Waterworks and Forestry for individual plants in accordance with the Water Law of FBiH*

According to these data, which represent the mean values of all measurements taken at the same locations throughout 2001 and 2000, presence of certain trends is obvious. The flow of Neretva river increases from the Raštani station (upstream of Mostar) through the "Mostar downstream" to Žitomislići station (further downstream). Because of the industrial wastewater

releases within Mostar, effect of tributaries, underground karst wells and flows, and the rivers such as Buna and Bregava, the Neretva river flow increases. The suspended solids and total solids levels also increase throughout the three stations. The Chemical Oxygen Demand (COD) increases from Raštani to Mostar and then drops downstream towards the Žitomislići station. As there are no major settlements between Mostar and Žitomislići, it is apparent that the Neretva purifies itself naturally between the two stations, where no accumulations or dams exist. The dissolved oxygen values decrease from Raštani to Mostar and then show an increase at the Žitomislići station. However, the original levels of COD and dissolved oxygen values from Raštani are not reached at Žitomislići. The content of sulfates shows an increase from Raštani to Mostar and then drops at the Žitomislići station, similarly to the trend observed for the total number of bacteria. However, the water quality at Žitomislići is still poorer than that recorded at Raštani.

6.3.2 Baseline Data for Odžak and Trnovo

A number of qualitative and quantitative measurements and analyses have been made for the Bosna and Željeznica rivers, and these are used as baseline data for Odžak and Trnovo project locations. However, some data is missing, was not sampled for, or was not sampled for in regular intervals. The data on the average precipitation, evaporation and evapotranspiration is provided in Table 6-8.

Table 6-8 Hydro-meteorological data

Station	*Watershed*	*Precipitation (mm)*	*Potential evapo-transpiration (PET) mm*	*Actual evapo-transpiration (= 0.85 PET) mm*	*Evaporation from water surface (=1.25* PET) mm*	*Precipi-tation / Evapo-ration*
Sarajevo (Trnovo)	Bosna	913	553	470	691	1.321
Tuzla (Modrac)	Bosna (Spreča)	895	571	485	714	1.254
Modriča (Odžak)	Bosna	795	585	497	731	1.087
Mostar	Neretva	1,513	718	610	898	1.686
Herzegovina	Neretva (Hutovo blato)	-	-	-	1,240	-
** The coefficient 1.25 is used for still lake water, while in practice this coefficient equals:* *1.25 – 1.35 in middle Bosnia* *1.5 – 2.0 in West Herzegovina and Neretva valley*						

The average monthly precipitation and temperature data for Trnovo and Odžak is given in Tables 6-9 and 6-10 below. This data shows that the climate in Trnovo and Odžak is mostly continental, with no extreme temperatures, but with seasonal variations.

Table 6-7 Water Quality Measurements - Neretva River

(bold figures indicate values exceeding the national legislation tresholds)

Parameter	*Unit*	*BiH stan-dard**	*Rastani*		*Mostar downstream*		*Žitomislići*	
Year			***2000***	***2001***	***2000***	***2001***	***2000***	***2001***
Flow Rate	m^3/s		92	107.16	102.25	-	209.03	-
Temperature	°C		13.0	12.15	10.15	12.68	12.63	7.81
Ph		6.8-8.5	7.6	7.93	7.9	7.85	7.92	7.81
Suspended Solids	mg/l	30	2.25	1.65	2.65	2.48	2.8	2.77
Total Solids	mg/l		-	142	-	177.4	-	184.2
COD	mg/l	12	8.413	9.21	**14.2**	11.27	10.34	10.92
Dissolved Oxygen	mg/l		10.2	10.82	9.98	9.72	10.67	10.28
Saturated O_2	%		99.97	87.8	96.83	93.4	104.7	99.72
BOD_5	mg O_2/l	4	1.38	1.4	1.17	1.49	1.54	1.89
$KmnO_4$	mg O_2/l		0.85	1.66	1.12	2.45	1.25	2.09
Total N	mg/l		0.63	0.64	0.44	0.72	0.58	0.00
NH_3-N	mg/l	0.1	0	0	0.00	0.00	0.00	0.00
NO_2-N	mg/l	0.05	0.0063	0.0062	0.1	0.0067	0.007	0.007
NO_3-N	mg/l	10	0.38	0.41	0.375	0.42	0.523	0.483
Chlorides	mg/l		7.08	6.9	6.6	7.0	7.29	6.92
Sulphates	mg/l	0.05		6.12	-	6.44	-	6.54
PO_4-P	mg/l						0.02	0.14
Total P	mg/l		0.11	0.08	0.02	0.22		
Ca-$CaCO_3$	mg/l		131.32	138.31	140.23	132.9	151.35	142.42
Mg-$CaCO_3$	mg/l		31.76	28.22	32.4	30.25	32.78	33.50
Alkalinity	mg/l $CaCO_3$		-	126	-	186	-	185
Total bacteria	/1ml		1658	670	16467	4783	15557	2885
Most probable coli number	/100 ml	10 000	4367	2207	**19100**	**63000**	**15683**	**17100**
Most probable E. coli number	/100 ml		176	218	13233	4917	6954	4426
Hg	mg/l	0.001		0.0000		0.0000	0.000	0.000
Pb	mg/l	0.05		0.00285		0.00285	0.00742	0.00305
Mn	mg/l							
Cd	mg/l	0.005		0.0008		0.0023	0.00222	0.0017
Fe	mg/l	0.3		0.0010		0.0020		0.0010
Zn	mg/l	0.2		0.0026		0.0035	0.01919	0.0178
Cr	mg/l	0.1		0.0000		0.000	0.00094	0.000

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According to these data, which represent the mean values of all measurements taken at the same locations throughout 2001 and 2000, presence of certain trends is obvious. The flow of Neretva river increases from the Raštani station (upstream of Mostar) through the "Mostar downstream" to Žitomislići station (further downstream). Because of the industrial wastewater

releases within Mostar, effect of tributaries, underground karst wells and flows, and the rivers such as Buna and Bregava, the Neretva river flow increases. The suspended solids and total solids levels also increase throughout the three stations. The Chemical Oxygen Demand (COD) increases from Raštani to Mostar and then drops downstream towards the Žitomislići station. As there are no major settlements between Mostar and Žitomislići, it is apparent that the Neretva purifies itself naturally between the two stations, where no accumulations or dams exist. The dissolved oxygen values decrease from Raštani to Mostar and then show an increase at the Žitomislići station. However, the original levels of COD and dissolved oxygen values from Raštani are not reached at Žitomislići. The content of sulfates shows an increase from Raštani to Mostar and then drops at the Žitomislići station, similarly to the trend observed for the total number of bacteria. However, the water quality at Žitomislići is still poorer than that recorded at Raštani.

6.3.2 Baseline Data for Odžak and Trnovo

A number of qualitative and quantitative measurements and analyses have been made for the Bosna and Željeznica rivers, and these are used as baseline data for Odžak and Trnovo project locations. However, some data is missing, was not sampled for, or was not sampled for in regular intervals. The data on the average precipitation, evaporation and evapotranspiration is provided in Table 6-8.

Table 6-8 Hydro-meteorological data

Station	*Watershed*	*Precipitation (mm)*	*Potential evapo-transpiration (PET) mm*	*Actual evapo-transpiration (= 0.85 PET) mm*	*Evaporation from water surface (=1.25* PET) mm*	*Precipi-tation / Evapo-ration*
Sarajevo (Trnovo)	Bosna	913	553	470	691	1.321
Tuzla (Modrac)	Bosna (Spreča)	895	571	485	714	1.254
Modriča (Odžak)	Bosna	795	585	497	731	1.087
Mostar	Neretva	1,513	718	610	898	1.686
Herzegovina	Neretva (Hutovo blato)	-	-	-	1,240	-
** The coefficient 1.25 is used for still lake water, while in practice this coefficient equals:* *1.25 – 1.35 in middle Bosnia* *1.5 – 2.0 in West Herzegovina and Neretva valley*						

The average monthly precipitation and temperature data for Trnovo and Odžak is given in Tables 6-9 and 6-10 below. This data shows that the climate in Trnovo and Odžak is mostly continental, with no extreme temperatures, but with seasonal variations.

Table 6-9 Monthly distribution of precipitation for Trnovo

Month:	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Average temp ^0C	-2.4	-0.7	2.9	7.2	11.7	14.4	16.0	15.7	12.5	7.9	3.3	-1.1
Precipitation (l/m^2)	97	89	103	100	90	98	75	81	92	111	154	138

Table 6-10 Monthly distribution of precipitation for Odžak (Bosanski Šamac)

Month:	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Average temp ^0C	-0.8	2.2	6.7	11.9	16.8	19.9	21.4	20.8	16.9	11.4	6.1	1.4
Precipitation (l/m^2)	51	45	52	56	61	83	71	63	60	51	66	59

The average flow rate data for Bosna river is provided in Table 6-11, while the water quality monitoring data for the rivers of Bosna and Željeznica are provided in Tables 6-12 and 6-13.

Table 6-11 Bosna Flow Rate Data

River	*Measurement Profile*	*Average flow rate Q (m^3/s)*	*Watershed Area A (km^2)*	*Specific flow ($l/s/km^2$)*	*Minimum daily flow ${}_dQ_{95}$ (m^3/s)*	*Minimum monthly flow ${}_mQ_{95}$ (m^3/s)*	*Flood water $Q_{1\%}$ (m^3/s)*
Bosna	Plandište	6.13	180	34.06	-	-	-
Bosna	Reljevo	26.8	1.185	22.62	-	-	-
Bosna	Zenica	78.7	4.124	19.08	-	-	-
Bosna	Zavidovići	91.7	4.996	18.35	-	-	-
Bosna	Maglaj	120.0	6.765	17.74	-	-	-
Bosna	Doboj	171.0	9.709	17.61	-	-	-
Bosna	Modriča (Odžak)	182.0	10.427	17.45	-	-	-
Bosna Tributaries:							
Spreča	Mouth of Bosna	24.3	1.942	12.51	-	-	-
Spreča	Modrac	15.5	1.944	8.0	-	0.65	1,000
Željeznica	Krupačke stijene	6.43	320	20	-	0.50	483
Miljacka	Dariva	3.85	273	14.1	-	0.30	300

Table 6-12 Water Quality Measurements - Bosna River (1991)

(bold figures indicate values exceeding the national legislation tresholds)

		Location						
Parameter	***Unit***	***BiH stndard****	***Plandi-šte***	***Reljevo***	***Raspo-točje***	***Zenica***	***Zavido-vići***	***Maglaj***
Water level	cm		67	90	-	68	-	34
Flow	m^3/s		0.608	5.2	-	14.5	-	18.6
Temperature (water)	°C		17	18	-	25	17	24
Temperature (air)	°C		30	22	-	27	21	26
Visible waste material			None	None	-	None	None	None

Noticeable color			None	None	-	None	None	None
Color	Pt-Co scale			-	-			7.4
Noticeable smell			None	-	-	None	None	None
pH		6.8-8.5	**8.88**	8.3	**9.2**	**8.95**	**8.61**	**8.52**
Electrical Conductivity	uS/20°		277	531	520	471	427	521
Nitrites	N mg/l		0.099	0.71	-	1.286	0.089	0.377
Nitrates	N mg/l		1.906	0.222	-	4.68	1.22	0
Dissolved Oxygen	mg/l		8.71	7.88	13.2	9.55	7.73	-
Saturated O_2	%		-	-	-	92.16	103.7	-
Suspended Solids	mg/l	30	20	-	10	20	20	20
Total solids	mg/l		120	-	90	90	150	140
BOD_5	mg O_2/l	4	2.68	-	**4.3**	1.39	3.29	0.54
$KMnO_4$	mg O_2/l		1.32	-	1.27	1.12	2.15	1.05
Hardness – total $CaCO_3$	mg/l		-	-	102.87	174.28	88.06	196.35
Ammonium	N mg/l				-	0	0	0
Chlorides	mg/l				-	9.69	1.43	9.43
Sulphates	mg/l	0.05			-	**59.34**	**6.35**	**61**
Sulphides	mg/l				-	0	0	0
Phosphates	mg/l					0.346	0	0.896
Ca-$CaCO_3$	mg/l							
Mg-$CaCO_3$	mg/l							
Alkalinity	mg/l $CaCO_3$		144	-	67	96	90	92
Most probable number coli	/100 ml	10 000						
Ca	mg/l					76.92	55.78	95.67
Mg	mg/l					14	11.51	13.98
Fe	mg/l	0.3			0.018	0.027	0.0113	0.0315
SiO_2	mg/l				-	2	0.95	2.2
K	mg/l		1.48	2.14	2.35	3.03	2.17	-
Na	mg/l		5.7	22.56	21.14	46.58	28.98	-

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The major issue for the Bosna river is the lack of data for the significant flow length. Common for all of the sampling locations is that there is no observed waste material, color or noticeable smell within the samples. As for the values measured for pH, Nitrates, Nitrites, Dissolved Oxygen, BOD and COD, there are no specific trends. The values increase and drop with variations in the flow, location or various settlements and their releases.

Unfortunately, there has been no permanent monitoring of the microbiological characteristics of the Bosna river. Hence no conclusions can be drawn on the effect of wastewater, but if we

consider the data on the degrading quality of the Sava river as a result of the Bosna river drain, it is evident that Bosna has a lower quality in its downstream sections, which degrades the quality of the Sava river.

Table 6-13 Water Quality Measurements - Željeznica River

(bold figures indicate values exceeding the national legislation tresholds)

		Location:			
Parameter	***Unit***	***BiH standard****	***Ilovica***	***Krup. Stij***	***Ilidža***
Water level	cm		54	47	28
Flow Rate	m^3/s		2.45	2.18	0.181
Temperature (water)	°C		15	16	21
Temperature (air)	°C		19	23	34
Visible waste material			None	None	None
Noticeable color			None	None	None
Color	Pt-Co scale		-	-	-
Noticeable smell			None	None	None
pH		6.8-8.5	8.25	**8.6**	**8.88**
Electrical Conductivity	uS/20°		320	354	277
Nitrites	N mg/l	0.05	**0.593**	**0.504**	**0.154**
Nitrates	N mg/l	10	1.42	1.409	1.169
Dissolved Oxygen	mg/l		6.93	9.22	6.63
Saturated O_2	%		74.83	91.55	74.5
Suspended Solids	mg/l	30	**30**	20	10
Total solids	mg/l		120	110	120
BOD_5	mg O_2/l	4	0.93	1.04	1.5
$KMnO_4$	mg O_2/l		2.7	4.1	3.2
Hardness – total $CaCO_3$	mg/l		188	78.59	92.61
Ammonium	N mg/l		0	0	0
Chlorides	mg/l		1.497	1.16	2.8
Sulphates	mg/l	0.05	**11.29**	**9.18**	**10.84**
Sulphides	mg/l		0	0	0
Phosphates	mg/l		0	0	0
Alkalinity	mg/l $CaCO_3$		88	120	92
Most probable number coli	/100 ml	10 000			
Ca	mg/l		41.31	72.92	68.56
Mg	mg/l		11.59	15.1	12.21
Fe	mg/l	0.3	0.0045	0.013	0.0045
SiO_2	mg/l		2.55	1.65	1.35

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When analyzing the results obtained for the Željeznica river, it is obvious that its flow rate decreases towards Ilidža measuring station. With the decrease of the flow rate, the pH values within the river increase. However, there is no visible waste material, nor there is obvious smell nor color. The values of nitrites and nitrates, along with the values of suspended solids decrease with the flow of the Željeznica. The values of the BOD show a steady increase, while the values of COD, total solids, and dissolved oxygen increase from Ilovica and then decrease toward Ilidža. Much like the Bosna river, there is no bacteriological information for the Željeznica river, but the effect of the Željeznica river was indicated within the classification of the Bosna river provided at the beginning of this chapter.

6.3.3 Baseline data for Živinice

The Spreča river flows into the Modrac lake, and leaves Modrac to become one of the tributaries of the Bosna river.

As Modrac lake is one of the most significant water accumulations in the Tuzla region, it is considered as one of the biggest potential water supply sources. Therefore stringent monitoring and measurement procedures have been conducted regarding both, the water quantity and water quality for Modrac. The Spreča river water quality is measured at on locations:

Sp-1 - downstream of Lukavac, where class 3 quality is prescribed
Sp-2 - at the mouth of the Spreča and Bosna rivers, where class 3 quality is prescribed

According to measurements performed during the period 1985 through 1989, the water is out of class prescribed. Upon a request by the Ministry of agriculture, forestry and water management, Direction for waters of the Tuzla canton, examination of the lake Modrac water quality was conducted during the period 2002-2003 with respect to its use as a drinking water source for the municipalities in Tuzla region. In accordance with article 119 of the Water law of the Federation of Bosnia and Herzegovina, the measurements were performed by the Institute of Chemical Engineering, SODASO Holding Tuzla. Based on the report for the summer period of the year 2002, it is obvious that this program was intended to cover:

Physico-chemical properties,
Biological characterictics, and
Microbiological characteristics of water.

The examination was conducted on three locations - at the mouth of the Spreča river, at the mouth of the Turija river and upstream of the dam, i.e. upstream of the sections of overflow and water intake for consumption. The results correspond to the measurements dated 20.08.2002. Sampling and procedure methods are set forth by the Regulation on Sampling and Laboratory Analysis of Drinking Water (Official Gazette of SFRJ, #33/87). Based on the results obtained, it can be concluded that Modrac water quality was lower than in the previous summer periods. The water quality at the three sampling points was of class 3 or class 4. The researchers were of opinion that the average quality and physico-chemical characteristics of water overall correspond to class 2 or 3. They stated that it was difficult to judge the trophic characteristics of the Modrac lake based on this extent of examination, but that in can be generally concluded that Modrac has characteristics of a mesptrophic lake with tendency

toward slight eutrophy, as well as that the sludgy lake bed does not provide habitation conditions or food. The microbiological (bacteriological) water characteristics were examined applying the methods set forth by the regulation mentioned above, while the assessment and interpretation of the results were made using the criteria published in Official Gazette of SFRJ, #33/87 and Public Gazette of SRBiH, #19/80. Based on the results obtained, it was established that water of the lake of Modrac and its tributaries Spreča and Turija had a high bacteriological load in the summer period, in particular at the mouth of Spreča, with a MPNB of 270,000/1000 ml, which makes it a class 4 water. Presence of fecal pollution was established for all lake sections as well as for the tributaries.

Based on "Framework waterworks basis" published in 1994, a regional sewage system Tuzla-Lukavac, including the area downstream of Modrac, was planned for the protection of the rivers of Jala and Spreča. This study, however, focuses on the protection of the lake of Modrac itself and the upstream area.

The most recent measurements conducted in 2003 were used for analyzing the Modrac drinking water supply potential, the summary results of which are given in Tables 6-15 and 6-16. The sampling points are shown on page 57, Figure 5, while the average precipitation and temperature data is given in the Table 6-14.

Table 6-14 Mothly distribution of precipitation for Živinice

Month:	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Average temp ^{0}C	-1.2	1.4	5.4	10.5	14.8	18.1	19.5	18.8	15.2	10.1	5.5	0.3
Precipitation (l/m^2)	62	52	62	85	92	129	117	92	63	64	68	78

Table 6-15 Modrac Lake Water Quality Data

(bold figures indicate values exceeding the national legislation tresholds)

			Location:								
Parameter	***Unit***	***BiH stand****	***Spreča mouth***	***Spreča mouth***	***Turija mouth***	***Turija mouth***	***Turija mouth***	***Modrac dam***	***Modrac dam***	***Modrac dam***	***Modrac dam***
Sampling Depth	m		0,2	2.3 (bottom)	0,2	2.0	4.4 (bottom)	0,2	2.0	4.0	8.2 (bottom)
Flow	m^3/s		NA	NA	NA	NA	NA	NA	NA	NA	NA
Temperature (air)	°C		20	-	22	-	-	23	-	-	-
Temperature (water)	°C		22	21.5	22.5	22.5	21.5	23	23.0	23.5	22.0
Color	Pt-Co scale		-	-	-	-	-	-	-	-	-
Turbidity	NTU		12.0	37.0	3.3	6.1	6.2	6.0	8.7	7.7	7.0
pH		6.8-8.5	8.4	8.1	**8.7**	**8.7**	**8.6**	**8.8**	**8.7**	**8.6**	8.1
Alkalinity	mg/l $CaCO_3$		135.0	135	135.0	130.0	130.0	115.0	120.0	125.0	140.0
Hardness –carb. $CaCO_3$	dH°		6.72	6.72	6.44	6.44	6.44	5.60	5.60	5.88	7.28
Hardness –non-carb. $CaCO_3$	dH°		4.06	4.76	4.34	4.34	4.48	4.48	5.32	5.04	4.06
Hardness – total $CaCO_3$	dH°		10.78	11.48	10.78	10.78	10.92	10.08	10.92	10.92	11.34
Carbonates (CO_3)	mg/l		18.0	18.0	24.0	18.0	18.0	18.0	24.0	24.0	12.0
Bicarbonate(HCO_3)	mg/l		109.8	109.8	91.5	103.7	103.7	85.4	73.2	79.3	134.2
Dissolved Oxygen	mg/l		10.10	10.60	13.20	13.10	12.10	16.05	14.50	13.30	7.90
Saturation with O_2	%		128.20	134.10	164.05	163.56	152.22	210.00	183.00	165.00	96.00
COD	mg O_2/l	12	9.7	7.5	**11.9**	**15.1**	**15.1**	**17.2**	**16.2**	**21.6**	**17.2**
$KMnO_4$ usage	mg O_2/l		25.3	38.2	21.2	32.6	33.2	22.8	43.3	39.8	18.0
NH3 (N)	mg/l	0.1	**1.35**	**0.50**	**1.95**	**1.70**	**1.60**	**0.06**	**0.44**	**0.12**	**0.44**
Nitrites	mg/l	0.05	0.0110	0.0440	0.0095	0.0090	0.0060	0.0030	0.0070	0.0080	0.0150
Nitrates	mg/l	10	0.4400	0.1600	0.2500	0.0800	0.0900	0.0500	0.7800	0.4400	0.2000
Organic Nitrogen	mg/l		0	0	0	0	0	0	0	0	0
Total Nitrogen	mg/l		1.2155	0.7512	2.3120	1.8745	1.7808	0.1175	2.2745	0.5907	0.6812
Orthophosphates	mg/l		0.0100	0.0120	0.0060	0.0010	0.0070	0.0030	0.0030	0.0060	0.0030
Total Phosphates	mg/l		0.0115	0.0138	0.0068	0.0011	0.0078	0.0034	0.0034	0.0027	0.0034
Free CO_2	mg/l		0	0	0	0	0	0	0	0	0

Bonded CO_2	mg/l		52.80	52.80	56.00	56.00	56.00	44.00	44.00	46.20	77.20
Chlorides	mg/l		14.90	17.00	24.10	17.10	17.00	24.10	19.90	17.70	24.10
Sulphates	mg/l	0.05	**81.60**	**83.30**	**81.40**	**81.50**	**80.80**	**81.70**	**82.30**	**82.00**	**82.90**
Silicates - SiO_2	mg/l		7.28	6.90	3.68	7.10	5.18	6.50	4.65	7.70	7.70
Na	mg/l		8.9	8.9	8.9	8.8	8.8	8.7	8.6	8.8	8.9
K	mg/l		2.6	2.6	2.6	2.7	2.6	2.5	2.5	2.7	2.7
Ca	mg/l		38.07	45.09	37.07	38.07	39.08	32.06	36.09	38.07	47.08
Mg	mg/l		23.70	22.49	24.31	23.70	23.70	24.31	25.52	24.31	23.70
Fe, total	mg/l	0.3	**0.30**	**1.26**	**0.37**	**0.43**	**0.63**	0.09	0.09	0.12	0.16
Mn	mg/l		0.02	0.08	0.09	0.12	0.14	0.009	0.014	0.015	0.09
Cu	mg/l	0.1**	0.0004	0.0005	0.0004	0.0003	0.0005	0.0003	0.0004	0.0004	0.0005
Zn	mg/l		0.2700	0.3000	0.2450	0.2500	0.2750	0.2300	0.1500	0.2000	0.1800
Al	mg/l		0.2600	0.8200	0.0700	0.2300	0.0900	0.3200	0.0600	0.1500	0.0100
Pb	mg/l	0.05	0.0030	0.0050	0.0080	0.0060	0.0020	0.0140	0.0060	0.0140	0.0190
Ni	mg/l	0.05	0.0130	0.0220	0.0100	0.0090	0.0120	0.0090	0.0090	0.0120	0.0130
Cr	mg/l	0.1	0.0030	0.0090	0.0030	0.0030	0.0030	0.0030	0.0020	0.0050	0.0060
Detergents (AAT)	mg/l		0.0160	0.0090	0.026	0.0140	0.0170	0.0140	0.0160	0.0085	0.0095
Total solids	mg/l		323.5	306.0	278.0	288.0	307.0	304.5	262.0	258.0	281.0
Suspended Solids	mg/l	30.0	**30.0**	**33.5**	18.0	15.0	12.0	2.0	27.5	**29.5**	23.0
Electrical Conductivity	uS/ 20°		380	391	378	378	382	431	432	432	420
"Transparency"	m		0.5	-	1.10	-	-	0.65	-	-	-

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*** 0.001 for 0.001 for salmonides*

Table 6-16 Microbiological analysis of Modrac Lake

(bold figures indicate values exceeding the national legislation tresholds)

		Location:					
Parameter	**BH Standard***	***Spreča mouth***		***Turija mouth***		***Modrac dam***	
Depth of sampling, m		0.2	4.5	0.2	5.5	0.2	6.0
Total number of aerobic mesophillic bacteria in 1 ml		40	500	90	85	120	50
Total Coliforms – MPN in 1000 ml	100 000	3,800	**270,000**	220	0	500	1,500
Total Fecal Coliforms (Eikman method)		+	+	-	-	-	-
Fecal Streptococci		+	+	-	-	-	+
Proteus types		-	-	-	-	-	-
Supphide-reducing clostridia in 10 ml		-	+	-	+	-	+
Pseudomonas aeruginosa		-	-	-	-	-	-

**Decree on Classification of Waterways - see pages 59 and 60; specific requirements are set by the design guideline tresholds, issued by the Federal Ministry of Agriculture, Waterworks and Forestry for individual plants in accordance with the Water Law of FBiH.*

One of the major issues and indicators when dealing with the Modrac Lake is the fact that the Total Coliforms are significantly higher at the mouth of the Spreča river, than the values recorded at the mouth of the Turija river or at the Modrac dam. In addition, the mouth of the Spreča is the only place where fecal coliforms have been detected at the given depths.

The measurement results also show increased content of detergents and total phosphates at the mouth of the Spreča. In addition, the values for nitrites and nitrates are the highest at the same location, while the total nitrogen value is the highest at the mouth of Turija. Dissolved oxygen is lowest at Spreča, as well as the values for saturation with oxygen and COD. Overall, the water quality is the poorest at the mouth of the Spreča river.

7 ANALYSIS OF ALTERNATIVES

This chapter provides an overview of the different project alternatives, and considers the corresponding environmental impacts. Each of the alternatives has been additionally analyzed with regards to other aspects of their implementation, including feasibility, and financial viability.

Waste water treatment plants, which are currently non-operational, already exist on the project locations of Odžak and Trnovo. Project documentation and designs for the rehabilitation of these plants are available. In case of Živinice, the preliminary project design has been prepared for the construction of new a waste water treatment plant using the standard biological treatment method with active sludge. Alternatives to this have been considered as well, but these are not described in the preliminary project design documentation available. The technology used with the chosen alternative can in the future be readily complemented by a unit for chemical removal of phosphorus, which was apparently one of the crucial factors in the selection process. Major issue on these three project locations is the environmental impact in case the project is not implemented, and the situation is left as-is. Hence, the "do nothing" alternative shall be evaluated for each of the three locations, while the alternatives for Mostar are more specific, as there isn't an existing wastewater treatment plant or facility, and several project alternatives have been considered within the studies prepared so far.

The alternatives considered for Mostar have been identified in the *Mostar Urban Environment and Water Quality Plan* (Harza, Chicago). As a preliminary step, the entire Mostar region has been divided into three drainage sub-areas, the North, Central and South valley, whereby the Central valley encompasses the city center with the highest concentration of population.

The first alternative identified for the Mostar region is the alternative where there would be a single service area for the entire valley, that is the three sub-areas would all be grouped into one service area. The details of this alternative have been based upon the 1996 project while the location for the proposed treatment plant could be changed, as the site originally proposed in 1996 may no longer be available.

In addition, different sub-options have been proposed with respect to the sewer and wastewater collection system. These alternatives would include dual main sewers in the central urban area, or a tunnel collection or an aqueous sewer. Each of these alternatives uses gravity flow, while, due to the different elevations of the urban area, a number of pumping stations would also be required.

The second alternative for Mostar is to establish two service areas, which would be made up of the North valley as one area, and the Central and South valley together as the second. The Central and South valley would be provided with the wastewater treatment plant as proposed (mechanical and biological treatment), while the less developed North valley could use re-circulation and simpler treatment methods. However, for this option the land available is the limiting factor, especially if biological treatment methods such as lagoons or wetlands are considered.

The third alternative is to have three different service areas, as defined in the three regions. Each one of these regions would have a separate collection system and a separate treatment plant. The treatment facility for the North valley would be similar to that proposed for the Central and South valley in the second alternative, which could also be the best solution for the South valley as the third service area. The Central portion would be provided with the mechanical and biological treatment system proposed by the initial study, as proposed in the second alternative, with the smaller inflow, as in this alternative the South valley would be a separate service region. The only difference between the second and third alternative is the separation of the South valley as a service area, with reduced waste water load in relative terms.

The various treatment technologies have also been analyzed in the *Mostar Urban Environment and Water Quality Plan*. A treatment plant with an oxidation ditch was identified and compared with the lagoon treatment or the wetland treatment. Following a detailed analysis, the oxidation ditch method was determined to be the least expensive with regard to set-up, and to require the least land surface. However, the oxidation ditch has the highest operational costs. One of the most important factors which favor the oxidation ditch is the fact that this method is the least sensitive and least prone to process upsets. Furthermore, the lagoons or the wetlands require larger land areas for set-up and operation, which might be scarce in the hilly and karst region around Mostar.

Based on financial and non-financial factors, that were analyzed in the Plan mentioned above, the options which are recommended for further evaluation are the ones that break down the service region into two or even three regions. The non-financial factors which were taken into consideration include effluent quality, and nitrogen wasteloads into the Neretva river, and the flexibility of the investment to be phased. In addition, the construction, operation and maintenance costs were compared, along with the complexity, flexibility and expandability of the plant. Land utilization and compatibility with the existing facilities were also taken into account. The alternative which received the highest ranking in this comparison was the two-service area alternative with a wastewater collection tunnel in the narrow urban area.

The possible impacts associated with this division of the wastewater treatment, include permanent loss of land resources, and depletion of natural resources through the operation of the plants. With the higher number of treatment plants or alternatives, the pumping costs are decreased and the number of pumping stations required are lowered. However, with the increased number of service areas and treatment plants, the land is additionally stressed, while its use becomes permanently altered on a greater number of locations, and to a greater extent. In addition to this, the higher the number of treatment plants or areas, the higher the odor releases and noise generation.

In case of the "do nothing" alternative, the results would be identical for all the four project locations. The situation would remain the same, with a worsening tendency due to the growth of the population. The wastewater would continue to be directly released into the environment, primarily the ground and surface waters. The concentration of organic and microbiological constituents and pollutants would be on rise, and the surface waters could not be used for drinking water supply, irrigation or leisure activities, while the aesthetics of the water bodies

would be significantly degraded. Having all this in mind, it is obvious that the environmental impacts of the "do nothing" alternative would be much greater than the possible impacts that may arise during the construction and the later operation of the plants considered.

8 IDENTIFIED ENVIRONMENTAL IMPACTS

8.1 Construction Impacts

Most short term impacts on the environment, i.e. immediate surrounding of the site, are expected to occur during the construction or future decommissioning activities. These impacts typically include traffic disruptions and congestion, or a decrease in local traffic safety. It should also be noted that the site might pose an additional safety threat in case of unrestricted access to it. Noise, vibration, dust and construction wastes are generated during construction, while land quality may be affected and vegetation destroyed during the works. It is also important to emphasize that there is certain probability of chance findings of cultural heritage items or mass graves during excavation or construction activities throughout BiH. In order to mitigate and minimize all of these impacts, the following list of good construction practices has been formulated.

Prior to commencement of all activities foreseen within this Project, it is necessary to familiarize the contactors with the environmentally sound clauses (see Appendix 3), i.e. give them instructions on environmentally most acceptable methods of performing the activities. In particular, the following principles should be followed:

- Compliance with general national environmental regulations,
- Protection of natural habitats and protected / sensitive areas,
- Protection of cultural and historic monuments,
- Obeying precautionary measures with respect to chance findings of mass graves and mine fields,
- Adequate disposal of construction and excavation wastes,
- Minimizing impact of presence of construction crews on site, such as location of construction camps, water requirements and sources, increased traffic to location, location of dumps, etc.
- Minimizing damages that could be incurred onto public or private properties during construction or decommissioning,
- Adequate management of waste and wastewater generated within the construction camp, and
- Establishment proper construction site access control.

Excavated material and other wastes are to be taken to adequate nearby landfills using agreed traffic routes. These are the Uborak landfill in case of Mostar, Sarajevo landfill for Trnovo, future regional landfill in Tuzla for Živinice, and Tešanj landfill or the future regional landfills in Tuzla or Bijeljina for Odžak (these new regional landfills are expected to be operational by 2007). Wherever possible, excavated material should be reused in order to avoid unnecessary exploration of new sources. Wherever possible, existing quarries should be used for supplies required. The contractors should take care to restore the original landscape appearance to the degree possible upon completion of the works.Details of environmental protection measures should be specified in the construction or decommissioning bid documents.

8.2 Changes in Land Use

Change in land use is one of the impacts that is permanent, and can be mitigated in one of the following ways applicable to this project:

- construct collectors and plants on public owned land,
- use locations of former wastewater treatment plants, as is the case in Odžak and Trnovo, and
- use locations within former industrial zones.

8.3 Resettlement

This project will not require any resettlement of population. Plants already exist in Odžak and Trnovo and this project will focus on their rehabilitation. However, new plants will be constructed in Mostar and Živinice. Unoccupied location for the plant in Živinice is already available. The ongoing Mostar plant planning activities are expected to provide a location away from settlements, with no major impacts on the local residents.

8.4 Noise and Vibration

Noise and vibration may occur both during the construction and during the later plant operation phases. During the construction and decommissioning phases, noise and vibration occur as a result of the increased traffic and construction works, such as compaction, excavation, drilling or mechanical digging. However, proper scheduling of the construction activities can substantially reduce the noise and vibration impacts, by limiting them to regular daytime periods. Additionally, all transport to and from the site with larger vehicles should be adapted to the local traffic flow of the daytime periods given.

During the plant operation, the noise levels produced should be maintained within acceptable limits. The plant should be located as far as possible from the settlements and urban areas, while equipment such as mufflers, sound enclosures or noise barriers should be used in order to reduce the level of noise.

8.5 Odor

Unpleasant odor is an unavoidable issue during wastewater treatment, due to a number of gasses produced and emitted, such as hydrogen sulfide. Since this odor cannot be avoided, it can be minimized by means of buffer zones around the treatment plant, or costly installation of odor control equipment.

During normal operation, no significant odor problems should arise, unless there is a malfunction that can make the sewage or sludge become septic and emit strong odors. In certain areas, such as the preliminary screening, odor is most frequently emitted. Hence, it is important to lower the retention time of the screened solids and wastes, and ensure their disposal on an appropriate disposal site, such as a sanitary landfill.

The overall effect of the project shall result in a long-term reduction of certain problems, such as odor release from the open water bodies in the project area. With the construction of collection systems and treatment plants for wastewater, the sewage will not be released directly into waterways and water bodies, especially rivers that flow through the cities.

8.6 Impact on Population and Development

This project will create new work places during the construction phase and the later plant operation, maintenance and management. Furthermore, by diverting the sewage from open rivers and water courses, the number of microbes and pollution in the water bodies will be reduced, hence improving the overall public health situation.

Construction of new structures can often have a negative aesthetic impact on the environment. Use of buffer zones and green belts is therefore recommended as a mitigating measure. However, the establishment of appropriate wastewater collection and treatment systems will help overcome substantial urban development barriers, and therefore this project will facilitate further construction within the urban areas.

8.7 Impact on Historical Sites

No impacts on historical sites or cultural heritage objects are expected on the locations of the identified four project components. However, in case of Mostar, precaution measures should be taken during the works in or around the old city area, where numerous significant structures are concentrated. Even though unlikely, chance findings of archeological sites or mass graves during the construction activities can not be ruled out. In this case, the relevant authorities need to be informed of such findings and all construction works need to be ceased.

8.8 Impact on Surface and Ground Water

Table 5. Quantities of substances reduced for years 2005 to 2024 (tons/year)

The project is expected to have a direct positive effect on the surface water quality, especially in the water bodies that have been the recipients of raw sewage. This will particularly be reflected in the achievement of more acceptable BOD (biological oxygen demand) values for the recipient, as well as significant reduction of microbiological and nutrient pollution on all project locations. This positive effect will depend on the plant efficiency. Available baseline data are incomplete, however, the following improvements have been estimated:

Project Component	Years	Average Waste-water production (m3/year)	Expected reducti-on of Nitrogen pollution loads (tons/year)	Expected reducti-on of Phosphorus pollution loads (tons/year)
Mostar	2005-2024	22,641,000	226	36
Odzak	2005-2024	1,783,000	18	3
Trnovo	2005-2024	697,000	7	1
Zivinice	2005-2024	600,000	6	1

Due to a strong interplay of groundwater and surface water in karst areas, in case of Mostar component there will also be a positive effect on groundwater. Concerning the Živinice component, it should be stressed that, due to the presence of numerous industrial pollution sources, improvement of the Modrac lake water quality will require a number of further measures in the future (out of the scope of this project) along with the establishment of proper wastewater treatment.

8.9 Impact on Drinking Water Sources

In certain instances, based on the geographic configuration, or the location of the treatment plant, the project is expected to directly improve and protect the drinking water sources. Thus for instance, the drinking water source for the city of Sarajevo is located downstream of Trnovo, near the river of Željeznica, which currently receives raw wastewater discharges from the Trnovo settlement. Upon construction/rehabilitation of the Trnovo wastewater treatment plant the releases of raw sewage into the river Željeznica will be decreased and the quality of the water flowing into the Sarajevo water supply area will be improved, especially the physicochemical and microbiological characteristics of the river, as will ultimately the health of the population receiving their drinking water from this source. In addition to this, there will be a positive effect on the health of the population utilizing the water for other purposes, such as recreation or irrigation. Precise estimates of future drinking water quality improvement can not be made since complex interactions and current individual pollution contribution of the existing surface and ground waters in the project areas can not be quantified for the time being.

8.10 Impact on Agriculture

If the sludge from the treatment plant is adequately treated, it can be used in agriculture as fertilizer, while disinfected effluent can be used for irrigation. As a result, the agricultural activities can be intensified, or provided potential to develop while preserving natural resources. However, it is important to note that the quality of the sludge and effluent needs to be carefully and continuously monitored in case of their agricultural use, in order to prevent toxic levels of heavy metals or pathogenic microbes in crops. Along with the monitoring system, the agricultural workers would need to be trained. Since it is not possible to foresee the quality of soil which would be irrigated or where sludge would be applied, at this stage it is not possible to propose specific sludge or effluent use plan. After identifying all the parameters, such a plan can be developed in consultation with the local institutions responsible and in accordance with the international standards.

8.11 Impact on Soil Quality

Soil quality can be affected, as can indirectly the public health, if the sludge generated in the wastewater treatment process is used for agricultural purposes, or if it is disposed of by spreading sludge over areas of land. Due to the possibly high concentrations of heavy metals and microbes in the sludge, the sludge needs to be closely monitored.

It should be taken into account that there is a flooding tendency on the location of the future wastewater treatment plant in Živinice. Therefore during the project design preparation stage appropriate measures will have to be planned in order to prevent sludge dissipation during floods, and proper sludge management system will have to be developed.

8.12 Impact on Health

When considering that the rivers and other watercourses in BiH are used for drinking water supply, irrigation and recreational purposes, it is evident that the release of untreated wastewater can cause significant concern, especially with regards to public health. Through collection and adequate treatment of wastewater, the quantities of raw sewage released into the watercourses will be reduced. As an immediate result, the amount of pathogenic microorganisms and polluting constituents is expected to be decreased, thus reducing the chances of disease occurrence either through drinking water, irrigation of crops or direct contact. In certain areas, such as the karst Mostar area, the interaction of groundwater and surface water is substantial. In such cases contamination of groundwater with pathogens and nutrients, such as nitrates, is also reduced.

8.13 Adverse Impacts on Natural Environment

No impacts on natural environment are expected in relation to this project. By careful planning, as well as following the adequate mitigation measures recommended in this Study (next chapter - Environmental Management Plan), the project is expected to have a positive overall effect on the nature. Thus improvement of water quality in the watercourses concerned is expected, which will in turn help preserve and protect the biodiversity and ecosystems.

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Mitigation Plan

The following plan of measures for mitigation of environmental impacts is applicable to all four project components, however, it should be noted that most construction phase activities will occur in the Mostar component.

Project: Water Quality Protection (WQP) Mostar, Odžak, Živinice, Trnovo				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Construction	Construction activities may lead to traffic disruptions and congestions	Clearly display informative/warning signs around construction area. Limit construction to regular time intervals. Allocate possible alternative traffic routes (diversions).		Included in construction costs	Construction Contractor
Construction	Construction activities may affect traffic safety.	Clearly display informative/warning signs around construction area. Limit construction to regular time intervals. Allocate possible alternative traffic routes (diversions).		Included in construction costs	Construction Contractor
Construction	Construction activities may jeopardize citizens passing by	Construction site must be confined (safety fence). Site admittance control must be established		Included in construction costs	Construction Contractor

Project: Water Quality Protection (WQP) Mostar, Odžak, Zivinice, Trnovo				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Construction	Temporary air pollution with dust generated by construction works and truck traffic	Reduce dust generating traffic to the extent possible. If possible, use closed or covered trucks for transportation of construction materials. Sprinkle earth with water to prevent dust generation, remove excess materials and clean sites upon completion of activities. Where possible, use protective cloth covers or screens in dust generation areas.		Minor/ Included in construction costs	Construction Contractor
Construction	Noise and vibration disturbances due to construction works	Limit construction activities to regular daytime intervals. Establish schedule and/or other specific restrictions on works. If necessary, use noise barriers and/or noise suppressors on equipment.		Minor/Included in construction costs	Construction Contractor
Construction	Excavated material and construction wastes may cause pollution and pose an environmental threat if not disposed of properly	All wastes generated through construction activities, including hazardous wastes, need to be disposed of on approved landfills		Should be included in construction costs; Cost estimate: 1KM/ton*km for transport, 50KM/t for disposal	Construction Contractor. Environmental inspector must ensure all regulations and procedures are met.

Project: Water Quality Protection (WQP) Mostar, Odžak, Živinice, Travnik				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Construction	Pollution of earth and surface waters by leaks/spills of fuel, lubricants, coolants, paint, solvents and bitumen	Periodically check technical condition of vehicles and all equipment. Store fuel, lubricants, coolants, paint, solvents and bitumen safely, handle cautiously. Any spills must be contained and cleaned up. Migration pathways for fuel, lubricants, coolants, paint and solvents have to be limited to prevent occasional leaks from escaping into the environment. Fuel and lubricants change or top-up should be made in dedicated adequate places		Minor/included in construction costs	Construction Contractor, WWTP Maintenance Crew
Construction	Equipment emissions may affect air quality	Properly maintained equipment should be used. Construction activities need to be limited to regular time intervals.		Minor	Construction Contractor
Construction	Erosion and sedimentation may occur as a result of excavation, stockpiling or backfilling of excavated material	Control of excavated materials through stockpiling on the uphill side of the trench.		Included in construction costs	Construction Contractor
Construction	Landslides due to construction works	Conduct geotechnical investigation and analyze results prior to works start. Respect safety rules during works.		Should be included in construction costs	Construction Contractor, External Consultant
Construction	Damage to trees and other vegetation during construction activities	Minimize vegetation clearing. Restore and replace all damaged trees or vegetation.		Cost estimate: 100-300 KM/m^2 for vegetation restoration	Construction Contractor

Project: Water Quality Protection (WQP) Mostar, Odžak, Žlvinice, Trnovo				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Construction	Although unlikely, chance findings of ordnances, mass graves or cultural heritage items are possible	Cease all construction works in the area, contact police/civil protection/authorities. Arrange necessary site preservation measures.		None or minor	Construction Contractor
Operation	Wastewater collection system (network) leaks can contaminate the soil and groundwater	Occurrence of leaks should be minimized by ensuring proper quality during project design preparation and construction, as well as by regular inspections and maintenance during operation		Included in construction and maintenance costs	Operator, WWTP maintenance crew
Operation	Discharged (effluent) wastewater can affect recipient water quality and biodiversity, if improperly treated	Ensure proper WWTP operation. Monitor effluent quality. Develop emergency/accident procedures.		Included in maintenance costs	Operator-WWTP maintenance crew
Operation	Use of open collectors can pose a health risk	Avoid use of open collection systems.		Included in maintenance costs	Operator-WWTP maintenance crew
Operation	Noise and odors generated at pumping stations, as well as odors due to leaks or from open canals, can be nuisance to local residents	Collection system leaks should be minimized by applying a quality control program during project design preparation and construction activities, complemented by regular inspections and maintenance during operation. Pumping stations should be located away from densely populated areas or placed in closed buildings. Use of open collection canals should be avoided.		Included in maintenance costs	Operator-WWTP maintenance crew

Project: Water Quality Protection (WQP) Mostar, Odzak, Zivinice, Tmovo					
Phase	Issue	Mitigating measure	Comments	[illegible]	Institutional responsibility
Operation	Disposal of residual solid products (sludge) from mechanical, chemical and/or biological treatment can cause pollution of water and soil	Special sludge accumulation areas must be provided in accordance with safety standards. Solid waste management system, should be established (collection, treatment, disposal or reuse) Safety procedures for transportation and use must be established.		Included in regular operational and maintenance expenses	Operator
Operation	Insufficient WWTP operation efficiency can result in inadequate effluent quality	Perform regular monitoring of WWTP operation. Conduct regular screening of quality of infloming wastewater. Control quality of effluent from WWTP. Periodically check WWTP condition.		Included in regular operational and maintenance expenses	Operator - Maintenance Crew
Operation	Excessive chlorine dozing can affect flora and fauna of the recipient	Establish adequate chlorination control system.		Included in regular operational and maintenance expenses	Operator - Maintenance Crew
Operation	Use of treated effluent for irrigation purposes may pose health and environmental hazards	Treated effluent needs to be chlorinated and undergo a strict monitoring procedure. Promote user awareness and education.		Included in maintenance costs	Operator - WWTP maintenance crew
Operation	Use of sludge in agriculture may degrade the soil quality or pose a risk to health if done inadequately	Test sludge quality, in particular microbiolocial characteristics. If not satisfactory, prohibit its use in agriculture. If sludge quality is satisfactory and the sludge is used in agriculture, check regularly its quality.	Sludge can be used in agriculture after additional treatment	Included in operational costs, with a possibility of cost sharing with sludge users	Operator

Project: Water Quality Protection (WQP) Mostar, Odžak, Živinice, Trnovo				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Operation	Wastewater from filter backwashing can pollute recipient water/environment if discharged without control	Recycle the backwash into the system and treat.		Included in maintenance costs	Operator - WWTP maintenance crew
Operation	Improperly disposed waste materials can pollute environment, including the screened material from preliminary, physical treatment, chemical residues etc.	Establish waste management plan. Dispose of all wastes on a sanitary landfill.		Included in operational/ maintenance costs. Cost estimate: 1KM/ton*km for transport, 50KM/t for disposal	Operator - WWTP maintenance crew
Operation	Odor released from the wastewater treatment plant is a nuisance to workers and nearby population	Careful planning and implementation of operation and maintenance procedures. Use of covers or adequate ventilation for odor generating equipment		Included in operational/ maintenance costs	Operator - WWTP maintenance crew
Operation	Uncontrolled release of flushing agents, as well as leaks or spills of chemicals, fuel, lubricants and coolants during supply, storage or use can pollute environment	Establish safe delivery/storage/ handling procedures (materials management). Check upon each delivery. Periodically check at/around storage and use places. Migration pathways for chemicals, fuel, lubricants and coolants have to be limited to prevent occasional leaks from escaping into the environment. Any spills must be contained and cleaned.		Included in maintenance costs	WWTP maintenance crew

Project: Water Quality Protection (WQP) Mostar, Odzak, Zivinice, Tmovo					
Phase	Issue	Mitigating measure	Comments	Cost	Institutional responsibility
Operation	Health and safety threat to workers posed by handling sludge and by overall operation of the facility	Establish periodical medical check-ups of employees. Maintain sanitary and safety facilities. Organize training and education programs for employees. Drying beds should be utilized for sludge treatment. Sludge should be transported in closed vehicles.		Included in maintenance costs	Operator - WWTP maintenance crew
Decommissioning	Activities may lead to traffic disruptions and/or congestions, as well as decrease in traffic safety	Clearly display informative/warning signs around construction area. Limit construction to regular time intervals. Allocate possible alternative traffic routes.		Included in decommissioning costs	Decommissioning contractor
Decommissioning	All removed materials and equipment may pose an environmental threat if not disposed of properly	All wastes generated through decommissioning activities, including hazardous, need to be disposed of on approved landfills.		Included in decommissioning costs. Cost estimate: 1KM/ton*km for transport, 50KM/t for disposal.	Decommissioning contractor

Project: Water Quality Protection (WQP) Mostar, Odžak, Živinice, Trnovo				Cost	Institutional responsibility
Phase	Issue	Mitigating measure	Comments		
Decommissioning	Activities may generate nuisances such as noise, vibrations and dust	Limit construction activities to regular daytime intervals. Establish schedule and/or other specific restrictions on works. Reduce dust generating traffic to the extent possible. If possible, use closed or covered trucks for transportation of construction materials. Sprinkle earth with water to prevent dust generation, If possible, use protective cloth covers or screens for dust generation areas. If necessary, use noise barriers and/or noise suppressors on equipment.		Included in decommissioning costs	Decommissioning contractor
Decommissioning	Open areas, pits, sumps and sinks must be filled in with material whose procurement shall not endanger the environment	Material used for filling in pits must be obtained from other areas where such material may be in excess. The material should not be significantly different from the surrounding material.		Included in decommissioning costs	Decommissioning contractor
Decommissioning	Equipment emissions may lead to a decrease in air quality	Decommissioning activities need to be limited to regular time intervals.		Minor	Decommissioning contractor

Project: Water Quality Protection (WQP) Mostar, Odžak, Živinice, Travnik					
Phase	Issue	Mitigating measure	Comments		Institutional responsibility
Decommissioning	Pollution of earth and surface waters by fuel, lubricant and coolant leaks	Periodically check technical condition of vehicles and all equipment. Store fuel, lubricants and coolants safely, handle cautiously. Migration pathways have to be limited to prevent occasional leaks from escaping into the environment. Any spills must be contained and cleaned.		Minor, included in decommissioning costs	Decommissioning contractor, WWTP Maintenance Crew
Decommissioning	Pollution of recipient waters is possible by effluent leaks caused during the decommissioning process	The pipes and the overall effluent release mechanism need to be sealed off or completely removed in order to prevent leaks and spills into the recipient after the treatment plant is closed.		Included in decommissioning costs	Decommissioning contractor, WWTP Maintenance Crew

9.2 Monitoring Plan

Phase	*What parameter is to be monitored*	*Where is the parameter to be monitored*	*How is the parameter to be monitored*	*When is the parameter to be monitored*	*Why is the parameter to be monitored*	*Cost*	*Responsibility*
Construction	Traffic disruptions and congestions, traffic safety	On site, around site	Visual inspection, complaints from neighbors or traffic participants	Regularly during construction, daily or weekly as appropriate	Prevention of disruptions. Population, traffic participants and workers safety	Minor/ included in construction costs	Construction Contractor, Site Overseer/ Suprevisor
Construction	Site admittance control	On site, around site	Visual inspection	Daily during construction	Population safety	Negligible	Construction Contractor, Site Overseer, Site Watch
Construction	Dust generation	On site, around site	Visual inspection, complaints from neighbors, irritation of respiratory system	Daily or as required during construction	Minimization of dust dissipation in the area, minimization of irritation of respiratory systems of the population and workers	Minor/ included in construction costs	Construction Contractor, Site Overseer
Construction	Noise and vibration generation	On site, around site	Aural inspection, complaints from neighbors or workers	Daily or as required during construction	Minimization of population nuisance, protection of workers health	Minor/ included in construction costs	Construction Contractor, Site Overseer
Construction	Waste generation and management	On site	Visual inspection, disposal records or receipts from landfills	Regular daily control	Protection of soil, groundwater, surface waters, aesthetic reasons	Included in construction costs	Construction Contractor, Site Overseer

Phase	*What parameter is to be monitored*	*Where is the parameter to be monitored*	*How is the parameter to be monitored*	*When is the parameter to be monitored*	*Why is the parameter to be monitored*	*Cost*	*Responsibility*
Construction	Leaks/spills of fuel, lubricants, coolants, paint, solvents and bitumen	On and around site.	Visual inspection. In case of frequent and substantial spills or leaks, detailed lab analysis of the contaminated media and water in the system should be conducted	Visual inspection daily during works. Lab analysis as required.	Protection of environment, workers safety	Should be included in construction costs; cost of additional lab testing: approximately 500-1000 KM	Construction Contractor, Site Overseer
Construction	Equipment emissions into air	On site, around site	Sensory inspection, air quality meters	Weekly during construction	Population and workers health protection, air quality protection	Portable air emission monitors: approximately 3000 KM	Construction Contractor, Site Overseer
Construction	Land erosion and sedimentation, landslides	On site	Geotechnical investigation, visual inspection	Geotechnical investigation prior to works start, visual inspection daily during works	Protection of soil, surface waters, groundwater, workers safety, construction safety	Minor; investigation cost: approx. 500-1500 KM	Construction Contractor, Site Overseer
Construction	Cut down and damaged trees/vegetation replacement	On site, around site	Visual inspection, photographs prior to start of construction works	Before and after construction works	Natural resources preservation, aesthetic reasons	Minor/ included in construction costs	Construction Contractor, Site Overseer
Construction	Chance findings of mass graves or cultural heritage items	On site, around site	Visual inspection	Daily during construction works	Search for missing persons, war crimes investigation, protection of cultural heritage	Negligible	Construction Contractor, Site Overseer
Operation	Leaks from the wastewater collection system	Throughout the system	Visual inspections, complaints from local residents	At regular maintenance intervals	To prevent contamination of soil and groundwater and health risks	Minor	Operator

Phase	*What parameter is to be monitored*	*Where is the parameter to be monitored*	*How is the parameter to be monitored*	*When is the parameter to be monitored*	*Why is the parameter to be monitored*	*Cost*	*Responsibility*
Operation	Quality and quantity of WWTP effluent	At the release points	Lab testing, Flow gauge	At regular control intervals (daily or weekly according to specific parameter)	To prevent pollution of recipient	Included in project and regular operational costs	Operator
Operation	Chlorination level	On site, at chlorination station/unit	Chlorine dozers, measurement of chlorine content in treated wastewater	Measurement of chlorine content in treated wastewater in accordance with chlorine dozing regime (continuous or batch-wise)	Protection of recipient flora and fauna	Included in operational expenses (chlorination dozer: approx. 300 KM; chlorine-in-water meter :app.250 KM)	Operator/control or maintenance unit, Site Overseer/ Supervisor
Operation	Disposal/treatment of residual solid products (sludge) from WWTP	On site, around site	Visual inspection, lab testing	Every batch, in accordance with internal sludge management plan	Prevention of environmental pollution	Included in operational costs	Operator, Site Overseer
Operation	Quality of recipient	Downstream of effluent discharge point	Visual/sensory inspection, simple routine testing of recipient samples	Visual inspection: daily/weekly, Lab testing: monthly or bimonthly	Prevention of recipient pollution	Included in operational costs	Operator/control or maintenance unit, Site Overseer/ Supervisor
Operation	Quality of discharged treated waste water (effluent), if used for irrigation	On discharge point	Routine lab testing of discharged treated waste water for basic parameters	Weekly during irrigation season	Prevention of pollution of agricultural land and further impacts on human health	Included in operational costs	Operator/WWTP Maintenance Crew, Site Overseer
Operation	*Handling of filter backwash water*	At/around filters	Visually	Upon every filter backwash	Prevention of environmental pollution	Included in operational costs	Operator/WWTP Maintenance Crew, Site Overseer

Phase	*What parameter is to be monitored*	*Where is the parameter to be monitored*	*How is the parameter to be monitored*	*When is the parameter to be monitored*	*Why is the parameter to be monitored*	*Cost*	*Responsibility*
Operation	Disposal of waste materials	On site, around site	Visual inspection, disposal records or receipts from landfills	During operation according to waste management plan	Prevention of environmental pollution, overall plant safety	Included in maintenance cost	Operator/WWTP Maintenance Crew, Site Overseer
Operation	Odor releases from the plant	On site and in immediate surrounding	Sense of smell, complaints by neighboring population	Daily/upon complaint	Minimization of nuisance of local population	Negligible	Operator/WWTP Maintenance Crew
Operation	Leaks or spills of fuel, lubricants, coolants and chemicals, such as chlorine	On site, around site, along supply routes	Visually, by means of records /routine control, accident reports, etc.) or by means of detectors	Daily during operation, or, as required, upon delivery of chemicals, fuel, lubricants and coolants	Prevention of environmental pollution, overall safety	Included in operational/ maintenance cost; chlorine leak detector: approximately 1000 KM	Operator/WWTP Maintenance Crew, Site Overseer
Operation	Compliance with legal regulations and internal procedures for safe material handling	On site/within plant	Visual inspection, regular reports	Daily	Workers health and safety, overall safety	Included in operational cost	Operator/WWTP Maintenance Crew, Internal Inspection Teams
Decommissioning	Traffic disruptions and congestions, traffic safety	On site, around site	Visual inspection, complaints from neighbors or traffic participants	Regularly during works, daily or weekly as appropriate	Prevention of disruptions. Population, traffic participants and workers safety	Negligible	Decommissioning Contractor
Decommissioning	Nuisances (dust, noise, vibrations)	On site, around site	Visually, aurally, complaints from neighbors	Daily during operation	Minimize local population nuisances	Negligible	Decommissioning Contractor
Decommissioning	Disposal of wastes (removed materials and equipment)	On site	Visual inspection, disposal records or receipts from landfills	Regular daily control, control upon completion of works	Protection of environmental pollution, aesthetic reasons	Included in decommis-sioning cost	Decommissioning Contractor

Phase	*What parameter is to be monitored*	*Where is the parameter to be monitored*	*How is the parameter to be monitored*	*When is the parameter to be monitored*	*Why is the parameter to be monitored*	*Cost*	*Responsibility*
Decommissioning	Filling of open areas, pits, sumps and sinks	On site	Visually	Towards and upon completion of works	Restoration of original appearance and configuration of land	Included in decommis-sioning cost	Decommissioning Contractor
Decommissioning	Air emissions from equipment	On site, around site	Sensory inspection, air quality meters	Weekly during works	Population and workers health protection, air quality protection	Portable air emission monitors: approximately 3000 KM	Decommissioning Contractor
Decommissioning	Fuel, lubricant and coolant leaks	On and around site.	Visual inspection. In case of frequent and substantial spills or leaks, detailed lab analysis of the media contaminated and water in the system should be conducted	Visual inspection daily during works. Lab analysis as required.	Protection of environment, workers safety	Should be included in decommis-sioning costs; cost of additional lab testing: approximately 500-1000 KM	Decommissioning Contractor
Decommissioning	Leaks/discharges through the effluent release system	At the effluent release points, at disassembling points	Visual inspection, complaints	Daily during works	Prevention of environmental pollution, workers safety	Included in decommis-sioning cost	Decommissioning Contractor

9.3 Institutional strengthening

Equipment Purchases

Table 9-1 Equipment purchases

Type of Equipment	Units (#)	Unit Cost (KM)	Total Cost (KM)	Local or International Purchase
Air Quality Monitoring Equipment	1 set	3000	3000	local
Chlorine Dozer	1	3000	3000	international
Chlorine-in-Water Meter	1	250	250	international
Chlorine Leak Detector	1	1000	1000	international

Training/Study Visits and Consultant Services

Table 9-2 Training Recommendation

Type of training:	- Technical training on equipment use and maintenance, - Training on improvements of the treatment process and alternative options, - Training on applicable national regulations and standards - Training on environmental awareness and environmental monitoring
Attendees:	- A number of key staff that would deliver secondary training - Equipment operators – secondary training - Key Management – secondary training
Purpose of the training:	- to familiarize workers with new equipment, techniques and technology - to ensure all workers know safe handling and operating procedures - to ensure workers know the importance of monitoring and how to properly conduct it - to familiarize management with alternative options, best available practices and possible improvements
Duration of training:	Two - four segments, each with a duration of 2-4 days.
Venue of training:	Depends on the number of attendees. The Consultant deems best to have a single venue in BiH, in a central location such as Sarajevo or Mostar.
Institute or organization to provide training:	Local organizations with significant and pertinent experience. If no such organization is available, foreign experts could provide this training. It is important to emphasize that, in case of foreign experts, the program should use experts from newer EU candidate countries, or geographically similar European countries that are comparable to BiH in terms of their size, location or major problems.
Topics to be covered:	- Equipment use, safety and efficiency - Safe handling, storage and use of chemicals - Alternative treatment options - Improvement of existing treatment procedures - Requirements of the new national regulations with regards to wastewater treatment - Importance of monitoring and how to properly and efficiently conduct it

Training methods:	The training should be organized to include theoretical lectures, but to focus on active participation and interaction of the trainees, coupled with specific project examples. In this manner the attendees shall be stimulated to implement the knowledge gained at this training in a group-learning environment, which shall serve as a preliminary session for some of the newer concepts. The training should be formulated in a flexible manner, which shall allow for changes in the schedule according to the participant input and desires.
Training material:	It is recommended to prepare simple booklets with training material and distribute them during the training.

Table 9-3 Summary of Training Costs

Description	Cost (KM)	
	With use of local consultants (2)	**With use of foreign consultants (2)**
Lectures	3000	6000
Literature / handouts	500	500
Room hire / technical support	1000	1000
Overnight of participants (if needed)	60 / participant x 20 = 1200	60 / participant x 20 = 1200
Refreshments and Meals	2000	2000
TOTAL COST:	7700	10700

9.3.1 Schedule of Activities

Table 9-4 Schedule of Activities

Activities	Start date	Duration	End Date
Mitigation activities	All mitigation and monitoring activities shall be carried out according to the phases in which each specific issue occurs. E.g., activities noted during construction shall occur during the construction phase of the project.		
Monitoring activities			
Training activities	Training should take place during project duration.		

9.3.2 Institutional arrangements

The Ministry of Waterworks, Agriculture and Forestry of the Federation of Bosnia and Herzegovina (FBiH) will coordinate the project activities through its Project Management Team (PMT), formed within Vodoprivreda Sarajevo and Vodoprivreda Mostar. The PMT is responsible for the overall environmental management and decision making in accordance with the EFP (Environmental Framework Policy) during the subprojects preparation and implementation stages, and it takes part in the categorization of the subprojects in accordance with the national legislation and the WB procedures. The results of the categorization should be considered and approved by the World Bank. The PMT will further be responsible for contacts and consultations with the Federal Ministry of Physical Planning and Environment regarding the requests (applications), procedures and the contents of the EA for the projects

subject to environmental permit requirement. Day-to-day financial management and procurement, as well as other project coordination issues, will be handled by Project Implementation Teams (PIT) formed within the utility companies on the four project locations (future plant operators).

Supervising body, appointed by both the future plant operator and the PMT/PIT, as well as the future operator themselves, will be responsible for everyday monitoring of the project activities, including the implementation of environmental impact mitigation measures during the construction works. It is recommended to esatblish a mechanism of regular monthly reporting to PMT on quantitative and qualitative progress of the project activities by the future operator and the supervising body. In Consultant's opinion, the PMT should arrange with the PITs additional parallel supervision of the project implementation, as well as the performance of the supervising body itself. This will ensure compliance with the agreed principles of implementation of project activities, and allow for timely corrective measures in case of irregularities.

The PMT is also in charge of organizing the required training, including the selection of consultants who will develop and conduct the training program.

10 PUBLIC CONSULTATIONS

Within the project task of Study preparation, two public consultations were organized for each of the identified four project locations (in Trnovo on October 25 and December 09, in Živinice on October 26 and December 09, in Odža on October 27 and December 10, and in Mostar on October 28 and December 10, 2004). For all these public consultations, the following was common:

- they were announced in the daily newspapers „Oslobođenje" i „Dnevni Avaz",

- each of the four towns had a local person assigned for direct itelephone invitations of stakehilders (NGO, local governmental institutions, residents), while in Odžak and Mostar local radio and TV broadcasting chanels were additionally used for announcement,

- the folowing material was prepared for the first public consultations:
  a) EA Study concept,
  b) Brief description of project areas/locations

- draft EA Study was prepared for the second consultations

- these materials were disclosed and made available to the public at the premises of the local governmental institutions (Municipalities) of the four towns, as well as on a Web site dedicated to this purpose,

- having in mind that all the public consultations had to be held at the time of or immediately after the local elections, in the circumstances of *interregnum* and saturation with public meetings, the actual response can be considered good, and

- the project was characterized as highly required, and all the participants supported it.

Minutes of the public consultations and lists of participants are provided in the appendix.

11 CONCLUSION

The selection of Mostar, Odžak, Živinice and Trnovo WQP BiH project components was based on the following key features of these locations:

- Živinice and Trnovo are located on closest upstream points of important drinking water sources (Živinice is located upstream of the Modrac lake, while Trnovo is located upstream of the Sarajevo drinking water supply zone; along with the municipal wastewater discharges, there are other local pollution sources, but reduction of the former will show the way to cope with the problems caused by the latter,
- Odžak is the main polluter in the area of isolated plateau,
- Mostar is a major city without wastewater treatment plant, and as such it represents a huge polluter of the Neretva river, which is a significant water supply source for the downstream areas.

In case of Odžak and Trnovo, only rehabilitation/reconstruction of existing wastewater treatment plants is required, and therefore environmental impacts during the reconstruction works are unlikely or can be of a minor extent.

Certain ordinary, minor extent environmental impacts can be expected during the construction of the collection system and wastewater treatment plant at the mouth of the Spreča and Oskova rivers within the Živinice component.

The wastewater treatment plant construction within project phase I in Mostar is planned ona a location dedicated to this purpose. The construction of two additional plants in the Northern and Central valley, as well as the main collector reconstruction, may result in certain environmental impacts in areas of high population density.

However, it can be concluded that, in case of all the four project components, the overall long term positive effects of the project exceed by far any short term, mostly minor negative effects, i.e. environmental impacts that may occur. This favorable ratio of the positive and negative effects can be enhanced even further by strict application of the mitigation measures recommended in this Study.

Literature

- Preliminary Project Design for Živinice WWTP, by Vodovodno preduzeće "Spreča" dd Tuzla, July 2003
- Preliminary Project Design for Odžak Sewage System and WWTP, by Zavod za Vodoprivredu dd. Sarajevo, November 2002
- Main Project Design for Trnovo WWTP Reconstruction/Rehabilitation, by Zavod za Vodoprivredu dd. Sarajevo , May 2004
- Mostar Urban and Water Quality Plan, by MWH, 2004
- Neretva Quantity and Quality Data for the period 1999-2001 – measurements on stations Raštani - upstream , Mostar - downstream, and Žitomislići – downstream of Mostar, obtained from JP " Sliv Jadranskog mora" Mostar
- Modrac Lake Water Quality Study, Institute of Chemical Engineering Tuzla, Summer 2002
- Report on Quantitative and Qualitative Caharcteristics of the Bosna and Željeznica Rivers, by Federal Office of Meteorology Sarajevo, August 2004
- The World bank " Pollution Prevention and Abatement Handbook 1998
- The World Bank Operation Manual ENVIRONMENTAL ASSESSMENT OP 4.01 January 1999
- The World Bank Operation Manual PROJECTS ON INTERNATIONAL WATERWAYS – Applicability of Policy OP 7.50 June 2001
- Law on Waters of FBiH (Službeni list FBIH18/98),
- Collection of Federal Regulations on Waters - Sparavalo Zdravko, Sarajevo 1999

11 APPENDICES

11.1 TOR – Terms of Reference (Projektni zadatak)

Bosnia & Herzegovina Water Quality Protection Project

ENVIRONMENTAL ASSESSMENT
Terms of Reference

1. The Bosna and Neretva Rivers are key drainage systems in Bosnia & Herzegovina (BiH). The Bosna River Basin covers the laregst and most developed area of the Federation part of BiH. The Bosnia River begins in the north of the Federation and flows for about 260 km, including the section from Vrelo Bosne (source of the scenic Bosna River) to the inter-entity boundary line at the mouth of the Sava River. The Basin is the most densely populated and industrialized region of the country. Substantial waste water is discharge from the nearby settlements and industries directly into the river and eventually into the Sava River.

2. The Neretva River Basin drains the second largest area in BiH. The Neretva River originates in BiH and flows through Croatia for 20 km before entering the Bay of Mali Ston and ultimately the Adriatic Sea. Efforts to reduce flows of untreated waste waters into these rivers would have a major impact on discharges into the Sava River and the Adriatic.

3. The Zeljeznica River is a tributary of the Bosna River. The Spreca River flows into Modrac Lake which is the main water source for the whole Tuzla region.

4. The World Bank is preparing a Water Quality Protection (WQP) Project to be supported by the Global Environmental Facility (GEF) which will be designed to reduce effluent based water pollution from municipal sources to the Bosna, Neretva, Zeljeznica, and Spreca Rivers.

5. In support of the GEF Program the WQP Project proposes: (i) for Odzag on the Bosna River, a sewage treatment plant, sewage main collector rehabilitation, and an outfall pipeline; (ii) for Mostar on the Neretva River, first stage construction of effluent treatment plant, and sewage main collectors, (iii) Trnovo on the Zeljeznica River, rehabilitation of a sewage treatment plant, and (iv) Zivinice on the Spreca River, sewage main collectors , and an upgrade of a sewage treatment plant. Some additional investments may be identified during implementation, possibly including pilot investments for wetland conservation, but they would be of very minimal scale and cost.

6. The total package of investments would significantly reduce current discharges into these rivers at points upstream of major drinking water intake sources in the basins. In this manner, they would improve the drinking water quality for a substantial number of inhabitants in the region and lead to their improved health conditions.

7. These investments will involve a substantial level of civil works activities involving rehabilitation and construction. Consequently, a potential for significant environmental impacts exists, and in accordance with World Bank environmental policies (OP/BP/GP 4.01), the project has been assigned "Category A" This category requires the preparation of an

Environmental Assessment (EA) for each site. This TOR covers the EAs for Odzag, Mostar, Trnovo, and Zivinice; should additional investments be identified during implementation, EAs will be prepared as a pre-condition to their being eligible for funding. Such EAs will be based on the model of this initial EA. The details on this will be provided in the Environmental Framework Policy for the WQP Project.

Objectives

8. The objective of this effort is to:

Prepare a "Category A" EA document in strict accordance and consistent with the requirements of both the Government of Bosnia &-Herzegovina (Federation) and World Bank policy and procedures for environmental assessment (OP/BP/GP 4.01).

9. Implicit with this objective are the procedural EA requirements for consultation and disclosure of EA documents with key affected groups and NGOs.

Work Program

10. The Work Program will consist of the following six tasks:

- Review of BiH EA Requirements
- Review of World Bank EA Requirements
- Identify Variance, Recommend Reconciliation, and Draft EA Preparation and Approval Schedule
- Support GEF Grant Recipient in First Public Consultation (EA TORs Review)
  - Prepare Draft EA Report
- Support GEF Grant Recipient in Second Public Consultation (Draft EA Review)
  - Prepare Final EA

11. Detailed requirements for each task are presented below:

Task A. Review of BiH EA Requirements

The Consultant will meet with environmental officials from BiH to establish EA requirements for the proposed collector system. In particular, the Consultant should focus on content of the EA document, review and approval requirements as well as any requirements for public consultation and EA disclosure

Task B. Review of World Bank EA Requirements

The Consultant should review World Bank EA policies and procedures as defined in OP/BP/GP 4.01 for environmental assessment and any additional World Bank safeguard policies and/or guidance documents regarding public consultation procedures. [2] Included should be the documentation and procedural requirements of the World Bank safeguard policy on International Waterways (OP/BP/GP 7.50).

[2] Neither land acquisition nor cultural properties are seen as relevant concerns, but if such is determined in the initial review they must be covered in the EA Otherwise subsequent determinations or chance finds would be covered by the Environmental Policy framework.

Task C. Identify Variance, Recommend Reconciliation, and Prepare Schedule

The Consultant should identify significant variance between BiH and World Bank requirements, and suggest how to best reconcile these differences. The Consultant should then prepare a detailed outline for the EA document and a proposed schedule for EA preparation, public consultation and review and approval by both BiH environmental officials and the World Bank. After receiving approvals from both BiH and the World Bank for the EA outline and the EA preparation and approval schedule, the Consultant should proceed to the next Task.

Task D. Support GEF Grant Recipient in First Public Consultation (Review of TOR, Outline, Schedule for EA)

The Consultant should support the effort of the Grant Recipient in successfully conducting the first of the two public consultations required by the World Bank for a Category A Environmental Assessment document. The purpose of this consultation is to review the EA outline and schedule, these Terms of Reference, and solicit from affected groups and local NGOs any environmental issues they consider to be a priority and they wish to see addressed in the EA report. The record of the consultation should be carefully documented (see Addendum 1, Section F).

Task E. Preparation of Draft EA Report

The consultant should prepare a draft EA report consistent with any documentation requirements of BiH environmental assessment regulations and World Bank policies (see OP 4.01 Annex B Content of an Environmental assessment Report for a Category A Project).

Issues to be addressed in the EA should be developed from: (i) public consultation, (ii) the World Bank Environmental Assessment Sourcebook (Volume II), (iii) the Consultant's own knowledge and experience, and (iv) information secured during a required field visit of the project site and discussions with local environmental authorities. The dates for all site visits and key meetings with the client agency and other governmental bodies should be included with the Preparation and Approval Schedule to be attached to the EA.

A critical section of the EA report is the Environmental Management Plan (EMP). The Consultant should prepare the EMP in accordance with the specifications presented in Addendum 1. *All priority issues addressed in the EA must be incorporated into the EMP. A sample outlined for the EA is provided in Exhibit 1.*

Task F. Support GEF Grant Recipient in Second Public Consultation (Draft EA Review)

Upon completion of the draft EA, the Consultant should support the effort of the Grant Recipient in successfully conducting the second of the two public consultations required by the World Bank for a Category A Environmental Assessment document. The purpose of this consultation is to review the draft EA document to insure that the issues identified in the first public consultation have been properly addressed and resolved to the satisfaction of locally affected groups and NGOs.

As before, the record of the second consultation should be carefully documented; this includes a narrative section in the EA and the inclusion of the minutes of consultations as an attachment to the EA (see Addendum 1, Section F).

Exhibit 1: Sample EA Outline

I. Introduction
II. Baseline Situation
  A. Existing Technical Investment
  B. Geography
  C. Social
  D. Historic/Cultural
III. Proposed Investment
IV. Analysis of Potential Environmental Impact
  A. Physical
    1. Short-term (Construction)
    2. Long-term
  B. Social
V. Alternatives (if any considered or why not considered)
VI. Environnemental Management Plan
  A. Summary of Key environmental impact issues
  B. Institutional Issues
  C. Mitigation Plan
  D. Monitoring Plan
  E. Public Consultation

Annexes
1. TOR for Preparation of the EA
2. Preparation and Approval Schedule for EA, Dates of Site Visits and Key Meetings
3. Minutes of Consultation
4. Contract Terms for Environmental Protection for Contractors in Performance of Works

Task G. Prepare Final EA

After completion of the second consultation, the Consultant should incorporate and comments received into the EA and send the draft to environmental authorities of BiH and to the World Bank for final review and comment.

The Consultant should then make any modifications to the EA document in accordance with recommendations of environmental authorities of BiH and the World Bank and prepare and transmit the final EA to the government of BiH and the World Bank. The final presentation of the report should be in written and electronic versions. Public access to the final EA will be assured by the World Bank and the Government of BiH.

ADDENDUM 1: ENVIRONMENTAL MANAGEMENT PLAN FORMAT

A. MITIGATION PLAN

			Cost		Institutional Responsibility*		Comments (e.g. secondary impacts)
Phase	**Issue**	**Mitigating Measure**	**Install**	**Operate**	**Install**	**Operate**	
Construction	• • •						
Operation	• • •						
Decommissioning	• • •						

* Any responsibilities designated for a Contractor, shall be specified in the Contractor Bid Document and attached to EMP

B. MONITORING PLAN

						Cost		Responsibility*	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
Baseline (Usually for Category A Projects only)									
Construct									
Operate									
Decommission									

* Any responsibilities designated for a Contractor, shall be specified in the Contractor Bid Document

INSTITUTIONAL ARRANGEMENTS

The Consultant should provide a narrative discussion supported by organizational charts detailing:

- Responsibilities for mitigation and monitoring
- Environmental information flow (reporting—from who and to who and how often)
- Decision making chain of command for environmental management (to take action, to authorize expenditures, to shut down, etc.)

In short, explain how all the monitoring data is going to be used to maintain sound environmental performance—who collects the data, who analyzes it, who prepares reports, who are the reports sent to and how often, and who does that person send it to, or what does he/she do with the information—who has the authority to spend, shutdown, change operations etc.

D. INSTITUTIONAL STRENGTHENING

The Consultant should identify the current institutional capacity of key players (public and private) and areas where capacity needs to be improved relative to environmental protection. Then give information on the following areas as is relevant to any required capacity building.

1. Training/Study Tours

List:

- Type of Training (Mitigation, Monitoring, Environmental Management, Other)
- Number of Students
  -Current and Future Organizational Unit in Which They Work or Current and -Future Title/Job Description
- Duration of Training
- Start Date/End Date (for each student)
- Venue of Training (Domestic or Abroad)
- Institute or Organization to Provide Training
- Cost (Local and Foreign)

2. Consultant Services

List:

- Type of Service
- Terms of Reference
- Justification
- Cost

3. **Special Studies**

List:

- Justification
- Terms of Reference
- Cost

4. **Equipment Purchases (Tabular Presentation Preferred)**

List:

- Type of equipment
- Number of Units
- Unit cost
- Total Cost
- Local or International Purchase

E. SCHEDULE

The Consultant should present (preferably in Chart Form) the start and finish dates for:

- **Mitigation Activities**
- **Monitoring Activities**
- **Training Activities**

This information should be keyed to the overall project schedule.

F. CONSULTATION: LOCAL NGOs AND PROJECT-AFFECTED GROUPS

Provide documentation of the following:

- **Manner in which notification of the consultation was announced: media(s) used, date(s), description or copy of the announcement**
- **Date(s) consultation(s) was (were) held**
- **Location(s) consultation(s) was (were) held**
- **Who was invited**

  Name, Organization or Occupation, Telephone/Fax/e-mail number/address (home and/or office)
- **Who attended**

  Name, Organization or Occupation, Telephone/Fax/e-mail number/address (home and/or office)
- **Meeting Program/Schedule**

What is to be presented and by whom

- **Summary Meeting Minutes (Comments, Questions and Response by Presenters)**
- **List of decisions reached, and any actions agreed upon with schedules and deadlines**

11.2 Minutes of the Public Consultations

Zapisnik Mostar

Spisak prisutnih Mostar

Zapisnik Odžak

Spisak prisutnih Odžak

Zapisnik Živinice

Spisak Prisutnih Živinice

Zapisnik Trnovo

Spisak prisutnih Trnovo

11.3 Environmental Clauses for Civil/Performance Works Contractors

Most environmental impacts occurring during the phases of construction and decommissioning can be avoided or substantially mitigated by taking the environmental protection measures agreed. Such protective measures should be included in the civil/performance works contract as environmental clauses addressing the following, but not limited to, issues:

1. All activities must be carried out in accordance with the current environmental legislation applicable.

2. Necessary measures should be taken for the protection of natural habitats or other areas of importance. This must include measures aimed at minimizing degradation of vegetation on the location or in the surrounding due to the works performed, as well as measures for vegetation restoration upon completion of works.

3. Necessary measures must be taken to protect cultural heritage items.

4. Accommodation camp for the workers must be located in agreement with local municipal authorities.

5. Use of potable water from the public supply network must be agreed upon with the local utility responsible.

6. Use of access roads should be agreed upon with the local municipal authorities, whereby main and alternative roads, as well as traffic regime should be specified.

7. All works should be scheduled in agreement with the local authorities. If possible, all activities should be carried out during regular daytime intervals.

8. All construction waste, including excavated material, must be properly disposed of. This includes its disposal on a landfill, as well as use of excavated soil for filling of holes, canals, etc. on other locations, where such material may be required. If waste is disposed of on a landfill, receipts should be kept. Burning of construction waste on the construction site is not allowed, except for burning of waste paper and wood/timber without content of hazardous materials (varnishes, paints, etc.) obeying all precaution and safety measures.

9. The works contractor must evacuate any waste water from disconnected pollutant sources during works on the receiving sewage system.

10. The works contractor must only use fully operational and well maintained equipment, machines and vehicles. If diesel fuel is used, best available quality, low sulfur fuel should be used.

11. The works contractor must take effective measures to prevent leaks and spills of fuel, coolant, lubricating oils, bitumen, paints, varnishes, solvents or other liquids during the works,

as well as during transport and storage of such materials. In case of spills or leaks on soil, the contaminated soil should be isolated in order to prevent migration of the contaminant. The contaminated soil should be disposed of on adequate landfill. Burning of contaminated soil, i.e. liquid spills or leaks, is prohibited.

12. If necessary, the works contractor should obtain air emission equipment (monitors for sulfur oxides, nitrogen oxides and particulate matter in air) and conduct regular monitoring.

13. The works contractor is obliged to acquaintance all his/her workers with the measures for minimization of noise and dust generation.

14. Upon completion of all works, all waste generated must be completely removed from the location and disposed of adequately by the works contractor.

11.4 Preparation and Approval Schedule for EA, Dates of Site Visits and Key Meetings

1. Preliminary meeting with the World Bank and Vodoprivreda Sarajevo representatives: 15.06.2004

2. Preliminary meeting with Vodoprivreda Sarajevo: 15.07.2004

3. Project start: 18.08.2004

4. Collection of baseline data: September 2004

5. Project locations visits 24.-28.10.2004

6. Further contacts with Government/Ministry representatives: 27.09.2004
(regular telephone consultations during September 2004)

7. Contacts with Vodoprivredas Sarajevo and Mostar: 17.08., 18.08., 28.10.2004

8. Meeting with representatives of WB, Water supply company, Vodoprivredas Sarajevo and Mostar, and the City of Mostar: 05.10.2004

9. Meeting with workgroup in Mostar: 28.10., 10.12.2004

10. First public consultations: 25., 26.,27. and 28.10.2004

11. Second public consultations: 09.12. and 10.12.2004

12. Meeting with Vodoprivreda Sarajevo 22.12.2004

13. Draft study approval by the World Bank: 02/2005

14. Draft study approval by the Ministry: 02/2005

BOSNIA AND HERZEGOVINA
WATER QUALITY
PROTECTION PROJECT

- ENVIRONMENTAL FRAMEWORK POLICY -

Report prepared for the Federal Ministry of Agriculture, Waterworks and Forestry, and the World Bank

BOSNA-S CO.

Sarajevo, February 2005

Acronyms and Abbreviations

WB	The World Bank
Bank	The World Bank
BiH	Bosnia and Herzegovina
FBiH	Federation of Bosnia and Herzegovina
EFP	Environmental Framework Policy
RS	Republika Srpska
Cat	Category or Categories
ToR	Terms of Reference
EA	Environmental Assessment
EIA	Environmental Impact Assessment
PEA	Preliminary Environmental Assessment
OP	Operational Procedure
Ministry	Federal Ministry of Physical Planning and Environment
EMP	Environmental Management Plan
PMT	Project Management Team
PIT	Project Implementation Team

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1 INTRODUCTION

The World Bank is providing assistance to the Government of Bosnia and Herzegovina in the preparation for the GEF grant for the Water Quality Project (WQP). The objective of the project is to reduce effluent based water pollution from municipal sources to the Neretva and Bosna Rivers and the Adriatic Sea. Investment would include rehabilitation or construction of alternate types of water treatment facilitates. Although the majority of investments for the project have been identified, additional small-scale investments may be identified during project implementation, in strict accordance with a pre-established set of selection criteria and selection procedures.

For those investments identified during project implementation, the key environmental regulatory requirements of the Government of Bosnia and Herzegovina and the environmental policies and procedures of the World Bank have been incorporated into this document, i.e. the Environmental Framework Policy (EFP). The EFP establishes the overall policy and procedures to be followed including requirements and guidelines for environmental screening, EA document requirements and content, EA review and approval procedures, and requirements for EA consultation and disclosure. Key information and procedures described in the EA report prepared for the already identified investments have been used to a great extent in this EFP. The EA report, which was prepared in consultation with the ministry responsible for environmental issues, contains general information about the project and details of implementation arrangements.

The EFP also identifies institutional responsibilities for environmental impact assessment and procedures for compliance with mitigation and monitoring measures for the investments. A summary of the environmental screening, evaluation and management procedures will form a chapter of the project Operations Manual.

2 OVERVIEW OF ENVIRONMENTAL POLICIES AND PROCEDURES OF THE GOVERNMENT OF BOSNIA AND HERZEGOVINA

Environmental management in Bosnia and Herzegovina (BIH) is not institutionalized at the state level, but rather carried out within the organizational structure of the entity governments, i.e. ministries on the entity level that have environmental issues in their portfolios. In FBiH, the ministry responsible for environmental issues is the Ministry of Physical Planning and Environment[1]. Lower level environmental management is under the responsibility of cantonal ministries. Responsibilities of BIH in regards to environmental protection stipulated by international agreements and conventions are within the jurisdiction of the state, i.e. the Council of Ministers (Ministry of Foreign Trade and Economic Relations, etc.).

Recently, both entities drafted new environmental laws that are harmonized with the legislation of the European Union. The new environmental laws are: Law on environmental protection; Law on nature protection; Law on air protection; Law on water protection; Law on waste management; and Law on environmental fund. In addition to environmental laws, several other important laws were also drafted in both entities recently, such as the law on physical planning and the law on construction. Although these laws replaced the existing pre-war laws (focused mostly on urbanism, physical planning and construction), setting a pro-European environmental legislation system, the transformation has not been completed yet as the implementation is poor, due to lack of specific secondary legislation as well as lack of knowledge and poor enforcement.

[1] Ministry of Physical Planning, Urbanism, Civil Engineering and Ecology in RS

The Bosnia and Herzegovina EIA legal framework is provided for mainly by the new Law on Environmental Protection (Official Gazette FBiH 33/03) which also includes an Environmental Permitting procedure. This law (paralleled by a similar law in RS) was prepared in accordance with environmental policies of the European Union and international conventions. Permits which are required by other laws (e.g. waste management permit from the Law on Waste Management, water management permit from the Law on water protection) as well as other necessary permits (forestry, agriculture, etc.) need to be obtained when requesting (applying for) an Environmental Permit. Other permits stipulated by specific laws may also be required for construction activities and need to be obtained by the borrower in consultation with municipal authorities prior to starting construction/project implementation. These may be but are not limited to: Law on Concessions, Law on Construction Land, Law on Physical Planning; and Law on Construction.

As set by the Law on Environmental Protection, a key by-law regulating the EIA process and Environmental Permitting procedure was adopted in FBiH recently (Official Gazette FBiH No. 19/04). This by-law regulates:

- Installations and facilities, or significant modifications in existing plants and processes, for which the Ministry of Physical Planning and Environment requires an EIA within the environmental permitting procedure - *Cat I.*
- Installations and facilities, or significant modifications in existing plants and processes, for which the Ministry shall decide whether an EIA is required during the Environmental Permitting procedure - *Cat II.*
- Installations and facilities which do not require an EIA, and which can be constructed and start operating only if they have obtained an Environmental Permit from the Ministry of Physical Planning and Environment (Ministry) - *Cat III.*
- Installations and facilities which do not require an EIA, and which can be constructed and start operating only if they have obtained an Environmental Permit from the Cantonal Ministry responsible for environment - *Cat IV.* Very small installations and facilities not requiring environmental permits (typically not exceeding household emissions) are also under the responsibility of relevant cantonal ministries and may transfer this obligation to municipalities (once they define the threshold limits for household emissions).
- Content of the EIA Report.
- Criteria for Environmental Screening.

Note: The categorization method and category numbers (Cat I,II,III and IV) are not specified by the by-law. The categorization is used in this document for easier comparison and reference.

Protection of nature in FBiH is addressed by the Law on Nature Protection. This Law puts forward the conditions and manner of restoration, preservation and sustainable development of landscapes, natural areas, plants, animals and their habitats, minerals, fossils, and other natural components within the territory of Federation of BiH. It defines general measures of nature protection (landscape protection, protection of wildlife and plants, The Red List, protection of habitats), and special measures of nature protection, that is definition of protected areas (within the jurisdiction of FBiH: protected natural area and national park; within the jurisdiction of the Canton: protected landscape and monument of nature), protected area management, activities within the protected area, and inclusion in the European network of protected areas the NATURA 2000 program.

Protection of cultural and historical heritage is addressed through the Law on Protection of Cultural-Historical Heritage (Official Gazette SR BiH no. 20/85). In accordance with this Law, an Institute for the Protection of Cultural-Historical and Natural Heritage of BiH has been formed (now transformed as the Institute for Protection of Monuments FBiH). Following the Dayton Peace Accord the cantons have formed their own Institutes for the Protection of Cultural-Historical and Natural Heritage. These institutes, in accordance with the Law on Protection of Cultural-historical and Natural Heritage, offer their expertise within the environmental impact assessment process and issuance of urban development permits. The opinions are expressed based on the existing data and site visits. If the project is not going to impact the cultural-historical heritage then the sole condition is for the investor to be bound to notify the municipal authorities and the relevant institute if real-estate, mobile objects and valuables or other natural values are found during construction works. In addition the investor is bound to retain the valuable in the state and position that it was encountered in, and to enable the institute to collect sufficient data for listing and documentation required for further steps in preservation of the found valuable.

Taking into consideration the Law on Cultural-Historical Heritage Protection and Law on Nature Protection, the Environmental Impact Assessment Report aside from the other contents, must also include: 1. the impact on flora, fauna, water, air and land, 2. impact on material goods, including cultural-historical and archeological heritage, 3. impact on the landscape, 4. sensitivity of the geographic areas that might be affected by the project and absorption capacity of the natural setting, taking into account the following categories:

a.) wetlands,
b.) coastal and water supply areas,
c.) karst areas,
d.) mountainous and forested areas,
e.) areas of rare and endemic plant and animal species,
f.) protected natural areas and national parks,
g.) monuments of nature and protected landscapes,
h.) areas where the environment is significantly already impacted by existing plants, processes and activities,
i.) heavily populated areas,
j.) landscapes with significant historical, cultural or archaeological value.

3 OVERVIEW OF WORLD BANK ENVIRONMENTAL POLICIES AND PROCEDURES

The World Bank has established policies for environmental screening and assessment of projects. All activities financed by the Bank have to be in compliance with local environmental rules and regulations, as well as with environmental policies of the Bank. The Bank requires environmental screening and, when warranted, environmental assessment of activities proposed for Bank financing to help ensure that they are environmentally sound and sustainable. The environmental assessment runs in parallel with the process of designing the activity and implementing it, and the type and its detail depend on nature, scale, and any potential environmental risks.

The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA. The Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- Cat A: A proposed project is classified as Cat A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. Examples of impacts are: direct pollutant discharges that are large enough to cause degradation of air, water or soil; large-scale physical disturbance of the site and/or surroundings; extraction, consumption, or conversion of substantial amount of forest and other natural resources; measurable modification of hydrologic cycle; hazardous materials in more than incidental quantities, etc. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Cat A project, the borrower is responsible for preparing a report, normally an EIA.

- Cat B: A proposed project is classified as Cat B if its potential adverse environmental impacts are less adverse/significant than those of Cat A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Cat A projects. Projects entailing rehabilitation, maintenance or upgrading rather than new construction will usually be in this category. The scope of EA for a Cat B project may vary from project to project, but it is narrower than that of Cat A EA.

- Cat C: A proposed project is classified as Cat C if it is likely to have minimal or no adverse environmental impacts. Projects in this category are usually projects on education, family planning, health, institutional development, human resource projects, etc. Beyond screening, no further EA action is required for a Cat C project.

Furthermore, the World Bank's exclusion list forbids financing of certain activities and projects. Several items on the exclusion list are directly related to environmental protection:

- Production or activities involving harmful or exploitative forms of forced labor/harmful child labor.
- Production or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements.
- Production or trade in weapons and ammunitions.
- Production or trade in alcoholic beverages (excluding beer and wine).
- Production or trade in tobacco.
- Gambling, casinos and equivalent enterprises.
- Trade in wildlife or wildlife products regulated under CITES.
- Production or trade in radioactive materials.
- Production or trade in or use of unbonded asbestos fibers.
- Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forest (prohibited by the Forestry policy).
- Production or trade in products containing PCBs.
- Production or trade in pharmaceuticals subject to international phase outs or bans.
- Production or trade in pesticides/herbicides subject to international phase outs or bans.
- Production or trade in ozone depleting substances subject to international phase out.
- Drift net fishing in the marine environment using nets in excess of 2.5 km in length.

4 WORLD BANK SAFEGUARD POLICIES

The World Bank's environmental assessment policy OP 4.01 is considered to be the umbrella policy for the Bank's environmental safeguard policies. These policies are critical to ensuring that potentially adverse environmental and social consequences are identified, minimized, and mitigated. These policies receive particular attention during the project preparation and approval process. The Bank undertakes screening of each proposed project to determine the appropriate

extent and type of EA to be undertaken and whether or not the project may trigger other safeguard policies. The Borrower is responsible for any assessment required by the Safeguard Policies, with general advice provided by Bank staff. The World Bank safeguard policies and triggers for each policy are given in the following table.

Table 1 WB Safeguard Policies and Triggers

Policy	Triggers
Environmental Assessment (OP 4.01)	If a project is likely to have potential (adverse) environmental risks and impacts in its area of influence.
Forestry (OP 4.36)	Forest sector activities and other Bank sponsored interventions which have potential to impact significantly upon forested areas
Involuntary Resettlement (OP 4.12)	Physical relocation and land loss resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location.
Indigenous Peoples (OD 4.20)	If there are indigenous peoples in the project area, and potential adverse impacts on indigenous peoples are anticipated, and indigenous peoples are among the intended beneficiaries.
Safety of Dams (OP 4.37)	If a project involves construction of a large dam (15 m or higher) or a high hazard dam; If a project is dependent upon an existing dam, or dam under construction.
Pest Management (OP 4.09)	If procurement of pesticides is envisaged; If the project may affect pest management in the way that harm could be done, even though the project is not envisaged to procure pesticides. This includes projects that may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk, (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health or environmental risks.
OPN 11.03 – draft OP 4.11 Physical Cultural Resources	The policy is triggered by projects which, prima facie, entail the risk of damaging cultural property (e.g. any project that includes large scale excavations, movement of earth, surficial environmental changes or demolition)
Natural Habitats (OP 4.04)	The policy is triggered by any project with the potential to cause significant conversion (loss) or degradation of natural habitats whether directly (through construction) or indirectly (through human activities induced by the project).
Projects in Disputed Areas (OP 7.60)	The policy is triggered if the proposed project will be in a "disputed area".
Projects on International Waterways (OP 7.50)	If the project is on international waterway such as: any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states (or any tributary or other body of surface water that is a component of this waterway); any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states-and any river flowing into such waters.

However, the following safeguard policies are relevant to the WQP project:

OP/BP 4.01

The World Bank's environmental assessment policy is described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. Environmental Assessment (EA) is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations. EA evaluates a project's potential environmental risks and impacts in its area of influence, examines project alternatives, identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts, and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible.

EA takes into account the natural environment (air, water, and land), human health and safety, social aspects (involuntary resettlement, indigenous peoples, and cultural property), and

transboundary environmental impacts, as well as country-specific overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects.

OP/BP 4.04 – Natural Habitats

The Bank supports the protection, maintenance and rehabilitation of natural habitats since conservation of natural habitats is essential for long-term sustainable development. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. This policy is triggered by any project with the potential to cause significant conversion (loss) or degradation of natural habitats whether directly (through construction) or indirectly (through human activities induced by the project).

Natural habitats are land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the areas primary ecological functions. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems.

The Bank does not support projects that, in the Bank's opinion, involve significant conversion or degradation of critical natural habitats. The environmental assessment process should identify any critical natural habitats within a proposed project's area of influence. For other natural habitats, the Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the project significantly converts or degrades natural habitats, the project includes mitigation measures acceptable to the Bank. Such measures normally include, as appropriate, minimizing habitat loss, and establishment and maintaining an ecologically similar protected area.

The public consultation and document disclosure requirements are those required under the EA Policy (OP 4.01). If, as part of the environmental assessment process, environmental screening indicates the potential for significant conversion or degradation of critical or other natural habitats, the project is classified as Category A; projects otherwise involving natural habitats are classified as Category A or B, depending on the degree of their ecological impacts.

OP/BP/GP 7.50 Projects on International Waterways

In order to ensure cooperation and goodwill of all involved stakeholders, the Bank has created the OP/BP/GP 7.05 for projects that are located on international waterways (river, canal, lake or any other watercourse that flows through two or more states; any tributary or other water body included as a component of the international waterway; any bay, gulf or strait bounded by two or more states, or a river flowing into such waters).

OP/BP/GP 7.05 requires that the potential Borrower notifies the other riparians of the proposed project and project details. Certain projects are exempt from the notification requirement. These are the projects that do not adversely change the quality or quantity of water that flows to other riparians, or the project that would not be adversely affected by other riparians water use.

OPN 11.03 – draft OP 4.11 Physical Cultural Resources

Cultural property includes sites that have archaeological (prehistoric), paleontological, historical, religious, and unique natural values. It includes remains left by previous human inhabitants (such as middens, shrines, and battlegrounds) and unique natural environmental features such as canyons and waterfalls.

In case that damage to cultural property is identified within the project, the Bank shall relocate the Project if possible, or in some cases the structures might be relocated, and protected. In certain cases the project might go through where project benefits are great, and a competent authority has deemed the damage as unavoidable, minor or otherwise acceptable (where the detailed justification is given within the project documents).

When a project triggers this policy, the Borrower assesses the project's potential impacts on physical cultural resources as an integral component of the Environmental Assessment (EA). The cultural resources component of the EA provides for (a) an investigation and inventory of physical cultural resources likely to be affected by the project, (b) documentation of the characteristics and significance of the these resources, and (c) an assessment of the nature and extent of impacts on these resources. Where the project may have adverse impacts on physical cultural resources, the Environment Management Plan includes a cultural resources component.

OP/BP 4.12 Involuntary Resettlement

Any World Bank financed projects involving resettlement components are subject to the World Bank Operational Policy (WB OP) 4.12 Involuntary Resettlement, revision April 2004, and Bank Procedure (BP) 4.12 of December 2001, which describe instruments and procedures to eliminate negative economic, social and environmental issues that may arise. The policy is triggered not only with physical relocation, but any loss of land resulting in relocation or loss of shelter, loss of assets or access to assets and loss of income sources and means of livelihood. The overall objectives of the policy are the following:

a. Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs.
b. Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.
c. Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.

5 COMPARISON OF WORLD BANK AND BiH EA REQUIREMENTS

Table 2 – Comparison of WB and BiH EA Requirements

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Categorization/ Screening	Categorization and screening is based on lists (19/04) of *installations and facilities* requiring environmental permits obtained through either an EIA or without EIA.	Screening and categorization is based on type, location, sensitivity, and scale of the proposed project identifying key issues including any resettlement, indigenious peoples, and cultural property concerns.
Significant impacts	Cat I: Installations and facilities to be assessed for their impact on environment requiring full EIA. The EIA is a requirement for obtaining an Environmental Permit. The EIA study needs to include the results of the Preliminary Environmental Assessment. The study also needs to incorporate the the comments and suggestions of governmental and non-governmental organizations as well as the results of public consultations.	Cat A: Projects likely to have significant adverse environmental impacts that are sensitive (irreversible).
Moderate Impacts	Cat II: Ministry screens the project and decides whether an EIA is required. The by-law defines facilities/installations which undergo screening and criteria for screening such as size, cumulative impact, use of natural resources, sensitivity, etc. in order to re-categorize as either Cat I or III. Cat III: Installations and facilities not requiring a full EIA and for which an Environmental Permit is issued by the Ministry .	Cat B: Projects with environmental impacts less adverse than those of Cat A.
Low or no impacts	Cat IV: All facilities and installations with threshold levels below Categories I, II and III. The Environmental Permit for Cat IV is issued by the Cantonal Ministry responsible for environmental issues.	Cat C: Projects with minimum or no adverse impacts.
Other	None	List of activities not eligible for financing by the Bank.

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Specific requirements for projects related to waste water treatment	Cat I Wastewater Treatment Plants (WWTP) with a capacity exceeding 50 000 PE Cat II / Cat III Wastewater Treatment Plants (WWTP) with a capacity from 10 000 to 50 000 PE Cat IV Wastewater Treatment Plants (WWTP) with a capacity below10 000 PE For existing plants, Environmental Permit has to be obtained by 2008 Exception: In case of rehabilitation of facilities or buildings damaged during the war, a Construction Works Permit is sufficient to start works, without prior issuance of Urbanism Consent and Environmental Permit. When applying for a new Construction Works Permit, the old permit and main project design technical documentation should be attached. Upon completion of the rehabilitation works, the facility, like any other existing facility, should obtain Environmental Permit by 2008.	The category is assigned based on screening. Large projects with potential significant impacts are assigned Cat A. Small-size projects and/or rehabilitation or reconstruction projects usually fall under Cat B.
EA Documentation/ Document Content	Cat I: Phase I: A request (written application) for Preliminary Environmental Assessment (PEA) needs to be submitted by the project developer (borrower) to the Ministry in order to determine the scope of the EIA study. The contents of both the PEA and EIA report are given in Table 3. Phase II: The Ministry defines the content and scope of the EIA based on the results of the Preliminary Environmental Assessment.	Cat A: Full EA is required, normally an EIA. The EMP is an essential part of the EA. EA content for a Cat A project is given in Annex I. (where applicable, separate Resettlement Plans and Indigenous Peoples Plans are disclosed with the EA report)
	Cat II: Activities in this category also undergo a Preliminary environmental assessment, where the content of the request and document submitted is identical to that of Cat I. Cat III: Content of an Environmental Permit Request is given in Table 3	Cat B: Scope of EA narrower than Cat. A project. Usually just an EMP is required. Environmental considerations are either incorporated in project documents or are included in a separate report. The Concept Review decides the scope of the EMP and whether any additional environmental requirements are necessary. (where applicable, separate Resettlement Plans and Indigenous Peoples Plans are disclosed with the EA report)
	Cat IV: Formal written request to Cantonal Ministry responsible for environmental issues has the same content as request for Cat III. The Cantons are authorized to modify the above requirements for Cat IV. Content of the request and other associated documents need to be reviewed by the Cantonal Ministry responsible for environmental issues for every project.	Cat C: No EA is required. No action is required beyond screening.

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Transboundary Environmental Impacts	For all projects and installations/facilities that may have negative transboundary (including inter-entity boundary) environmental impacts the following are required by the Law on Environmental protection: - The EIA report needs to have a special chapter containing information on possible transboundary environmental impacts. - A copy of the request for the Environmental Permit (and relevant documents included with the request) needs to be sent to other relevant entity (RS) or foreign state authorities. The Ministry is obliged to notify the other entity or foreign state, define the level of involvement and send the relevant documents along with the copy of the request. The above measures need to be in taken only if there are *negative* transboundary impacts. Considering that the Water Quality Project is designed to reduce the overall pollution from municipal sources into international waters, the above is not required unless certain activities are expected to have negative transboundary environmental impacts.	Notification of riparians may be required if international waterways are involved. However since by design the project seeks to improve the water quality and will not adversely change the quality or quantity of water notification of riparians is not required (an exclusion must be requested from the Office of the Vice President and cleared with the WB Legal Department).
Consultations	Public consultation is the responsibility of the Ministry for Categories I, II, III while it is under the responsibility of Cantonal Ministries responsible for environmental issues for Cat IV. Cat I: Article 61 of the Law on environmental protection in FBiH prescribes that the public consultation should take place after the draft EIA study is submitted. However art. 36. of the same law requires public consultations to be carried out through all phases of the EIA. Although not specified explicitly, this article may be interpreted that the public consultation is also required during the Preliminary Environmental Assessment phase. The Ministry will decide whether a second consultation is required and therefore the borrower needs to consult the Ministry beforehand. Cat II: Depending on the screening results, Cat II is re-categorized either as Cat I or Cat III and will thus inherit the requirements of these categories. Cat III & IV: Consultation is carried out once, during the Environmental Permit issuing procedure. Transboundary impacts: In case of negative transboundary (including inter-entity boundary) environmental impacts, the representatives and the public of the entity/foreign state have the right to participate in the consultation process.	The borrower is required to consult project affected groups and local NGO's about the projects environmental aspects and take their views into account. Cat A: At least two consultations (1) at the scoping stage, shortly after environmental screening, and before the ToRs for the EA are finalized, and (2) once a draft EA report is prepared. Cat B: At least once during the EA process.

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Disclosure	Cat I & II: Preliminary Environmental Assessment Report (which is the result of the PEA request submitted) is disclosed prior to consultation and 30 days are allowed for comments. For all Cat. I projects, and those Cat II projects that require an EIA (following the PEA), the Ministry sends a copy of the EIA study (may be interpreted as "draft EIA study" although not mentioned in the Law) to relevant authorities and other interested parties, allowing 30 days for receiving comments to the report. Categories III & IV: Request for issuing an Environmental Permit (and relevant documents) must be accessible by the public, whereby 30 days are allowed for comments.	Cat A: Borrower provides for the initial consultation a summary of the proposed project's objectives, description, and potential impacts. After draft EA report is prepared, the borrower provides a summary of the EA's conclusions. The borrower makes the draft EA report available at a public place (in local language). Cat B: Separate Cat B reports are to be made available to local NGOs and affected groups (local language). The disclosure process is complete only after the EA report is officially received by the Bank.
EA Review and Approval	Cat I, II & III: The Ministry reviews and approves the EIA report and Environmental Permit request. Cat IV: Cantonal Ministries responsible for environmental issues review and approve Environmental Permit requests.	For Cat. A & B Projects, before formal clearance of environmental aspects of the project, the Bank reviews the results of the EA (especially consultations, EMP and institutional capacity), ensuring that the EA report is consistent with the ToR.

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Licensing/ permitting	New construction projects: The following permits are required (each being a requirement for the next) for new construction projects: - Environmental Permit (for installations and facilities listed in the by-law, categories I,II,III & IV) - Urbanism Permit (not required if detailed urbanism plans are available; Urbanism-technical conditions are prescribed by the relevant authority) - Construction Permit - Usage permit Reconstruction/Rehabilitation projects: The following permits are required (each being a requirement for the next) for reconstruction/rehabilitation projects: - Environmental Permit (for installations and facilities listed in the by-law an Environmental Permit is not required until 2008 if a conditioning plan exists for categories I,II,III & IV) - Urbanism Permit (not required if detailed urbanism plans are available; Urbanism-technical conditions are prescribed by the relevant authority) - Construction Permit - Usage permit Note: Repair/rehabilitation of buildings and facilities destroyed during the war only require a construction permit and do not require urbanism and environmental permits. During the issuing of environmental and urbanism permits for all categories, other permits may be required for reference by the relevant entity, cantonal or municipal authorities issuing the permits (e.g. water use permit).	None

ISSUE	BIH REQUIREMENTS	WORLD BANK REQUIREMENTS
Effluent standards/ guidelines	The Environmental Permit contains the prescribed limit values for pollutant emissions. However, the lack of secondary legislation creates a gap in defining these values. For the time being, several laws and guidelines (mostly pre-war) are used for this purpose. The laws and guidelines are given below: -Regulation on hazardous substances that must not be discharged into waters (Official gazette of SFRJ No.3/66 and 7/66). -Regulation on categorization of water streams (Official gazette of SRBiH, No. 42/67). -Some cantonal laws for air quality and noise are in place. -Instruction on the establishment of maximum allowed contents of hazardous materials in soil and methods of their testing (Official gazette of FBiH No 11/99) (New entity environmental guidelines containing environmental/effluent standards are under preparation).	Emission levels acceptable to the Bank are given in the PPAH
Mitigation Plan	For Cat I projects, mitigation measures are prescribed in the EIA study which are also included in the Environmental Permit. For other categories requiring an Environmental Permit, measures for protection of air, water, soil, flora and fauna and solid waste management measures are included in the permit itself. These measures can be considered as mitigation measures.	Mitigation measures are included in the EMP. Obligation to carry out the EMP and additional conditions/measures under the EMP need to be included in the loan conditions. The EMP format is given in Annex II.
Monitoring Plan	The Ministry may require the preparation of a monitoring plan during preparation of EIA. A Self-monitoring plan is included in the Environmental Permit. Besides self-monitoring, the Environmental Protection Law states that, monitoring of installations and facilities by authorized institutions will be carried out every 3 years, in order to ensure that the requirements of the Environmental Permit (monitoring and other issues) are satisfied. Other environmental laws (e.g. Law on Air Protection, Law on Water Protection etc.) also specify the required monitoring procedures to be carried out by authorized institutions.	Monitoring plan is included in the EMP.
Permits and Licensing during implementation	The Environmental Permit is reissued every 5 years or earlier if found necessary by the Ministry (Art. 74).	None

Table 3 Comparison of World Bank and BiH EA Document Content Requirements

World Bank (Cat A)	World Bank (Cat B)	PEA Content (Cat I & II) - BiH	EIA study (minimum contents) (Cat I & II) – BiH	Content of an Environmental Permit Request (Cat III & IV) BiH	Content of an Environmental Permit (Cat I, II, III & IV) BiH
Executive summary		Non-technical summary	Non-technical summary	Non-technical summary	
Policy, legal and administrative framework					
Project description		Project description containing information on location, purpose and size of facility, installation	Project description	Description of the installation facility	
Baseline data			Description of the environment (population, flora, fauna, climate, cultural heritage, landscape, etc.)	State of the project location	
Environmental impacts		Information necessary for identifying and assessing the main environmental impacts	Description of possible key environmental impacts	Source of emissions, types and levels of emissions, key environmental impacts	
Analysis of alternatives		Description of possible project alternatives and the selected alternative solution	Outline of main alternatives	Description of alternatives	
EMP	EMP				
- Mitigation measures	- Mitigation measures	Description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment	Description of measures for mitigating negative impacts	Proposed measures and technologies for prevention or reduction of emissions from the installation, waste minimization measures, measures during decommissioning and other measures	- Requirements for protection of air, soil, water, plants and animals - Requirements for waste management - Measures for minimization of trans-boundary pollution - Measures specifying work conditions in emergency situations.
- Monitoring plan	- Monitoring plan		The Ministry may require the preparation of the monitoring plan during preparation of the EIA study. In general, the monitoring plan is prepared after the EIA is completed, as a requirement of the Environmental Permit.	Proposed measures for emission monitoring and their impacts	- Emission thresholds for polluting substances - Monitoring system including monitoring methodology and frequency
- Capacity Development and Training	- Capacity Development and Training				
- Implementation Schedule and Cost Estimates	- Implementation Schedule and Cost Estimates				
Other: - Records of consultations - Associated reports: Resettlement plan or indigenous peoples development plan		Other: Copy of the cadastre from the physical/spatial plan	Other: An indication of any difficulties encountered by the developer in compiling the required info.	Other: - Material balance - Copies of requests for other permits	

6 DIFFERENCES BETWEEN THE BiH AND WORLD BANK EA SYSTEMS AND GUIDELINES FOR THE WATER QUALITY PROJECT

The comparison given in the previous tables demonstrates considerable overlap in some segments of the EA process despite the differences in the approach. EA processes of the World Bank and BiH can be aligned to some extent, but only after the screening/categorization stages, where requirements for further stages are defined. The complex administrative structure in BiH (entities, cantons and municipalities) results in different requirements at different levels. The EA legislation in FBiH has been drafted recently and implementation has just started. Weak knowledge of the laws at certain levels of responsibility in the EA process, results in varying interpretations of the law. This is exacerbated by the lack of secondary legislation (e.g. effluent standards) which is also a requirement for full implementation of the EA process.

The BiH E(I)A process is based on the Environmental Permit, which is in turn a requirement for other necessary permits (such as the urbanism permit). The steps required for obtaining an Environmental Permit are laid during both categorization and screening. Investments to be identified after starting the implementation of the Water Quality Project are expected to be small-scale. Moreover, majority of investments already identified and those to-be-identified involve rehabilitation and reconstruction. Therefore, in most cases, the national legislation will only require applications for permits (Environmental Permit, Construction Permit, etc), which can be obtained irrelevant of whether an EIA report is produced.

Considering these specific circumstances, it is anticipated that the requirements of the World Bank with regards to specific components of the EA process will be more stringent in practice. However, these more stringent requirements can be easily incorporated into the overall BiH EIA process. The borrower and other agencies implementing the project are responsible for satisfying these specific requirements of the Bank at certain points.

Differences in key elements of the two EA systems and specific implementation guidelines are given in further text:

Categorization and Screening: The World Bank carries out screening and as a result categorizes projects based on their impacts (type, location, sensitivity, scale, etc.), whereas in BiH, the categorization is the first stage and is carried out based on pre-defined lists of installations and facilities where scale and threshold levels are key factors in defining the category. In the case of Cat II projects, based on the decision of the Ministry, the categorization may be followed by a screening process where a Preliminary Environmental Assessment is required prior to defining the category of the installation and other specific requirements.

A project categorized as Cat II or III by national legislation may not require an EIA, however by Bank procedures and safeguards it may require a full EIA and higher requirements for pubic involvement. Similarly, a project categorized as Cat B by the Bank where an EMP is sufficient, may trigger a full EIA by local regulations. A demonstrative comparison of categorization in the BiH and World Bank systems is given in Annex III. Therefore the two screening/categorization procedures need to be carried out separately, where projects would be categorized as A/B/C in accordance

with Bank's screening policies and as category I/II/III/IV as per national policies. The different requirements based on separate categorization are given in further text.

All investments identified during the implementation phase will include a mandatory Environmental Appraisal Form (Annex IV). The Environmental Appraisal Form will be used for screening investments in order to identify and satisfy both the requirements of BiH and those of the World Bank. The Environmental Appraisal Form has two parts, the first part to be completed by the borrower and the second to be completed by PMT, prior to Bank review. The Environmental Appraisal Form will summarize the nature of the project, permits that need to be obtained and scope and depth of the EA. Overlapping requirements of both systems and specific requirements will be identified in this form.

Required EA Documents: The comparison in Table 4 shows that the contents of the EIA report in Bosnia and Herzegovina are very similar to those of the World Bank. The main differences arise where the Bank requires additional specific information (e.g. capacity development and training). This information can be included in the reports and documents submitted to the Ministry/Cantonal authorities and will not have an impact the outcome of the overall EIA process that will satisfy the national requirements.

In order to satisfy both the specific requirements of the Bank and procedural requirements of BiH EIA process, and avoid duplication of effort, documents prepared during the initial preparatory phases need to be based on the national requirements. These documents will also satisfy Bank's requirements prior to the initial consultation (Cat A projects). Specific information is required by the Bank, in either the EMP or EIA, needs to be included in the draft EA report prior to disclosure and appraisal.

Environmental Management Plan: National EIA legislation specifies the document chapters and issues to be analyzed in the EIA process, however it does not specify a pre-defined format or layout which must be followed for mitigation and monitoring topics. Therefore, the EMP format given in Annex II should be used for the the investments and included in the loan package of the borrower. An EMP is an essential part of Cat A projects and is usually sufficient for Cat B projects. Use of a pre-defined format will improve the supervision and monitoring of environmental issues associated with the investments.

The scheme given in Table 4 the next page should be used by the borrower and PMT in order to determine the E(I)A document content requirements of the separate categorizations by the two EA systems. Corresponding categories will be included in the Environmental Appraisal Form. For investments that fall under Category C only national EIA requirements need to be followed. Similarly for reconstruction projects where no action is required by national EIA legislation, the borrower should follow Bank's EA requirements.

Since the WB and BiH categorization criteria are different, it should be noted that the following table shows all possible situations with respect to the two categorization systems.

Table 4 EA Document Requirements Based on Categorization/Screening

BiH	WB	Combined BiH & WB requirements	Additional specific information required by the Bank
Cat I	Cat A	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Policy, Legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training
	Cat B	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training
Cat II[a]	Cat A	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training
	Cat B	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training
Cat II[b]	Cat A	PEA. Monitoring plan needs to be included in the PEA. An EIA document needs to be prepared based on the information included in the PEA.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training - Baseline data - Some elements of the PEA may require additional information/detail as per WB full EIA requirements.
	Cat B	PEA. Monitoring plan needs to be included in the PEA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training
Cat III&IV	Cat A	Full EIA based on the information included in the Environmental Permit Request.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training - The information and detail included in some elements of the Environmental Permit Request may not be sufficient for the full EIA required by the Bank. Additional work on the document may be required.
	Cat B	Environmental Permit Request (contains essential elements of the EMP)	- Implementation Schedule and Cost Estimates - Capacity Development and Training

Cat II[a]: Projects which require an EIA following the PEA and screening carried out by the Ministry.
Cat II[b]: Projects which do not require an EIA following the PEA and screening carried out by the Ministry are subject to direct Environmental Permitting.

Strategic Environmental Assessment (SEA): Projects categorized by Bank policies as Cat C are not subject to environmental assessment. Similarly, by national legislation, these projects (such as education and institutional development) do not undergo an environmental assessment but in some cases may require a Strategic Environmental Assessment (SEA). In FBiH, the environmental protection law requires the preparation of SEA for all spatial planning documents which may have negative environmental impacts. Spatial planning documents which may require SEA are the following:

a. Spatial outline as a basis for preparing a spatial plan.
b. Programs of measures and activities.
c. Spatial plans
d. Urbanism plans
e. Other spatial planning documents defined in Cantonal spatial planning laws.

Public Consultations: The primary objective of public consultations is to identify environmental issues which the project affected groups consider important. Consultation requirements greatly overlap in the two EA systems with minor differences in the approach. According to Bank's policies, the responsibility for organizing and holding consultations is with the borrower, while by national requirements the Ministry/Cantonal Ministry is the party responsible. BiH legislation does not explicitly define which groups and organizations need to be consulted while a requirement of the Bank is that views of project affected groups and local NGO's be taken into account. Therefore, in order to satisfy the above requirements the borrower needs to:

(i) assist the relevant ministry during the consultation process where the ministry is responsible for public consultations;
(ii) include project affected groups and local NGOs in the consultation process.
(iii) disclose records of all consultations with the EA documents as per World Bank requirements

If the project is categorized as Cat I by national legislation, two public consultations are required, one during the Preliminary Environmental Assessment stage and second after the Draft EIA report is prepared. The same is valid for Cat II projects that require an EIA report following screening. Cat II projects which do not require an EIA report, Cat III and Cat IV projects require only one public consultation during the Environmental Permit issuing stage. The World Bank requires at least two consultations for Cat A projects, at the scoping stage - shortly after environmental screening (before the ToRs for the EIAs are finalized), and once a draft EA report is prepared. For Cat B projects, at least one consultation is required during the EA process. The requirements given in the following table need to be followed for all investments. It is assumed that the Bank's requirement for the first consultation for Cat A projects will be fulfilled if a consultation is held during the PEA stage (BiH requirement).

Table 5 Public Consultation Requirements Based on Categorization/Screening

BiH	WB	Combined BiH & WB min. requirements	Specific issues/requirements
Cat I	Cat A & B	1 public consultation during the PEA stage and 1 public consultation after draft EIA report is produced.	The ministry is responsible for organizing both public consultations.
Cat II[a]	Cat A & B	1 public consultation during the PEA process and 1 public consultation after draft EIA report is prepared.	The ministry is responsible for organizing both public consultations.
Cat II[b]	Cat A	1 public consultation during the PEA process and 1 public consultation after draft EIA report is prepared.	The ministry is responsible for organizing the first consultation while the borrower is responsible for organizing the second consultation.
	Cat B	1 public consultation during the Environmental Permit issuing process.	The ministry is responsible for organizing the public consultation.
Cat III&IV	Cat A	1 public consultation during the Environmental Permit issuing process and 1 public consultation after the draft EIA report is prepared.	The ministry is responsible for organizing the first consultation while the borrower is responsible for organizing the second consultation.
	Cat B	1 public consultation during the Environmental Permit issuing process.	The ministry is responsible for organizing the public consultation.

Cat II[a]: Projects which require an EIA following the PEA and screening carried out by the Ministry.
Cat II[b]: Projects which do not require an EIA following the PEA and screening carried out by the Ministry.
Environmental Permit is issued by the Ministry without directly.

Disclosure: For categories I and II and/or Cat A projects, the first disclosure should take place during the Preliminary Environmental Assessment stage (prior to the first consultation), and the second after the draft E(I)A report is prepared. For categories, III and IV, requests for issuing environmental permits need to be publicly available during the permit issuing procedure. However, if the project is Cat B, the EMP should be disclosed together with the permit request (if not already included with the permit request) in order to satisfy World Bank procedures. All documents (EIA report, draft EIA report, EMP) need to be sent to the World Bank for disclosure at the Infoshop. Where required by the national EIA process, in-country disclosure of EIA documents is the under the responsibility of the ministry (Ministry's website: www.fmpuio.gov.ba), Cantonal ministries and municipalities. In case it is not a requirement of the national EA process, the disclosure needs to be ensured by the borrower in consultation with the PMT.

Effluent Standards: Until new environmental guidelines are drafted, existing standards and guidelines should be used for specifying acceptable emission levels. The Environmental Permit issued by the relevant authority will contain the allowable limits for pollutants. In case guidelines/effluent standards for specific pollutants do not exist or are not prescribed in the Environmental Permit, the PPAH or EU standards – whichever is stricter - should be used for determining the acceptable levels. For water discharge/treatment related investments it is crucial to turn to the Regulation on Categorization of Water Streams during the preparatory phase.

World Bank Safeguards: An investment may involve activities or environmental features that are always of particular concern to the Bank, such as involuntary resettlement. In case one or more World Bank safeguards are triggered (see section 4 for triggers), such as, reason to expect significant impacts on cultural heritage or projects that involve resettlement, the activity needs to be classified as Cat A during the screening process, and be subject to a full EA. Investments expected to trigger safeguards need to be recorded in the Environmental Appraisal Form.

7 STEPS IN THE ENVIRONMENTAL REVIEW PROCESS

In FBiH, the environmental review results in an Environmental Permit, which is in turn a condition for obtaining the Urbanism Permit. Certain installations and facilities require an EIA in order to obtain an Environmental Permit. All required permits and sequence of permits need do be identified by the borrower in coordination with the Ministry.

The key steps in the environmental review process are as follows:

Step 1: Categorization

The borrower prepares the initial project concept and consults the municipal authorities in order to check if the project/activity location is compatible with the existing spatial plans. The borrower then identifies the basic characteristics of the project that would be used for the environmental screening (type and size, capacity and output of the activity, use and quantities of hazardous materials, etc). With

guidance from the municipality*, the borrower identifies the project/activity category in accordance with BiH legislation, including the authority responsible for issuing the required permits. Following the categorization, the borrower consults the responsible authority and identifies steps and obligations for obtaining the required permits (environmental and other permits). This information is included in the project Environmental Appraisal Form in coordination with the PMT. The PMT needs to input information related to WB EA categorization requirements and safeguards into the Environmental Appraisal Form and does the preliminary assignment of the environmental category according to WB policies. The PMT should send this information to the ECA Regional Environmental Unit for review and approval. In case at a later stage re-categorization needs to take place due to change in the status of the project or identified impacts, the PMT should update the Appraisal Form and re-submit it to the ECA Regional Environmental Unit for approval.

Step 2: Preparation of documents and necessary permits

Based on the categorization and inputs from the relevant federal or cantonal ministry responsible for environmental issues, the borrower prepares the required documents. If needed, the borrower may be assisted by specialists/consultants. In case the project does not require an Environmental Permit the borrower may directly proceed to obtaining an urbanism permit from the municipal authorities (In case a detailed urbanism plan exists for the municipality, the urbanism permit is not required. The municipality issues the urban-technical conditions which are a basis for preparing the investment-technical documentation, required for obtaining a construction permit.) Even if no action is required by national laws, the borrower is responsible for following the WB EA requirements identified in the Environmental Appraisal Form.

Step 3: Request for Environmental Permit/Preliminary Environmental Assessment

In case an Environmental Permit is required, the borrower submits the request (application) for Preliminary Environmental Assessment to the Entity Ministry for Projects of Cat I & II or request for obtaining an Environmental Permit for projects of Cat III (Entity Ministry) and IV (Cantonal Ministry). For projects of Cat II, the preliminary assessment will determine whether an EIA is required prior to issuing of the Environmental Permit (if EIA is not required, direct environmental permitting applies). For Cat I projects the preliminary assessment will determine the scope of the EIA study. Table 3 defines the E(I)A document requirements based on the separate Categorization/Screening of the BiH and WB systems.

Step 4: Public Consultation and Disclosure

For Cat I & II, the relevant authority (in step 3) makes the documents available to interested parties for comments (30 days are allowed for comments), and (if found necessary) arranges a public consultation as near as possible to the subject location. For Cat III & IV the request for issuing an Environmental Permit (or draft permit) must be accessible by the public, whereby 30 days are allowed for comments.

Step 5: Environmental Permit/EIA study

- In case there are no comments, the competent ministry issues an Environmental Permit for Projects of *Cat III and IV* (within 120 days starting

* in case the municipality does not have sufficient knowledge of the EA process and legislation the borrower should contact the cantonal ministry responsible for environmental issues

from the request date). The Environmental Permit is then used for obtaining other permits (urbanism permit, construction permit and usage permit).
- Following the screening and preliminary assessment, *Cat II* projects will either receive an Environmental Permit from entity ministries or will be required to prepare an EIA study.
- Projects of *Cat I* will automatically require an EIA study, its scope being defined by the PEA.
- The decision for preparation of EIA is issued 60 days after the request for PEA was made.

The borrower needs to take into account the above given time constraints established by the national EA legislation and submit all requests and documents in a timely manner in order to eliminate unnecessary delays in appraisal.

Step 6: Preparation of EIA study

The borrower is required to contact an institution/firm that will prepare the EIA study based on a ToR approved by the PMT. The list of institutions/firms authorized for preparation of EIA reports is available with the Ministry. The borrower submits EIA study/draft EIA study for review and approval (in local language) to the Ministry and (in English language) to the PMT/Bank for clearance. The PMT needs to ensure that the EIA report is consistent with the ToR.

Step 7: Disclosure

The Ministry sends a copy of the draft EIA study to relevant authorities and other interested parties, allowing 30 days for receiving comments to the report. Additionally, the EIA report in English language needs to be sent by the borrower through the PMT to the World Bank for disclosure at the Infoshop.

Step 8: Public Consultation

The Ministry organizes a public consultation to be held as near as possible to the project location, and invites the public to the consultation via printed media/radio/TV. Comments and suggestions on the EIA study must be received within 30 days starting from the date of invitation for public consultation. Public consultation requirements are given in Table 2. The borrower needs to assist the Ministry during the consultation process.

Step 9: Approval

The Ministry issues a decision for either approving (within 30 days following receipt of the final EIA study) or rejecting the EIA study. The decision is sent to the borrower and interested parties that participated in the consultation process. Additionally the borrower needs to receive formal clearance of the environmental aspects of the project from the Bank. The formal clearance should be noted on the Environmental Appraisal Form.

8 INSTITUTIONAL RESPONSIBILITIES AND ARRANGEMENTS FOR ENVIRONMENTAL MANAGEMENT

Institutional arrangements for the implementation of the Water Quality Project have been defined, consisting of a Project Management Team (PMT) to be formed within the Vodoprivredas. Project Implementing Teams (PITs) would be located in each of the utilities (borrowers).

The PMT is responsible for the overall environmental management and decision making in accordance with the EFP during the preparation and implementation of investments. A separate environmental unit for the project is not required, since the PMTs will be located in Vodoprivredas which are staffed with qualified staff. Vodoprivredas have extensive knowledge of water pollution from municipal sources.

The borrower is responsible for obtaining an Environmental Permit for projects that may impact upon the environment. For the purpose of screening, the borrower, with the guidance of PMT, should prepare the initial project concept/minimum required information about the project which will enable adequate categorization. The PMT will play a key role during the screening, and will participate in categorization of investments/projects in accordance with requirements of national legislation and Bank's procedures. The information in this document coupled with the Environmental Appraisal form is intended to guide both the PMT and the borrower in defining the various requirements of both BiH and the WB. The results of the screening and categorization should be reviewed and approved by the World Bank ECA Regional Environmental Unit. The Bank should provide assistance during the screening process, especially with respect to safeguards. Furthermore, the PMT will advise the borrower on the World Bank EA requirements (contents of an EA report and/or EMP format, consultation, disclosure and approval procedures), and other essential information. The PMT will also be responsible for contacts and consultations with the Ministry, related to requirements, procedures and EIA contents for projects requiring environmental permits from the Ministry (Cat I, Cat II and Cat III). Where an Environmental Permit or any other necessary permit (e.g. urbanism or construction permit) is issued by cantonal or municipal authorities, the PIT should send the official permit request and attached documents to the PMT for review prior to submission to authorities.

The PMT is responsible for overseeing the selection and contracting of Consultants to be engaged in the preparation of the EIA report or EMP as well as for supervision during preparation. EIA reports or other separate reports (such as EMP) will be submitted by the borrower through the PMT to the Bank for review and approval. For Cat A projects the borrower retains independent EA experts not affiliated with the project to carry out the EA. Public consultations will usually be organized by the Ministry. In case the Ministry is not responsible for the consultation by national policies, the borrower will be responsible for carrying out the consultation, in agreement with the PMT and by informing the competent ministry/authority. The borrower will send a copy of the consultation record to the PMT. In case significant issues have been identified during the consultations, the borrower will inform the Bank through the PMT accordingly.

During both the construction and operating phases the borrower will carry out the routine monitoring to ensure that mitigation requirements specified in the EMP and any other environmental requirements specified in the Environmental Permit (this is especially important where contractors are engaged for construction/erection work). The EMP format and other relevant EA documents (Environmental Appraisal Form)

will be included in the loan package. The environmental protection law requires that the borrower reports to the competent authority (that issued the permit) on emission monitoring results, accidents, and other information requested by the permit(s), during the initial and last phases of construction, operation and decommissioning. When required by national policies, and if the PMT finds it necessary (due to lack of equipment or capacity), specialized institutions/companies will perform the required monitoring and data collection. Implementation of mitigation measures specified in the EMP and Environmental Permit must be supervised by the PITs on a regular basis. Reports on mitigation measures and monitoring results are submitted by the borrower to the PMT quarterly, after being reviewed by the PITs. The PMT is responsible for reviewing and analyzing the reports received from the borrower and can request additional monitoring in order to ensure that all environmental guidelines and permit requirements are satisfied. The environmental compliance reports will be attached annually to financial reports submitted by the PMT to the Bank.

Table 6 Institutional Arrangements during Implementation

Institution	Mitigation measures	Monitoring	Permitting	Review
World Bank		Reviews the reports concerning implementation of monitoring plan		Reviews reports received from PMT
PMT	Annually reports to the World Bank on compliance with mitigation measures.	Data analysis and review. Reports to the World bank (together with mitigation). If required requests additional monitoring.	Assistance in obtaining necessary permits (for entity level)	Reviews quarterly reports sent by the borrower.
PIT	Supervision. Ensures that mitigation measures are implemented and adequately reported to the PMT.	Supervision. Ensures that monitoring is implemented in accordance with the monitoring plan.	Assistance in obtaining necessary permits (for cantonal and municipal level)	
Borrower	Implementation of mitigation measures	Implementation of self-monitoring in accordance with requirements of the Environmental Permit.	Request for renewed Environmental Permit every 5 years or a new permit if there are major modifications in the project/facility.	
Ministry **Cantonal Ministry** **Municipality**	Through inspection ensures that measures proposed in the Environmental Permit are implemented.	Inspection and monitoring per requirements of the Environmental Permit.	Issues the new or renewed permit. Issues urbanism and construction permits	Reviews reports sent by institutions authorized for monitoring/inspecti on.
Institutions authorized for monitoring		Periodical monitoring during the operation of the facility.		

9 INSTITUTIONAL CAPACITY FOR IMPLEMENTATION

Institutional capacity considerably differs across institutions:

Municipalities: Municipalities are the first point of contact during project implementation and in some cases they are responsible for issuing an Urbanism or Environmental Permit. Municipalities do not have separate environmental departments. In general, environmental issues are dealt with in urbanism and/or construction departments. These departments lack staff capable of dealing with general environmental procedures and issues. Furthermore, knowledge of new environmental laws and especially requirements of the EIA process is very weak.

Currently, the World Bank is implementing a capacity building project aimed at informing and training municipalities on new developments in environmental legislation in BiH with a focus on the EA process. The training program should be expanded to cover municipalities where projects will be implemented. Staff in urbanism and/or construction departments should be trained on the following topics: current legislation, Environmental Permit issuing procedure, implementation of mitigation measures, monitoring and inspection, effluent standards.

Cantons: Almost all cantonal ministries dealing with physical planning and environment issues have separate environmental departments. Current inspection and enforcement capacity is poor due to lack of staff. Although cantons have their own environmental regulations and are well informed on the new entity environmental laws, they still require additional training. In some cases, cantons are responsible for issuing environmental permits. The Staff in cantons where investments will be implemented need to be updated on new developments in environmental legislation in BiH, especially the proposed EIA legislation which will soon be adopted. Cantons and municipalities in which projects will be implemented should be trained together for environmental issues described above.

Ministry: The Ministry was involved in preparation of the new entity laws and proposed legislation and is well informed about its obligations in the EA process. The Ministry is understaffed (less than 10 employees), which has caused a delay in drafting the remaining secondary legislation required for full implementation of the EIA procedure (standards, BAT, monitoring requirements and other essential parts of the Environmental Permit). Entity ministries urgently need new staff and strengthening of inspection and monitoring capacities in order to ensure effective implementation of environmental policies. Despite the existing constraints within the Ministry (and cantonal ministries), there is sufficient capacity for review and approval of EIA documents and environmental permits once the EIA procedure is fully established throughout the country.

Institutions authorized for monitoring: Majority of institutions in BiH involved in monitoring activities are well equipped with monitoring equipment and have sound knowledge of international monitoring standards, especially in monitoring of water quality. A key issue is the lack of official environmental standards, resulting in different monitoring practices in different institutions. Monitoring plans prepared by the borrower need to be reviewed by the PMT, in order to ensure that proper standards and monitoring methodologies are included in the EMPs. During project implementation, although unlikely, specific monitoring requirements may arise, where national monitoring institutions do not have the necessary knowledge and equipment.

These requirements should be highlighted in the project EMPs, and should be resolved by a specialist/expert employed or contracted by the PMT.

Implementing agencies/borrowers: The PMTs will be located in Vodoprivredas. The Vodoprivredas have extensive knowledge of water pollution issues and are capable of analyzing and managing environmental issues. Vodoprivredas also have significant experience in monitoring and related technical issues.

The PMTs are required to coordinate and oversee the screening and categorization activities as well as review reports received from the borrowers. If needed, the PMTs can contract external experts temporarily. However, environmental consultancy services will be required by borrowers (utilities) to a greater extent, especially during the initial EA process, when initial project concept notes are prepared and (negative) environmental impacts are identified. Considering that the project is designed to reduce pollution in waters from municipal sources, it is anticipated that a part of the procurement will include monitoring equipment. The monitoring equipment will be used for the self-monitoring activities required by the Environmental Permit. The borrowers may require some basic training for environmental management and monitoring equipment. This training can be provided by the Vodoprivredas or professional training agencies. All required monitoring equipment and training should be included in the EMP.

The PMT and PIT will play a key role during initial project preparation and screening and categorization process. Therefore these agencies will need to undergo adequate training on both World Bank and BiH environmental policies. Capacity for implementing safeguards is low. This is mainly due to the lack of corresponding laws in the national legislation and lack of experience in these issues. Natural and cultural resources have been ignored in the past. Therefore, the PMT and the borrowers need to be exposed to World Bank safeguards, since it will be actively involved in the categorization process required by the Bank where important issues such as cultural property and involuntary resettlement need to be included in the project documents sent to the Bank for the review. It is recommended that a separate training, in the form of a one and a half day (12 hour) seminar, be organized for the PMT and PITs covering the following aspects:

- World Bank – Environmental Assessment (OP/BP 4.01)
- Safeguard Policies
- Mitigation measures
- Monitoring
- Environmental screening and categorization
- BiH Environmental review process

10 INVOLUNTARY LAND ACQUISITION AND RESETTLEMENT GUIDELINES FOR THE WATER QUALITY PROJECT

WB OP 4.12 POLICY REQUIREMENTS

All World Bank financed projects involving resettlement components are subject to the World Bank Operational Policy (WB OP) 4.12 Involuntary Resettlement, revision April 2004, and Bank Procedure (BP) 4.12 of December 2001, which describe instruments and procedures for eliminating negative economic, social and environmental issues that may arise. The policy is triggered not only with physical relocation, but any loss of land resulting in relocation or loss of shelter, loss of assets or access to assets and loss of income sources and means of livelihood. The overall objectives of the policy are the following:

d. Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs.
e. Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.
f. Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.

For subprojects to be prepared during project implementation, the Bank requires that subproject resettlement plans consistent with this policy framework are prepared and submitted to the Bank for approval. The borrower's obligations to implement the resettlement plan are provided for in the loan package and the full costs of resettlement activities are included in the total cost of the project.

The subproject specific resettlement plan minimally needs to include: baseline census and socioeconomic survey information; specific compensation rates and standards; policy entitlements related to any additional impacts identified through the census of the survey; description of resettlement sites and programs for improvement or restoration of livelihoods and standards of living; implementation schedule for resettlement activities; and detailed cost estimate.

For subprojects where impacts on the entire population are minor, or fewer than 200 people are displaced, an abbreviated resettlement plan may agreed with the borrower. An abbreviated resettlement plan covers the following minimum elements: a census survey of displaced persons and valuation of assets; description of compensation and other resettlement assistance to be provided; consultations with displaced people about acceptable alternatives; institutional responsibility for implementation and procedures for grievance redress; arrangements for monitoring and implementation; and a timetable and budget.

OP 4.12 suggests the following three categories of persons for eligibility for compensation and assistance:

a) Those who have formal rights to land (including customary and traditional rights recognized under the laws of the country). These persons are provided with compensation for the land they lose, and other assistance in accordance with the policy.

b) Those who do not have formal rights to land at the time the census begins but have a claim to such land and assets-provided that such claims are recognized under the laws of Bosnia and Herzegovina or become recognized through a process identified in the resettlement plan. These persons are provided with compensation for the land they lose, and other assistance in accordance with the policy.
c) Those who have no recognizable legal right or claim to the land they are occupying. These persons are provided resettlement assistance in lieu of compensation for the land they occupy, and other assistance as necessary.

BIH REAL PROPERTY ACQUISITION / RESETTLEMENT POLICIES

The treatment of Real Property Acquisition, Restriction of Access or Involuntary Resettlement issues in BiH equally protects the interests of both, the owner of the land in question and the state. For the time being there is no unified policy pertaining to land acquisition or resettlement on the level of State, which would be applicable on the whole territory of BiH. The Expropriation Law in force in FBiH, with its amendments, has been inherited from the former Socialist Republic of BiH, when BiH was a constitutive part of Socialist Federative Republic of Yugoslavia:

- Law on Expropriation, (published in the Official Gazette of SRBiH, no. 12/87),
- Amendments to the Law on Expropriation, (published in the Official Gazette of SRBiH, no. 38/89).

This Law on Expropriation and its amendments will be valid in FBiH until new legislation is developed and ratified by the entity government. The process of expropriation is specified in detail through this Law, along with the requirements for such a process, compensation, substitution, partial or complete expropriation, etc. Complete expropriation gives the beneficiary the right of ownership on the expropriated land, while the partial or incomplete expropriation process provides the beneficiary with the rights of servitudes (leasing, right of way, etc.).

The process of real property expropriation is conducted only for the sake of construction activities or other uses which are of "interest to the State" or "general interest". Land and other real property, such as buildings and installations, whether privately owned or state owned, can be subject to expropriation. In case of expropriation of private real property, the State becomes the new owner, or a legal entity that will use the land or buildings for the purposes specified within the expropriation procedure and documents.

Real property can be subject to expropriation where the following activities of general interest are planned:

- construction of railways, roads, bridges, airports, canals, buildings as well as facilities for their maintenance,
- construction of power plants and facilities for conveyance of electrical energy,
- construction or expansion of factories or mines,
- construction and development of harbors, piers, shores, docks, ship building, warehouses,
- communication network development,
- exploration of ores and other substances naturally occurring in the earth's crust,
- regulation of water flow,

- irrigation, dewatering, and rehabilitation of land,
- forestation,
- construction of settlements, streets, squares, and parks,
- construction of water supply networks, sewage systems, gas lines, cemeteries and other public facilities,
- construction of residential or commercial buildings,
- erection of silos and establishment of nurseries,
- construction of schools, museums, art galleries, and other educational and cultural premises,
- construction of hospitals, treatment facilities and other medical and social facilities,
- any other activities or purposes deemed as those of "general interest".

General interest, or interest of the State is usually established with the development of a physical plan. If this is not the case, the municipal authorities reach a decision on the need for a certain real property to be deemed as that of general interest. If the property is located in more than one municipality, then the higher authorities are in charge of making the decision on general interest, if and only if the separate municipalities do not provide their individual decisions within 60 days. Without the establishment of general interest, the property cannot be expropriated, and is solely subject to consented sales agreements.

The process of expropriation, as defined in the above Law can be outlined through the following procedural steps:

1. The borrower (expropriation beneficiary) gathers information in order to determine whether general interest has been established on the land aimed for expropriation by either legal bodies (by means of law, regulations, decrees or decisions) or determined in physical planning documents (physical plans, urbanism plans, regulative plans, etc.);
2. If no general interest has been established, the borrower (beneficiary) may request permission to carry out preliminary activities such as land examination, measurements, etc., as required to produce detailed investment documentation and file a proposal for establishment of general interest or a proposal for expropriation; permission to carry out such preliminary activities is obtained from the municipal body in charge of ownership/legal issues;
3. The Municipality makes a decision granting an approval for the execution of preliminary activities;
4. The borrower (beneficiary) submits to the Municipality a proposal to establish a general interest, accompanied by a proof of financing means dedicated to the compensation of the real-estate to be expropriated;
5. The Municipality establishes whether the planned activity is of a general interest; In cases of multi-municipal projects, each of the municipalities is required to reach their decision within 60 days, otherwise higher authorities from the entity/cantonal level will decide;
6. The borrower (beneficiary) submits a request to the Municipality for a complete or partial expropriation of the real property; such a request must contain the following information:
   -identity of expropriation beneficiary
   -details of the real property aimed for expropriation and its location
   -identity of real property owner
   -reason (purpose) for expropriation.
   An excerpt from the cadastre/land office, a proof of financial means dedicated for compensation, a proof that general interest has been established and other supporting documents must accompany the proposal.

7. The Municipality notifies the property or land owner that a proposal for expropriation of his/her real-estate has been submitted;
8. The Municipality authorities manage the procedure (record of values of expropriated real-estates, expertise, offer by expropriation user, meeting of two parties, agreement on compensation, discussion on real-estates subject to expropriation, etc.);
9. The Municipality issues a decision on a complete or partial expropriation;
10. If parties involved do not reach an agreement on compensation of real-estates subject to expropriation before the municipal authority, the final decision shall be reached by the local court.

The Law on Expropriation specifies provisions that ensure that the owner of the property to be expropriated will:

- be provided alternate and corresponding housing, if the expropriated property was used for residential purposes,
- be provided with nearby housing and access to farmland, if required,
- if the expropriated land is an orchard, vineyard, farmland or forest the owner shall be compensated for the market value of the land and the crops or wood that could be yielded from the land,
- if the expropriated property was used for commercial activities, then the owner will be provided with alternate commercial facilities which are suitable for the activities that are conducted.

Compensation for infertile or uncultivable land is equivalent to the compensation that would be used for lowest category pastures in the given municipality. Compensation for expropriated buildings is based on the market value of building material and manpower needed for their construction, including the market value of building material transportation and administrative expenses such as those incurred during the preparation of technical documentation.

In cases of financial compensation during the process of expropriation, the previous owner must be adequately compensated, as determined through the mutual agreement of Municipal authorities and the landowner. This agreement also contains provisions on the amount of compensation and the time frame during which this compensation is to be given to the owner. The agreement is valid when signed by both parties, and the agreement is prepared following a meeting where both parties are made familiar with their rights and duties. The owner has the right to refuse the offer and to settle this matter in the local court. In relation to this, it should be mentioned that there have been delays in the past with the court processing of some individual cases. Having in mind that only minor extent property acquisition can be expected, governmental authorities have offered their assurances during the negotiation process that any cases that may arise in connection with the Project are given priority and processed efficiently at local courts.

Table 7 Review of FBiH and WB Property Acquisition and Resettlement Requirements

Issue	FBiH Requirements	World Bank OP/BP 4.12 Requirements	Comments
Avoidance or Minimization of Resettlement/Land Acquisition	The legal requirements do not define the mechanisms for avoidance or minimization of expropriation. Instead, a clear definition of activities for which land can and cannot be expropriated is given. Land or facilities cannot be expropriated without officially designated "general interest" for the land or facility, made in accordance with the urbanism and physical plans for the area.	*Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs*	The WB requirement is prerequisite - the borrower (expropriation beneficiary) must consider all viable project alternatives prior to filing his requests in accordance with the legal procedures of the given Entity.
Categorization of Compensation Eligibility	There are no groups or classifications of people affected by expropriation. The people affected are referred to as "owners" and they are compensated for expropriation of their housing, commercial facility or land, whether it is agricultural, an orchard, field with crops or even forested.	According to WB OP 4.12, there are 3 categories of persons in terms of compensation eligibility: a) Those who have formal rights to land and are entitled to compensation for the land they use and other assistance; b) Those who do not have formal rights to land at the time the census begins but have a claim to such land and assets, provided that such claims are recognized under the laws of Bosnia and Herzegovina or become recognized through a process identified in the resettlement plan, and are entitled to compensation for the land and other assistance; and c)Those who have no recognizable legal right or claim to the land they are occupying, but are entitled to resettlement assistance.	The WB requirement must be met.
Informing Stakeholders and Public Participation/ Consultations	After a claim for expropriation has been submitted to the Municipality, the Municipal authorities inform the owner and call for a joint meeting of both parties in the presence of Municipal authorities that shall conduct and oversee the expropriation procedure. In case of incomplete or partial expropriation, the municipal office must inform the owner about his/her right to request complete expropriation.	*Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.*	Entity legal requirements must be met, but the borrower should approach and consult the property owners during all expropriation stages.

Issue	FBiH Requirements	World Bank OP/BP 4.12 Requirements	Comments
Compensation Determination	Compensation is determined based on the market value of the expropriated land or facility. Compensation for expropriated land is based on the type of land and the benefits that the owner could have received (agricultural land, orchards, forestry, etc.). Alternate real property and/or cash payment are the usual compensation instruments. The latter is common in case of minor land acquisition.	*Displaced persons should be provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project. Furthermore, the policy offers cash compensation as an alternative, or residential housing alternatives.*	Compensation determination must be in compliance with the Entity legal requirements. Having in mind the minor extent of possible expropriation, Entity governments should assure smooth processing by the municipal offices in charge or regular courts without delays.
Assistance to Resettled Parties	No specific assistance is prescribed other than compensation offered for land and facilities, and related losses of income or housing.	*Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.*	The borrower should meet the WB requirement in addition to compliance with the compensation mechanisms defined by the Entity Laws.
Right of Appeal	Expropriation procedure can be terminated by the beneficiary, or by both parties together. All expropriation annulment procedures are conducted by the same Municipal authority that was involved in the initial process. If no agreement is reached, then the parties will take their case in front of the regular court.	*Appropriate and accessible grievance mechanisms are established for displaced persons and host communities.*	Property owners and/or persons subject to involuntary resettlement must be given the right of appeal during and after the processing.
Monitoring of Processes	No monitoring procedures are prescribed.	Resettlement Plan is prepared by the Borrower for specific projects and issues. The Borrower is responsible for adequate monitoring and evaluation of the activities set forth in the resettlement instrument. Upon completion, the Borrower conducts an after assessment to determine whether the defined objectives of the resettlement instrument have been met.	The municipal offices in charge are responsible for the monitoring and implementation according to the Entity Law. Their work is monitored by the Entity Governments. The Borrower is responsible to create and update the Land Acquisition Plan while the PMT follows up the entire process and ensures compliance with the WB requirements.

GUIDELINES FOR WQP PROJECT

Any cases of involuntary real property acquisition, restriction of access to assets or resettlement that may arise in conjunction with the implementation of sub-projects will be carefully considered and processed in full compliance with the World Bank Operating Procedure (WB OP) 4.12 revision April 2004 on one hand, and the current Entity legislation on the other. After the need for involuntary acquisition, restriction of access to assets or resettlement has been identified, the borrower (beneficiary) should carry out a survey in order to determine the number of people affected, their average income and standard of living, employment rate and general health condition, and establish who shall be eligible for compensation and assistance, in consultation with the local governmental office in charge (in case of FBiH: municipal office in charge of legal/ownership issues).

During the processing of a real property acquisition, restriction of access to assets or resettlement case, the following guidelines should be adhered to in addition to procedural requirements of the applicable Entity legislation described:

a. Avoidance and minimization of real property acquisition, restriction of access to assets and resettlement

Involuntary real property acquisition, restriction of access to assets or resettlement should be avoided wherever possible, or minimized, whereby all viable sub-project alternatives should be carefully considered.

b. Development of a Real Property Acquisition / Resettlement Plan

If expropriation of land cannot be avoided or minimized, then the borrower (expropriation beneficiary) must prepare a "Real Property Acquisition or Resettlement Plan", whereby local or international consultants may be engaged for support.
This plan shall be specific for each of the locations/sites where expropriation shall be conducted. The Plan shall include the following details:

- identification and description of the property to be expropriated,
- information on the owner of the land, and other information gathered during the census, regarding the owners or project affected groups,
- notification of owners and public,
- consultations with the project-affected persons and general public,
- information on public or persons present during consultations,
- complete and detailed description of the land acquisition process including:
    - information and estimates on land or object acquired,
    - reasons why avoidance or minimization were not possible,
    - eligibility for expropriation/compensation
    - type of expropriation (complete, incomplete or partial)
    - authorities which have or will participate in the process, and institutional responsibilities,
    - type of compensation offered (cash, alternate housing, alternate commercial spaces)
    - resettlement, land acquisition measures, or assistance to be provided,
    - grievance and dispute mechanisms,
    - implementation schedule,
    - costs and budget,
    - specific monitoring and evaluation mechanisms,

- in cases alternative housing or land is provided, details and contact information must be provided.

The entire expropriation process should be conducted in a transparent manner. In this sense, the borrower must provide a copy of the "Real Property Acquisition Plan" in both, English and local language to the authority involved in expropriation process and to the Project Implementing Team (PIT). The preliminary framework or draft of the "Real Property Acquisition Plan" shall be prepared by the borrower, with possible assistance of the PIT. This preliminary Plan shall be submitted to the Project Management Team(PMT) for review and approval, which could, in turn submit this document to the World Bank authorities, if requested or required.
The local authorities shall participate in the expropriation process as described above. The entire process shall be defined and tracked through the updated version of the "Real Property Acquisition Plan", and can be subject to interventions of the PMT through the borrower, over which the PMT has authority.

This plan needs to be retained with the other project documentation, and must be made available to the Project or BiH government authorities whenever requested. All other issues that arise during the project preparation or implementation, with regards to expropriation, must be included in the updated version of the Plan, which shall serve as a unified instrument of monitoring the land acquisition process throughout the various stages of the project. The borrower is responsible for updating this plan and adequate monitoring procedures. Furthermore, as described above, the updated document must be readily available to either local or World Bank (including the PMT) authorities for review and/or monitoring activities.
Following the completion of the project, the borrower needs to conduct an assessment in order to determine whether the objectives of the Plan have been achieved. This assessment encompasses the baseline conditions and results. If the goals have not been met, or the results of the assessment are not satisfactory, the borrower should propose follow up measures in accordance and agreement with the World Bank authorities, or as defined in the O.P.4.12.

c. Measures for informing stakeholders

Where real property acquisition, restriction of access to assets or resettlement can not be avoided, the public, project-affected groups and owners need to be informed through direct contact and a public announcement. Furthermore, these groups should be consulted and given the opportunity to take part in planning and implementing corresponding resettlement, or other programs, as applicable. As elaborated above in point b. the borrower (beneficiary) is obliged to prepare the "Real Property Acquisition Plan" which shall specify the following segments:
-Provision of assistance during resettlement, such as moving allowances,
-Provision of alternative residential housing or housing sites in combination with other compensations, or, where applicable, alternative agricultural land or other assets in accordance with the Entity Law on Expropriation, and
-Provision of specific support following the resettlement, where required in order to restore the previous standard of living of persons affected.

Affected persons should be informed on grievance mechanisms during the initial procedural stages. Following the approval of resettlement plans and signing of the compensation contracts, affected persons should be notified accordingly as to be given the opportunity to express their objections and seek redress. During the processing of the case, the municipal governmental office in charge will make efforts to minimize the potential disputes. However, any dissatisfied persons will have the right to file their appeals or complaints with the municipal governmental office in charge or, if necessary, with the local court.

The borrower is responsible to conduct the expropriation procedure in cooperation with the municipal governmental office in charge[8] while both are responsible for the implementation of resettlement, or other programs and compensation measures.
The whole process is monitored by the municipal governmental office in charge, whose work is subject to supervision by the Project Management Team of the WQP Project".

The borrower (beneficiary) must contact local authorities and any relevant NGO during the preliminary procedural stages, and keep them up to date throughout the processing of the case. In addition to this, prior consultations with planned host communities of re-settlers must also be arranged in order to avoid and/or resolve any problems that may arise (non-acceptance by host community, etc.).

d. Compensation Measures

Real property acquisition (expropriation) procedures are arranged by the municipal governmental offices in charge in accordance with the Entity legislation applicable and additional provisions, as defined by this document.

In case of resettlement, criteria for eligibility must be established by the municipal governmental office in charge*, based on the legal rights of the persons affected to the land subject to acquisition (expropriation) and in accordance with the World Bank requirements, as defined in the Operational Policy 4.12. This means that the persons who have or claim formal rights to land or assets are considered eligible for compensation of the land or assets they lose, as well as other assistance such as moving allowance and support after resettlement, whereas persons who do not have any recognizable legal rights or claims to the land they have been occupying before the acquisition/expropriation procedure start-up are eligible to resettlement assistance.

It should be emphasized that, in addition to compensation principles of the Entity Law described, any loss of income resources due to real estate acquisition, restriction of access to assets or resettlement must also be compensated.

Both the municipal governmental office in charge and the borrower (expropriation beneficiary) are responsible for the implementation of compensation measures.

The whole process needs to be transparent, publicly disclosed, and should be defined in detail within the "Real Property Acquisition Plan". Furthermore, through the Plan the entire process is monitored by the municipal governmental office in charge, whose work is subject to supervision by the Project Management Team of the WQP Project".

e. Assistance to Resettled Parties

Resettled persons should be assisted in their efforts to at least restore their standard of living to the levels prior to resettlement. Where required, they should also be offered support for a certain period of time after the resettlement, based on a reasonable estimate of the time needed to restore their standard of living at least to the previous level. Particular attention has to be paid to the needs of vulnerable groups such as poor or elderly persons, if any. The "Real Property Acquisition Plan" shall include contact information of the owners which would allow for monitoring visits, if required.

Annex I : Contents of an Environmental Assessment Report for a Category A Project

1. An environmental assessment (EA) report for a Category A project focuses on the significant environmental issues of a project. The report's scope and level of detail should be commensurate with the project's potential impacts. The report submitted to the Bank is prepared in English, French, or Spanish, and the executive summary in English.

2. The EA report should include the following items (not necessarily in the order shown):

(a) *Executive summary.* Concisely discusses significant findings and recommended actions.

(b) *Policy, legal, and administrative framework.* Discusses the policy, legal, and administrative framework within which the EA is carried out. Explains the environmental requirements of any co-financiers. Identifies relevant international environmental agreements to which the country is a party.

(c) *Project description.* Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicates the need for any resettlement plan or indigenous peoples development plan. Normally includes a map showing the project site and the project's area of influence.

(d) *Baseline data.* Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigatory measures. The section indicates the accuracy, reliability, and sources of the data.

(e) *Environmental impacts.* Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

(f) *Analysis of alternatives.* Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

(g) *Environmental management plan (EMP).* Covers mitigation measures, monitoring, and institutional strengthening;

(h) *Appendices*

(i) List of EA report preparers—individuals and organizations.
(ii) References—written materials both published and unpublished, used in study preparation.
(iii) Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
(iv) Tables presenting the relevant data referred to or summarized in the main text.
(v) List of associated reports (e.g., resettlement plan or indigenous peoples development plan, where applicable).

Annex II Environmental Management Plan (EMP)

1. A project's environmental management plan (EMP) consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures. Management plans are essential elements of EA reports for Category A projects; for many Category B projects, the EA may result in a management plan only. To prepare a management plan, the borrower and its EA design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements. More specifically, the EMP includes the following components.

Mitigation

2. The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. Specifically, the EMP

(a) identifies and summarizes all anticipated significant adverse environmental impacts (including those involving indigenous people or involuntary resettlement);

(b) describes—with technical details—each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;

(c) estimates any potential environmental impacts of these measures; and

(d) provides linkage with any other mitigation plans (e.g., for involuntary resettlement, indigenous peoples, or cultural property) required for the project.

Monitoring

3. Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the borrower and the Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP. Specifically, the monitoring section of the EMP provides
(a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and
(b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

Capacity Development and Training

4. To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the EA's assessment of the existence, role, and capability of environmental units on site or at the agency and ministry level. If necessary, the EMP recommends the establishment or expansion of such units, and the training of staff, to allow implementation of EA recommendations. Specifically, the EMP provides a specific description of institutional arrangements—who is responsible for carrying out the mitigatory and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training). To strengthen environmental management capability in the agencies responsible for implementation, most EMPs cover one or more of the following additional topics: (a) technical assistance programs, (b) procurement of equipment and supplies, and (c) organizational changes.

Implementation Schedule and Cost Estimates

5. For all three aspects (mitigation, monitoring, and capacity development), the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

Integration of EMP with Project

6. The borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the EMP will be executed effectively. Consequently, the Bank expects the plan to be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project's overall planning, design, budget, and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive funding and supervision along with the other components.

Annex III Comparison of BiH and World Bank policies for projects and installations/facilities that trigger the EA process

WB (Illustrative examples)	BiH (Proposed legislation)
Dams and reservoirs (A) Thermal power and hydropower development or expansion (A)	Facilities for production of hydro energy with output larger than 5 MW for individual installations or several adjacent installations with total capacity of 2 MW the distance between the first and last not exceeding 2 km. (I)
	Dams and other facilities designed to hold or store water with a capacity exceeding 2 million m3 (I)
	Thermal power stations and other combustion installations with heat output of 50 MW or more (I)
	Combustion facilities with heat output larger than 10 MW (III)
	Dams and other facilities designed to hold or store water with a capacity larger than 1 million m3 (II)
	Facilities for production of hydroenergy with capacity exceeding 1 MW. (II)
New construction or major upgrading of high (A) Rehabilitation or maintenance of highways or rural roads (B)	New construction of highways (I)
	New construction or expansion of existing roads to 4 lanes exceeding 10 km. (I)
	Construction of new cantonal and regional roads exceeding 2 km (II)
	Construction of new cantonal and regional roads below 2 km (III)
Electrical transmission (B)	Construction of overhead electrical power lines with a voltage of 220 kV or more; or 110 kV if part of the transmission system (I)
Tourism (B)	Ski-runs, ski-lifts and cable-cars and associated facilities with areas exceeding 10 ha or more. (I)
	Ski-runs, ski-lifts and cable-cars and associated facilities with areas exceeding 5 ha or more.(II)
	Holiday villages and hotel complexes outside urban areas and associated facilities with areas exceeding 5 ha or 500 beds.(II)
	Permanent camp sites outside urban areas with more than 500 camp places (II)
	Urban development projects, including construction of shopping centers and parking places exceeding 5 ha or 750 parking places (II)
	All facilities and installations, storing chlorine in quantities exceeding 10 t. (III)
	All facilities and installations, storing chlorine in quantities below 10 t. (IV)

Annex IV Environmental Appraisal Form (Page 1/2)

A. PROJECT DATA	
Project Information Provided by:	Contact Person:
Contact E-mail address:	Tel/Fax:
Project Title:	Project No.
Country:	Date:
Brief project description: (if you require more space, attach an additional page)	
B. BIH EIA REQUIREMENTS (to be filled in by the applicant)	
Category:	
Documents Required:	
Public Consultation and Disclosure Requirements:	
Required Permits:	
Review and Approval Requirements:	
Additional / Other Requirements:	

C. WORLD BANK EA REQUIREMENTS (to be filled in by the PMT Officer)			
Project Categorization According to World Bank Environment Category:			
Documents Required/EA Document Content:			
Public Consultation and Disclosure Requirements:			
Additional / Other Requirements:			
World Bank Safeguards Triggered: Cultural Property : Natural Habitats: Other:			
C. ENVIRONMENTAL CLEARANCE BY THE WORLD BANK			
	Name/Department:	Signature:	Date:
Approved by:			
Department:			
D. PREPARED BY			
	Name:	Signature:	Date:
Borrower			
PMT Officer			

Water Quality Protection Project Bosnia and Herzegovina
Environmental Framework Policy (EFP)
- Summary -

List of abbreviations Used:

WB	The World Bank
Bank	The World Bank
BiH	Bosnia and Herzegovina
FBiH	Federation of Bosnia and Herzegovina
EFP	Environmental Framework Policy
Cat	Category or Categories
EA	Environmental Assessment
EIA	Environmental Impact Assessment
PEA	Preliminary Environmental Assessment
OP	Operational Procedure
EMP	Environmental Management Plan
PMT	Project Management Team
PIT	Project Implementation Team

Upon identification of any new project components, the contents of this chapter should be carefully considered and applied accordingly.

WORLD BANK SAFEGUARD POLICIES

The World Bank undertakes screening of each proposed project to determine the appropriate extent and type of EA to be undertaken and whether or not the project may trigger other safeguard policies. The Borrower is responsible for any assessment required by the Safeguard Policies, with general advice provided by Bank staff. The World Bank safeguard policies and triggers for each policy are given in the following table.

Table 1 WB Safeguard Policies and Triggers

Policy	Triggers
Environmental Assessment (OP 4.01)	If a project is likely to have potential (adverse) environmental risks and impacts in its area of influence.
Forestry (OP 4.36)	Forest sector activities and other Bank sponsored interventions which have potential to impact significantly upon forested areas
Involuntary Resettlement (OP 4.12)	Physical relocation and land loss resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location.
Indigenous Peoples (OD 4.20)	If there are indigenous peoples in the project area, and potential adverse impacts on indigenous peoples are anticipated, and indigenous peoples are among the intended beneficiaries.
Safety of Dams (OP 4.37)	If a project involves construction of a large dam (15 m or higher) or a high hazard dam; If a project is dependent upon an existing dam, or dam under construction.
Pest Management (OP 4.09)	If procurement of pesticides is envisaged; If the project may affect pest management in the way that harm could be done, even though the project is not envisaged to procure pesticides. This includes projects that may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk, (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health or environmental risks.
OPN 11.03 – draft OP 4.11 Physical Cultural Resources	The policy is triggered by projects which, prima facie, entail the risk of damaging cultural property (e.g. any project that includes large scale excavations, movement of earth, surficial environmental changes or demolition)
Natural Habitats (OP 4.04)	The policy is triggered by any project with the potential to cause significant conversion (loss) or degradation of natural habitats whether directly (through construction) or indirectly (through human activities induced by the project).
Projects in Disputed Areas (OP 7.60)	The policy is triggered if the proposed project will be in a "disputed area".
Projects on International Waterways (OP 7.50)	If the project is on international waterway such as: any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states (or any tributary or other body of surface water that is a component of this waterway); any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states-and any river flowing into such waters.

DIFFERENCES BETWEEN THE BiH AND WORLD BANK EA SYSTEMS AND GUIDELINES FOR THE WATER QUALITY PROJECT

Categorization and Screening: The World Bank carries out screening and as a result categorizes projects based on their impacts (type, location, sensitivity, scale, etc.), whereas in BiH, the categorization is the first stage and is carried out based on pre-defined lists of installations and facilities where scale and threshold levels are key factors in defining the category. The two screening/categorization procedures need to be carried out separately, where projects would be categorized as A/B/C in accordance with Bank's screening policies and as category I/II/III/IV as per national policies. All investments identified during the implementation phase will include a mandatory Environmental Appraisal Form (Annex 4), which will be used for screening investments in order to identify and satisfy both the requirements of BiH and those of the World Bank. The Environmental Appraisal Form has two parts, the first part to be completed by the borrower and the second to be completed by PMT, prior to Bank review. The Environmental Appraisal Form will summarize the nature of the project, permits that need to be obtained and scope and depth of the EA. Overlapping requirements of both systems and specific requirements will be identified in this form.

Required EA Documents: The scheme given in the next table should be used by the borrower and PMT in order to determine the EA document content requirements of the separate categorizations by the two EA systems. Corresponding categories will be included in the Environmental Appraisal Form. For investments that fall under Category C only national EA requirements need to be followed. Similarly for reconstruction projects where no action is required by national EA legislation, the borrower should follow Bank's EA requirements.

The WB and BiH categorization criteria are different (please refer to main EFP document for description). Therefore it should be noted that the following table shows all possible situations with respect to the two categorization systems.

Table 2 EA Document Requirements Based on Categorization/Screening

BiH	WB	Combined BiH & WB requirements	Additional specific information required by the Bank
Cat I	Cat A	PEA followed by a full EIA Monitoring plan needs to be included either in the PEA or EIA.	- Policy, Legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training
	Cat B	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training
Cat II[a]	Cat A	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training
	Cat B	PEA followed by a full EIA. Monitoring plan needs to be included either in the PEA or EIA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training

Cat II[b]	Cat A	PEA. Monitoring plan needs to be included in the PEA. An EIA document needs to be prepared based on the information included in the PEA.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training - Baseline data - Some elements of the PEA may require additional information/detail as per WB full EIA requirements.
	Cat B	PEA. Monitoring plan needs to be included in the PEA.	- Implementation Schedule and Cost Estimates - Capacity Development and Training
Cat III&IV	Cat A	Full EIA based on the information included in the Environmental Permit Request.	- Policy, legal and Administrative Framework - Implementation Schedule and Cost Estimates - Capacity Development and Training - The information and detail included in some elements of the Environmental Permit Request may not be sufficient for the full EIA required by the Bank. Additional work on the document may be required.
	Cat B	Environmental Permit Request (contains essential elements of the EMP)	- Implementation Schedule and Cost Estimates - Capacity Development and Training

Cat II[a]: Projects which require an EIA following the PEA and screening carried out by the Ministry.
Cat II[b]: Projects which do not require an EIA following the PEA and screening carried out by the Ministry are subject to direct Environmental Permitting.

The content of WB and BiH E(I)A documents is provided in Annex 3.

Public Consultations: Consultation requirements greatly overlap in the two EA systems with minor differences in the approach. According to Bank's policies, the responsibility for organizing and holding consultations is with the borrower, while by national requirements the Ministry/Cantonal Ministry is the party responsible. BiH legislation does not explicitly define which groups and organizations need to be consulted while a requirement of the Bank is that views of project affected groups and local NGO's be taken into account. Therefore, in order to satisfy the above requirements the borrower needs to:

(i) assist the relevant ministry during the consultation process where the ministry is responsible for public consultations;
(ii) include project affected groups and local NGOs in the consultation process.
(iii) disclose records of all consultations with the EA documents as per World Bank requirements

The requirements given in the following table need to be followed for all investments. It is assumed that the Bank's requirement for the first consultation for Cat A projects will be fulfilled if a consultation is held during the PEA stage (BiH requirement).

Table 3 Public Consultation Requirements Based on Categorization/Screening

BiH	WB	Combined BiH & WB min. requirements	Specific issues/requirements
Cat I	Cat A & B	1 public consultation during the PEA stage and 1 public consultation after draft EIA report is produced.	The ministry is responsible for organizing both public consultations.
Cat II[a]	Cat A & B	1 public consultation during the PEA process and 1 public consultation after draft EIA report is prepared.	The ministry is responsible for organizing both public consultations.

Cat II[b]	Cat A	1 public consultation during the PEA process and 1 public consultation after draft EIA report is prepared.	The ministry is responsible for organizing the first consultation while the borrower is responsible for organizing the second consultation.
	Cat B	1 public consultation during the Environmental Permit issuing process.	The ministry is responsible for organizing the public consultation.
Cat III&IV	Cat A	1 public consultation during the Environmental Permit issuing process and 1 public consultation after the draft EIA report is prepared.	The ministry is responsible for organizing the first consultation while the borrower is responsible for organizing the second consultation.
	Cat B	1 public consultation during the Environmental Permit issuing process.	The ministry is responsible for organizing the public consultation.

Cat II[a]: Projects which require an EIA following the PEA and screening carried out by the Ministry.
Cat II[b]: Projects which do not require an EIA following the PEA and screening carried out by the Ministry.
Environmental Permit is issued by the Ministry without directly.

Disclosure: For categories I and II and/or Cat A projects, the first disclosure should take place during the Preliminary Environmental Assessment stage (prior to the first consultation), and the second after the draft EA report is prepared. For categories, III and IV, requests for issuing environmental permits need to be publicly available during the permit issuing procedure. However, if the project is Cat B, the EMP should be disclosed together with the permit request (if not already included with the permit request) in order to satisfy World Bank procedures. All documents (EIA report, draft EIA report, EMP) need to be sent to the World Bank for disclosure at the Infoshop. Where required by the national EIA process, in-country disclosure of EIA documents is the under the responsibility of the ministry (Ministry's website: www.fmpuio.gov.ba), Cantonal ministries and municipalities. In case it is not a requirement of the national EIA process, the disclosure needs to be ensured by the borrower in consultation with the PMT.

World Bank Safeguards: In case one or more World Bank safeguards are triggered, giving reason to expect significant impacts on, for example, cultural heritage or projects that involve resettlement, the activity needs to be classified as Cat A during the screening process, and be subject to a full EA. Investments expected to trigger safeguards need to be recorded in the Environmental Appraisal Form.

STEPS IN THE ENVIRONMENTAL REVIEW PROCESS

In FBiH, the environmental review results in an Environmental Permit, which is in turn a condition for obtaining the Urbanism Permit. Certain installations and facilities require an EIA in order to obtain an Environmental Permit. All required permits and sequence of permits need do be identified by the borrower in coordination with the Ministry. The key steps in the environmental review process are as follows:

Step 1: Categorization

The borrower prepares the initial project concept and consults the municipal authorities in order to check if the project/activity location is compatible with the existing spatial plans. The borrower then identifies the basic characteristics of the project that would be used for the environmental screening (type and size, capacity and output of the activity, use and quantities of hazardous materials, etc). With guidance from the municipality*, the borrower identifies the project/activity category in accordance with BiH legislation, including the authority responsible for issuing the required permits. Categorization according to FBiH legislation is made by Federal Ministry of Physical Planning and Environment. Following the categorization, the

* in case the municipality does not have sufficient knowledge of the EA process and legislation the borrower should contact the cantonal ministry responsible for environmental issues

borrower consults the responsible authority and identifies steps and obligations for obtaining the required permits (environmental and other permits). This information is included in the project Environmental Appraisal Form in coordination with the PMT. The PMT needs to input information related to WB EA categorization requirements and safeguards into the Environmental Appraisal Form and does the preliminary assignment of the environmental category according to WB policies. The PMT should send this information to the ECA Regional Environmental Unit for review and approval. In case at a later stage re-categorization needs to take place due to change in the status of the project or identified impacts, the PMT should update the Appraisal Form and re-submit it to the ECA Regional Environmental Unit for approval.

Step 2: Preparation of documents and necessary permits
Based on the categorization and inputs from the relevant federal or cantonal ministry responsible for environmental issues, the borrower prepares the required documents. If needed, the borrower may be assisted by specialists/consultants. In case the project does not require an Environmental Permit the borrower may directly proceed to obtaining an urbanism permit from the municipal authorities (In case a detailed urbanism plan exists for the municipality, the urbanism permit is not required. The municipality issues the urban-technical conditions which are a basis for preparing the investment-technical documentation, required for obtaining a construction permit.) Even if no action is required by national laws, the borrower is responsible for following the WB EA requirements identified in the Environmental Appraisal Form.

Step 3: Request for Environmental Permit/Preliminary Environmental Assessment
In case an Environmental Permit is required, the borrower submits the request (application) for Preliminary Environmental Assessment to the Entity Ministry for Projects of Cat I & II or request for obtaining an Environmental Permit for projects of Cat III (Entity Ministry) and IV (Cantonal Ministry). For projects of Cat II, the preliminary assessment will determine whether an EIA is required prior to issuing of the Environmental Permit. For Cat I projects the preliminary assessment will determine the scope of the EIA study. The contents of PEA request (application), EIA Study and Environmental Permit request (application) are shown in Annex 3.

Step 4: Public Consultation and Disclosure
For Cat I & II, the relevant authority (in step 3) makes the documents available to interested parties for comments (30 days are allowed for comments), and (if found necessary) arranges a public consultation as near as possible to the subject location. For Cat III & IV the request for issuing an Environmental Permit (or draft permit) must be accessible by the public, whereby 30 days are allowed for comments.

Step 5: Environmental Permit/EIA study
- In case there are no comments, the competent ministry issues an Environmental Permit for Projects of *Cat III and IV* (within 120 days starting from the request date). The Environmental Permit is then used for obtaining other permits (urbanism permit, construction permit and usage permit).
- Following the screening and preliminary assessment, *Cat II* projects will either receive an Environmental Permit from entity ministries or will be required to prepare an EIA study.
- Projects of *Cat I* will automatically require an EIA study, its scope being defined by the PEA.
- The decision for preparation of EIA is issued 60 days after the request for PEA was made.

The borrower needs to take into account the above given time constraints established by the national EA legislation and submit all requests and documents in a timely manner in order to eliminate unnecessary delays in appraisal.

Step 6: Preparation of EIA study
The borrower is required to contact an institution/firm that will prepare the EIA study based on a ToR approved by the PMT. The list of institutions/firms authorized for preparation of EIA reports is available with the Ministry. The borrower submits EIA study/draft EIA study for review and approval (in local language) to the Ministry and (in English language) to the PMT/Bank for clearance. The PMT needs to ensure that the EA report is consistent with the ToR.

Step 7: Disclosure
The Ministry sends a copy of the draft EIA study to relevant authorities and other interested parties, allowing 30 days for receiving comments to the report.
Additionally, the EIA report in English language needs to be sent by the borrower through the PMT to the World Bank for disclosure at the Infoshop.

Step 8: Public Consultation
The Ministry organizes a public consultation to be held as near as possible to the project location, and invites the public to the consultation via printed media/radio/TV. Comments and suggestions on the EIA study must be received within 30 days starting from the date of invitation for public consultation. The borrower needs to assist the Ministry during the consultation process.

Step 9: Approval
The Ministry issues a decision for either approving (within 30 days following receipt of the final EIA study) or rejecting the EIA study. The decision is sent to the borrower and interested parties that participated in the consultation process. Additionally the borrower needs to receive formal clearance of the environmental aspects of the project from the Bank. The formal clearance should be noted on the Environmental Appraisal Form.

INSTITUTIONAL RESPONSIBILITIES AND ARRANGEMENTS FOR ENVIRONMENTAL MANAGEMENT

The PMT (Project Management Team) is responsible for the overall environmental management and decision making in accordance with the EFP during the preparation and implementation of investments.
The borrower is responsible for obtaining an Environmental Permit for projects that may impact upon the environment. For the purpose of screening, the borrower, with the guidance of PMT, should prepare the initial project concept/minimum required information about the project which will enable adequate categorization. The PMT plays a key role in the screening process, and will participate in categorization of investments/projects in accordance with requirements of national legislation and Bank's procedures. The information in this document coupled with the Environmental Appraisal form is intended to guide both the PMT and the borrower in defining the various requirements of both BiH and the WB. The results of the screening and categorization should be reviewed and approved by the World Bank ECA Regional Environmental Unit. The Bank should provide assistance during the screening process, especially with respect to safeguards. Furthermore, the PMT will advise the borrower on the World Bank EA requirements (contents of an EA report and/or EMP format, consultation, disclosure and approval procedures), and other essential information. The PMT will also be responsible for contacts and consultations with the

Ministry, related to requirements, procedures and EIA contents for projects requiring environmental permits from the Ministry (Cat I, Cat II and Cat III). Where an Environmental Permit or any other necessary permit (e.g. urbanism or construction permit) is issued by cantonal or municipal authorities, the PIT should send the official permit request and attached documents to the PMT for review prior to submission to authorities. The PMT is responsible for overseeing the selection and contracting of Consultants to be engaged in the preparation of the EIA report or EMP as well as for supervision during preparation. EIA reports or other separate reports (such as EMP) will be submitted by the borrower through the PMT to the Bank for review and approval. For Cat A projects the borrower retains independent EA experts not affiliated with the project to carry out the EA. Public consultations will usually be organized by the Ministry. In case the Ministry is not responsible for the consultation by national policies, the borrower will be responsible for carrying out the consultation, in agreement with the PMT and by informing the competent ministry/authority. The borrower will send a copy of the consultation record to the PMT. In case significant issues have been identified during the consultations, these should be included in the EIA and EMP, and the borrower should inform the Bank through the PMT accordingly. During both the construction and operating phases the borrower will carry out the routine monitoring to ensure that mitigation requirements specified in the EMP and any other environmental requirements specified in the Environmental Permit (this is especially important where contractors are engaged for construction/erection work). The environmental protection law requires that the borrower reports to the competent authority (that issued the permit) on emission monitoring results, accidents, and other information requested by the permit(s), during the initial and last phases of construction, operation and decommissioning. When required by national policies, and if the PMT finds it necessary (due to lack of equipment or capacity), specialized institutions/companies will perform the required monitoring and data collection. Implementation of mitigation measures specified in the EMP and Environmental Permit must be supervised by the PITs on a regular basis. Reports on mitigation measures and monitoring results are submitted by the borrower to the PMT quarterly, after being reviewed by the PITs. The PMT is responsible for reviewing and analyzing the reports received from the borrower and can request additional monitoring in order to ensure that all environmental guidelines and permit requirements are satisfied. The environmental compliance reports will be attached annually to financial reports submitted by the PMT to the Bank.

Table 4 Institutional Arrangements during Implementation

Institution	Mitigation measures	Monitoring	Permitting	Review
World Bank		Reviews the reports concerning implementation of monitoring plan		Reviews reports received from PMT
PMT	Annually reports to the World Bank on compliance with mitigation measures.	Data analysis and review. Reports to WB (together with mitigation). If required requests additional monitoring.	Assistance in obtaining necessary permits (for entity level)	Reviews quarterly reports sent by the borrower.
PIT	Supervision. Ensures that mitigation measures are implemented and adequately reported to the PMT.	Supervision. Ensures that monitoring is implemented in accordance with the monitoring plan.	Assistance in obtaining necessary permits (for cantonal and municipal level)	
Borrower	Implementation of mitigation measures	Implementation of self-monitoring in accordance with requirements of the Environmental Permit.	Request for renewed Environmental Permit every 5 years or a new permit if there are major project/ facility modifications.	

Ministry **Cantonal Ministry** **Municipality**	Through inspection ensures that measures proposed in the Environmental Permit are implemented.	Inspection and monitoring per requirements of the Environmental Permit.	Issues the new or renewed permit. Issues urbanism and construction permits	Reviews reports sent by institutions authorized for monitoring.
Monitoring Institutions		Periodical monitoring during the operation of the facility.		

INVOLUNTARY LAND ACQUISITION AND RESETTLEMENT GUIDELINES

Should any need for property acquisition or resettlement arise in relation to the implementation of individual project components, the guidelines provided in this section should be followed.

Table 5 Review of FBiH and WB Property Acquisition and Resettlement Requirements

Issue	FBiH Requirements	World Bank OP/BP 4.12 Requirements	Comments
Avoidance or Minimization of Resettlement/Land Acquisition	Requirements for avoidance or minimization of expropriation are not specified. Instead, a clear definition of activities for which land can and cannot be expropriated is given. Land or facilities cannot be expropriated without officially designated "general interest" for the land or facility, made in accordance with the urbanism and physical plans for the area.	*Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs*	The WB requirement is prerequisite - the borrower (expropriation beneficiary) must consider all viable project alternatives prior to filing his requests in accordance with the legal procedures of the given Entity.
Categorization of Compensation Eligibility	There are no groups or classifications of people affected by expropriation. The people affected are referred to as "owners" and they are compensated for expropriation of their housing, commercial facility or land, whether it is agricultural, an orchard, field with crops or even forested.	The following categories are eligible for compensation: a) persons with formal rights to land and are entitled to compensation for the land they use and other assistance; b) persons without formal rights to land at the time the census begins but have a claim to such land/assets, provided that such claims are recognized under the laws of BIH or through a process identified in the resettlement plan, and are entitled to compensation for the land and other assistance; and c) persons with no recognizable legal right/claim to the land they occupy, but are entitled to resettlement assistance.	The WB requirement must be met.
Informing Stakeholders and Public Participation/ Consultations	After a claim for expropriation has been submitted to the Municipality, the Municipal authorities inform the owner and call for a joint meeting of both parties in the presence of Municipal authorities that shall conduct and oversee the expropriation procedure. In case of incomplete or partial expropriation, the municipal office must inform the owner about his/her right to request complete expropriation.	*Displaced persons should be meaningfully consulted and should be encouraged to participate in planning and implementing resettlement.*	Entity legal requirements must be met, but the borrower should approach and consult the property owners during all expropriation stages.

Issue	FBiH Requirements	World Bank OP/BP 4.12 Requirements	Comments
Compensation Determination	Compensation is determined based on the market value of the expropriated land or facility. Compensation for expropriated land is based on the type of land and the benefits that the owner could have received (agricultural land, orchards, forestry, etc.). Alternate real property and/or cash payment are the usual compensation instruments. The latter is common in case of minor land acquisition.	*Displaced persons should be provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project. Furthermore, the policy offers cash compensation as an alternative, or residential housing alternatives.*	Compensation determination must be in compliance with the Entity legal requirements. Having in mind the minor extent of possible expropriation, Entity governments should assure smooth processing by the municipal offices in charge or regular courts without delays.
Assistance to Resettled Parties	No specific assistance is prescribed other than compensation offered for land and facilities, and related losses of income or housing.	*Displaced persons should be assisted in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.*	The borrower should meet the WB requirement in addition to compliance with the compensation mechanisms defined by the Entity Laws.
Right of Appeal	Expropriation procedure can be terminated by the beneficiary, or by both parties together. All expropriation annulment procedures are conducted by the same Municipal authority that was involved in the initial process. If no agreement is reached, then the parties will take their case in front of the regular court.	*Appropriate and accessible grievance mechanisms are established for displaced persons and host communities.*	Property owners and/or persons subject to involuntary resettlement must be given the right of appeal during and after the processing.
Monitoring of Processes	No monitoring procedures are prescribed.	Resettlement Plan is prepared by the Borrower for specific projects and issues. The Borrower is responsible for adequate monitoring and evaluation of the activities set forth in the resettlement instrument. Upon completion, the Borrower conducts an after assessment to determine whether the defined objectives of the resettlement instrument have been met.	The municipal offices in charge are responsible for the monitoring and implementation according to the Entity Law. Their work is monitored by the Entity Governments. The Borrower is responsible to create and update the Land Acquisition Plan while the PMT follows up the entire process and ensures compliance with the WB requirements.

Any cases of involuntary real property acquisition, restriction of access to assets or resettlement that may arise in conjunction with the implementation of sub-projects will be carefully considered and processed in full compliance with the World Bank Operating Procedure (WB OP) 4.12 revision April 2004 on one hand, and the current Entity legislation on the other. After the need for involuntary acquisition, restriction of access to assets or resettlement has been identified, the borrower (expropriation beneficiary) should carry out a survey in order to determine the number of people affected, their average income and standard of living, employment rate and general health condition, and establish who shall be eligible for compensation and assistance, in consultation with the local governmental office in charge (in case of FBiH: municipal office in charge of legal/ownership issues).

According to FBiH legislation, the following procedural steps have to be made in the process of expropriation:

1. The borrower (expropriation beneficiary) gathers information in order to determine whether general interest has been established on the land aimed for expropriation by either legal bodies (by means of law, regulations, decrees or decisions) or determined in physical planning documents (physical plans, urbanism plans, regulative plans, etc.);
2. If no general interest has been established, the borrower (beneficiary) may request permission to carry out preliminary activities such as land examination, measurements, etc., as required to produce detailed investment documentation and file a proposal for establishment of general interest or a proposal for expropriation; permission to carry out such preliminary activities is obtained from the municipal body in charge of ownership/legal issues;
3. The Municipality makes a decision granting an approval for the execution of preliminary activities;
4. The borrower (beneficiary) submits to the Municipality a proposal to establish a general interest, accompanied by a proof of financing means dedicated to the compensation of the real-estate to be expropriated;
5. The Municipality establishes whether the planned activity is of a general interest; In cases of multi-municipal projects, each of the municipalities is required to reach their decision within 60 days, otherwise higher authorities from the entity/cantonal level will decide;
6. The borrower (beneficiary) submits a request to the Municipality for a complete or partial expropriation of the real property; such a request must contain the following information:
   -identity of expropriation beneficiary
   -details of the real property aimed for expropriation and its location
   -identity of real property owner
   -reason (purpose) for expropriation.
   An excerpt from the cadastre/land office, a proof of financial means dedicated for compensation, a proof that general interest has been established and other supporting documents must accompany the proposal.
7. The Municipality notifies the property or land owner that a proposal for expropriation of his/her real-estate has been submitted;
8. The Municipality authorities manage the procedure (record of values of expropriated real-estates, expertise, offer by expropriation user, meeting of two parties, agreement on compensation, discussion on real-estates subject to expropriation, etc.);
9. The Municipality issues a decision on a complete or partial expropriation;
10. If parties involved do not reach an agreement on compensation of real-estates subject to expropriation before the municipal authority, the final decision shall be reached by the local court.

During the processing of a real property acquisition, restriction of access to assets or resettlement case, the following guidelines should be adhered to in addition to procedural requirements of the Entity legislation:

a. Avoidance and minimization of real property acquisition, restriction of access to assets and resettlement

Involuntary real property acquisition, restriction of access to assets or resettlement should be avoided wherever possible, or minimized, whereby all viable sub-project alternatives should be carefully considered.

b. Development of a Real Property Acquisition / Resettlement Plan

If expropriation of land cannot be avoided or minimized, then the borrower (expropriation beneficiary) must prepare a "Real Property Acquisition or Resettlement Plan", whereby local or international consultants may be engaged for support.

This plan shall be specific for each of the locations/sites where expropriation shall be conducted. The Plan shall include the following details:

- identification and description of the property to be expropriated,
- information on the owner of the land, and other information gathered during the census, regarding the owners or project affected groups,
- notification of owners and public,
- consultations with the project-affected persons and general public,
- information on public or persons present during consultations,
- complete and detailed description of the land acquisition process including:
    - information and estimates on land or object acquired,
    - reasons why avoidance or minimization were not possible,
    - eligibility for expropriation/compensation
    - type of expropriation (complete, incomplete or partial)
    - authorities which have or will participate in the process, and institutional responsibilities,
    - type of compensation offered (cash, alternate housing, alternate commercial spaces)
    - resettlement, land acquisition measures, or assistance to be provided,
    - grievance and dispute mechanisms,
    - implementation schedule,
    - costs and budget,
    - specific monitoring and evaluation mechanisms,
    - in cases alternative housing or land is provided, details and contact information must be provided.

The entire expropriation process should be conducted in a transparent manner. In this sense, the borrower must provide a copy of the "Real Property Acquisition Plan" in both, English and local language to the authority involved in expropriation process and to the Project Implementing Team (PIT). The preliminary framework or draft of the "Real Property Acquisition Plan" shall be prepared by the borrower, with possible assistance of the PIT. This preliminary Plan shall be submitted to the Project Management Team (PMT) for review and approval, which could, in turn submit this document to the World Bank authorities, if requested or required. The local authorities shall participate in the expropriation process as described above. The entire process shall be defined and tracked through the updated version of the "Real Property Acquisition Plan", and can be subject to interventions of the PMT through the borrower.

c. Measures for informing stakeholders

Where real property acquisition, restriction of access to assets or resettlement can not be avoided, the public, project-affected groups and owners need to be informed through direct contact and a public announcement. Furthermore, these groups should be consulted and given the opportunity to take part in planning and implementing corresponding resettlement, or other programs, as applicable. As elaborated above in point b. the borrower (beneficiary)

is obliged to prepare the "Real Property Acquisition Plan" which shall specify the following segments:
-Provision of assistance during resettlement, such as moving allowances,
-Provision of alternative residential housing or housing sites in combination with other compensations, or, where applicable, alternative agricultural land or other assets in accordance with the Entity Law on Expropriation, and
-Provision of specific support following the resettlement, where required in order to restore the previous standard of living of persons affected.

Affected persons should be informed on grievance mechanisms during the initial procedural stages. Following the approval of resettlement plans and signing of the compensation contracts, affected persons should be notified accordingly as to be given the opportunity to express their objections and seek redress. During the processing of the case, the municipal governmental office in charge should make efforts to minimize the potential disputes. However, any dissatisfied persons will have the right to file their appeals or complaints with the municipal governmental office in charge or, if necessary, with the local court.

The borrower is responsible to conduct the expropriation procedure in cooperation with the municipal governmental office in charge while both are responsible for the implementation of resettlement, or other programs and compensation measures. The whole process is monitored by the municipal governmental office in charge, whose work is subject to supervision by the Project Management Team of the WQP Project". The borrower (beneficiary) must contact local authorities and any relevant NGO during the preliminary procedural stages, and keep them up to date throughout the processing of the case. In addition to this, prior consultations with planned host communities of resettlers must also be arranged in order to avoid and/or resolve any problems that may arise (non-acceptance by host community, etc.).

d. Compensation Measures
Criteria for eligibility must be established by the municipal governmental office in charge, based on the legal rights of the persons affected to the land subject to acquisition (expropriation) and in accordance with the World Bank requirements, as defined in the Operational Policy 4.12. This means that the persons who have or claim formal rights to land or assets are considered eligible for compensation of the land or assets they lose, as well as other assistance such as moving allowance and support after resettlement, whereas persons who do not have any recognizable legal rights or claims to the land they have been occupying before the acquisition/expropriation procedure start-up are eligible to resettlement assistance. It should be emphasized that, in addition to compensation principles of the Entity Law described, any loss of income resources due to real estate acquisition, restriction of access to assets or resettlement must also be compensated.

Both the municipal governmental office in charge and the borrower (expropriation beneficiary) are responsible for the implementation of compensation measures. The whole process should to be transparent, publicly disclosed, and defined in detail within the "Real Property Acquisition Plan".

e. Assistance to Resettled Parties
Resettled persons should be assisted in their efforts to at least restore their standard of living to the levels prior to resettlement. Where required, they should also be offered support for a certain period of time after the resettlement, based on a reasonable estimate of the time needed to restore their standard of living at least to the previous level. Particular attention has to be paid to the needs of vulnerable groups such as poor or elderly persons, if any. The "Real Property Acquisition Plan" shall include contact information of the owners which would allow for monitoring visits, if required.

Annex 1 : Contents of an Environmental Assessment Report for a Category A Project

1. An environmental assessment (EA) report for a Category A project focuses on the significant environmental issues of a project. The report's scope and level of detail should be commensurate with the project's potential impacts. The report submitted to the Bank is prepared in English, French, or Spanish, and the executive summary in English.

2. The EA report should include the following items (not necessarily in the order shown):

(a) *Executive summary*. Concisely discusses significant findings and recommended actions.

(b) *Policy, legal, and administrative framework*. Discusses the policy, legal, and administrative framework within which the EA is carried out. Explains the environmental requirements of any co-financiers. Identifies relevant international environmental agreements to which the country is a party.

(c) *Project description*. Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicates the need for any resettlement plan or indigenous peoples development plan. Normally includes a map showing the project site and the project's area of influence.

(d) *Baseline data*. Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigatory measures. The section indicates the accuracy, reliability, and sources of the data.

(e) *Environmental impacts*. Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

(f) *Analysis of alternatives*. Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

(g) *Environmental management plan (EMP)*. Covers mitigation measures, monitoring, and institutional strengthening;

(h) *Appendices*

(i) List of EA report preparers—individuals and organizations.
(ii) References—written materials both published and unpublished, used in study preparation.
(iii) Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
(iv) Tables presenting the relevant data referred to or summarized in the main text.
(v) List of associated reports (e.g., resettlement plan or indigenous peoples development plan, where applicable).

Annex 2 Environmental Management Plan (EMP)

1. A project's environmental management plan (EMP) consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures. Management plans are essential elements of EA reports for Category A projects; for many Category B projects, the EA may result in a management plan only. To prepare a management plan, the borrower and its EA design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements. More specifically, the EMP includes the following components.

Mitigation

2. The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. Specifically, the EMP

(a) identifies and summarizes all anticipated significant adverse environmental impacts (including those involving indigenous people or involuntary resettlement);

(b) describes—with technical details—each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;

(c) estimates any potential environmental impacts of these measures; and

(d) provides linkage with any other mitigation plans (e.g., for involuntary resettlement, indigenous peoples, or cultural property) required for the project.

Monitoring

3. Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the borrower and the Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP. Specifically, the monitoring section of the EMP provides
(a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and
(b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

Capacity Development and Training

4. To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the EA's assessment of the existence, role, and capability of environmental units on site or at the agency and ministry level. If necessary, the EMP recommends the establishment or expansion of such units, and the training of staff, to allow implementation of EA recommendations. Specifically, the EMP provides a specific description of institutional arrangements—who is responsible for carrying out the mitigatory and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training). To strengthen environmental management capability in the agencies responsible for implementation, most EMPs cover one or more of the following additional topics: (a) technical assistance programs, (b) procurement of equipment and supplies, and (c) organizational changes.

Implementation Schedule and Cost Estimates

5. For all three aspects (mitigation, monitoring, and capacity development), the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

Integration of EMP with Project

6. The borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the EMP will be executed effectively. Consequently, the Bank expects the plan to be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project's overall planning, design, budget, and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive funding and supervision along with the other components.

Annex 3 The World Bank and BiH EA Document Content Requirements

World Bank (Cat A)	World Bank (Cat B)	PEA Content (Cat I & II) - BiH	EIA study (minimum contents) (Cat I & II) - BiH	Content of an Environmental Permit Request (Cat III & IV) BiH	Content of an Environmental Permit (Cat I, II, III & IV) BiH
Executive summary		Non-technical summary	Non-technical summary	Non-technical summary	
Policy, legal and Administrative Framework					
Project description		Project description containing information on location, purpose and size of facility, installation	Project description	Description of the installation facility	
Baseline data			Description of the environment (population, flora, fauna, climate, cultural heritage, landscape, etc.)	State of the project location	
Environmental impacts		Information necessary for identifying and assessing the main environmental impacts	Description of possible key environmental impacts	Source of emissions, types and levels of emissions, key environmental impacts	
Analysis of alternatives		Description of possible project alternatives and the selected alternative solution	Outline of main alternatives	Description of alternatives	
EMP	EMP				
- Mitigation measures	- Mitigation measures	Description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment	Description of measures for mitigating negative impacts	Proposed measures and technologies for prevention or reduction of emissions from the installation, waste minimization measures, measures during decommissioning and other measures	- Requirements for protection of air, soil, water, plants and animals - Requirements for waste management - Measures for minimization of trans-boundary pollution - Measures specifying work conditions in emergency situations.
- Monitoring plan	- Monitoring plan		The Ministry may require the preparation of the monitoring plan during preparation of the EIA study. In general, the monitoring plan is prepared after the EIA is completed, as a requirement of the Environmental Permit.	Proposed measures for emission monitoring and their impacts	- Emission thresholds for polluting substances - Monitoring system including monitoring methodology and frequency
- Capacity Development and Training	- Capacity Development and Training				
- Implementation Schedule and Cost Estimates	- Implementation Schedule and Cost Estimates				
Other: - Records of consultations - Associated reports: Resettlement plan or indigenous peoples development plan		Other: Copy of the cadastre from the physical/spatial plan	Other. An indication of any difficulties encountered by the developer in compiling the required info.	Other: - Material balance - Copies of requests for other permits	

Annex 4 Environmental Appraisal Form

A. PROJECT DATA	
Project Information Provided by:	Contact Person:
Contact E-mail address:	Tel/Fax:
Project Title:	Project No.
Country:	Date:
Brief project description: (if you require more space, attach an additional page)	
B. BIH EA REQUIREMENTS (to be filled in by the applicant)	
Category:	
Documents Required:	
Public Consultation and Disclosure Requirements:	
Required Permits:	
Review and Approval Requirements:	
Additional / Other Requirements:	

C. WORLD BANK EA REQUIREMENTS (to be filled in by the PMT Officer)
Project Categorization According to World Bank Environment Category:
Documents Required/EA Document Content:
Public Consultation and Disclosure Requirements:
Additional / Other Requirements:
World Bank Safeguards Triggered: Cultural Property : Natural Habitats: Other:

C. ENVIRONMENTAL CLEARANCE BY THE WORLD BANK			
	Name/Department:	Signature:	Date:
Approved by:			
Department:			

D. PREPARED BY			
	Name:	Signature:	Date:
Borrower			
PMT Officer			

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA
(Minutes of Meeting)

Broj (No).: 5090/2-05

Datum (Date): 10.12..2004	Mjesto sastanka (. .' ; :	Mostar – Education Center

Sastanak (' .'--'i .) Second Public Consultation

Naziv Projekta (Project ' '' . ; WQP Project

Attendees

City of Mostar	g. Žarko Markić, Načelnik Odjela za infrastrukturu
Bosna-s	Domagoj Bačić, Ivica Katalinić
Other	see attached list of attendees

This public consultation was organized as part of the task of EA Study preparation in acordance with the World Bank requirements. Its objective was to obtain comments or suggestions on the Draft EA Study. For this purpose, the Draft was disclosed to the public through the Internet and made available at the premises of the City of Mostar. The consultation was announced in the major daily newspapers, while NGOs were personally invited. The features of the second public consultation were:

1. Prior to public consultation a preliminary meeting was held at the premises of the City of Mostar, which was attended by the working group of the City of Mostar (Žarko Markić, □emal Čosić, Ibrahim Šehić, Branimir Krvavac, Semir Mustafić, Mirko Šarac) and Mr. Berislav Crnjac of «Integra» Company, along with Bosna-S representatives. Specific comments were made on the Draft EA Study, and these were repeated in the public consultation meeting.

2. Representatives of the City of Mostar, Government of the Herzegovina-Neretva Canton, Vodoprivreda Mostar, Water Supply Company, University of Mostarr, and other citizens.

3. Representatives of three local TV stations, one local radio station, and several reporters were also present and provided media coverage.

Discussion minutes:

- **Mr. Žarko Markić**, representative of the City of Mostar, Director of Infrastructure DEpartment and member of the working group made an introduction speech and adddressed the results of the first public consultation.

- **Mr. Berislav Crnjac,** Director of Integra Company, who cooperated with Harza during the preparation of «Mostar Urban and Water Quality Plan» study stated that some information was not completely clarified during the first public consultation, and he therefore gave a brief background to the Harza study and explained the five phases of the collection system works recommended by the Harza study. He emphasized the priority activities of the project, in order to make sure that the stakeholders get a good understanding of the project implementation planned.

- **Mr. Domagoj Bačić of Bosna-S provided a further explanation of the purpose of the public consultation, and presented the Draft EA Study, inviting the attendees to make comments on its contents.**

- **Mr. Sead Pintol,** representative of the City of Mostar, welcomed the attendees and expressed his content with the organization of the public consultation, adding that efforts should be made to achieve stronger public participation in the future . He asked a couple of specific questions on the coverage of certain areas with the sewage system (e.g. the Radobolje river area), on which Integra Comopany representative replied..

- **Mr. Mirko Šarac of Vodoprivreda Mostar,** member of the working group assigned by the City made the following specific comments on the Draft EA Study text:
  - recently passed cantonal legislation, which was published in the Official Gazette (Narodne novine Hercegovačko-neretvanske županije, No. 4 i 7 /2004, should be included in the second chapter,
  - federal Environemnat Protection Law should be referred to in the second chapter,
  - description of the federal Law on Waters in Section 2.2 should be corrected,
  - typographical errors in the description of project component Mostar, Chapter 5, should be corrected,
  - more precise explanation of the Mostar component project area should be provided, distinct from the City of Mostar area,
  - sewage system works in the central part of the Old Town of Mostar should be addressed in section 8.7 - Impact on Historical Sites,
  - positive effects of the project in respect of reduction of microbiological pollution, as one of the key objectives of the project, should be ephasized in section 8.8 - Impact on Surface and Ground Water, and
  - Institutional arrangements for project implementation should be clearly described in section 9.1.4.

- **Mr.. Semir Mustafić,** representative of the Water Supply Company,also made some recommendations for adjustment of the text in Chapter 5 - Decription of Project Areas, i.e. parts pertaining to Mostar component.

- **Mr. Zdravko Talić,** representative of the cantonal Ministry of Construction Works, Physical Planning and Environmental Protection, stated that processing according to cantonal legislation has not yet started, and any new elements may be included later on, during the formal procedure.

Attachment: List of Attendees

Uradio (Prepared by): D. Bačić	Ovjerio (Approved by): V. Huseljić

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA
(Minutes of Meeting)

Broj (...): 5090/2-01

Datum (Date): 10.12.2004	Mjesto sastanka (Location):	Odžak – Euro Hotel hall

Sastanak (...): Second public consultations

Naziv Projekta (Project Title): Water Quality Protection Project

Representative of Odžak Municipality, **Mrs. Zlata Mujan** , tel. 063 341130, fax 031 710811,
Present (Bosna-s): Fethi Silajdžić i Goran Krstović,
Stakeholders present: see attached attendance sheet

According to the procedures of the World Bank, the requirement is to hold two public consultations within the Environmental Assessment procedure. The second public consultation is aimed at obtaining comments from the stakeholders with the regards to the Draft EA Report. Prior to the consultations, the Report was made available to the public at the location of the Municipality, the consultation was announced in the daily newspapers, and NGOs have been directly contacted and invited. The major conclusions are:

1. Representatives of the Canton, Municipality, NGOs and local communities Odžak 1,2 and 3 were present.
2. Representatives of Bosna-S have presented the Draft EA Report, and have asked for the stakeholder opinions and comments. Prior to opening the discussion, Mr. Silajdžić has stressed that the land ownership and resettlement issues shall be included in the EFP (Environmental Framework Policy) Document.
3. Major points made during the discussion are:
   - Mr. Dževad Pobrić, Public Enterprise «Komunalac» Odžak, has stressed the issue of land expropriation, since the collection pipe would need to be placed over privately owned land. He has also mentioned that it is imperative for the study to mention that the land expropriation shall be conducted according to existing procedures.
   - Mrs. Sedika Sejdić, NGO CGSA Odžak, has stated that the current pollution of the wastewater being released makes the environmental impact of a treatment plant negligible.
   - Mrs. Mirzeta Čizmić, Ministry of Energy and Physical Planning of Posavina Canton, has brought up the fact that the ownership and legal issues represent a base for the implementation of this project. Furthermore, Mrs. Čizmić has pointed out to the Consultant a rather broad spectrum of legal regulations that affect the Project, and that the Consultant had not, according to her opinion, included in the Report. The Consultant had committed to seriously examining this remark. At the end of her address, use of wastewater treatment sludge in agriculture was also brought up. The Consultant has then provided possibilities and options for using / not using sludge in agriculture.
   - Mr. Anto Šimić, former Mayor of Odžak Municipality, has closed the meeting, by inviting all interested to view the presented Report, and in the following 15 days submit their remarks or comments in writing to the Consultant. Mr. Šimić has additionally expressed his opinion of the great significance of the project itself and the activities to be implemented by joint efforts from all of the governmental levels. He has stressed the importance of local input in similar discussions.

Attachment: Attendance sheet

Uradio (Prepared by): Goran Krstović	Ovjerio (Approved by): Verner H...

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA

(Minutes of Meeting)

Broj (No).: 5090/2-01

Datum (Date): 09.12.2004	Mjesto sastanka (...):	Živinice – sala BKC

Sastanak (Meeting): Druga javna konsultacija

Naziv Projekta (...): Projekat zaštite kvaliteta voda

Attendees:

Representatives of the Municipality of Živinice — **Mr. Asmir Nišić**

Bosna-s: Mr. Fethi silajdžić, Mr. Goran Krstović,

Other: see List in the attchment

This public consultation was organized as part of the task of EA Study preparation in acordance with the World Bank requirements. Its objective was to obtain comments or suggestions on the Draft EA Study. For this purpose, the Draft was disclosed to the public through the Internet and made available at the premises of the Municipality of Živinice The consultation was announced in the major daily newspapers, while NGOs were personally invited. The features of the second public consultation were:

1. Among the attendees there were representatives of the Municipality of žlvinice, NGO Kontakt Plus, Utility Company Živinice ("Communal Enterprise"), Konjuh Company, Energopetrol Company, and other stakeholders.
2. Bosna-S representatives **presented the Draft EA Study, inviting the attendees to make comments on its contents.** Mr. Silajdžić stressed that expropriation issues related to the project implementation are addressed by the EA Study and EFP (Environmental Framework Policy), which describe the expropriation procedure .
3. Minutes of the meeting:
   - Mr. Asmir Nikšić, representative of the Municipality of Živinice, emphasized the specific problems related to the location of future water treatment plant, i.e. the flooding tendency of the nearby rivers of Oskova and Spreča. This may present a problem during the operation of WWTP. Therefore this issue should be addressed by the Study, while the river beds of Oskova and Spreča should be regulated prior to WWTP construction, and the flooding issue should be taklen into account when designing the plant,
   - Other attendees agreed to this.
   - Mr. Sulejman Hajdarević, of Utility Company Živinice ("Communal Enterprise") stressed that the occurence of torrents in Živinice region should be considered when designing the plant capacity, i.e. with respect to extreme water quantities.
   - Mr. Osman Abadžić addressed the issue of disposal location for WWTP sludge and other solid waste. The Consultant explained that the Draft EA Study recommends disposal of sludge on sanitary landfills.
   - Following some questions by the representatives of Konjuh Company and Energopetrol Company, the he Consultant stressed that the future operation of the WWTP will not free anyone from liability for the pollution of watercourses.
4. The Consultant finally invited the attendees to provide any additional comments on the Draft EA Study.within 15 days.

Attachment: List of Attendees

Uradio (Prepared by): Goran Krstović	Ovjerio (Approved by): Verner Huseljić

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA
(Minutes of Meeting)

Broj (No).: 5090/2-08

Datum (Date): 09.12.2004	Mjesto sastanka (:	Trnovo- city Hall

Sastanak ( ): Second Public Consultation

Naziv Projekta (Project title): Water Quality Protection Project

Present for Bosna-S Oil Services Company Domagoj Bačić and Fethi Silajdžić,
Other present as per attached list

1. First Public Consultation meeting was attended by representatives of Municipality, NGO – Association of fishers and other citizens mainly employed in the Municipality,
2. In introductory notes Consultant's representative made short presentation of EA, which was made public beforehand.
3. There were no remarks on the Study Draft.
4. It was noted that questions of land acquisition for this project were solved in previous time (during original construction before the war)
5. Discussion:

Mr. Hamza Kadrispahić, once more expressing support for this project addressed problem of it's sustainability. Namely, he noted that questions of who will operate the unit after it's reconstruction, and financing of it's operation still need to be addressed.

Mr. Mušan Vatrić, as well expressed his support to the project, but he declared that there still exist a number of other different polluters downstream of River Željeznica, beside town of Trnovo, and that in the future those polluters should be eliminated as well.

Mr. Osman Smječanin, representative of the Municipality, answering these questions declared that Municipality is taking measures in it's authority, in order to solve them and eliminate other polluters,

- Since revitalization of industry (carpet factory and wood processing plant) is expected in the near future, eventual additional water treatment units should be foreseen in this process, before spent water outlet in the municipal network,
- Also he informed participants that Municipality has applied for another project, that is enlargement of sewage network in order to collect sewage from settlements Turova, Tošići and Godinja.

Mr. Aziz Dedić, representative of NGO, Fishermen Association, giving his support to such efforts and knowing that it is not directly connected with the subject of this meeting, declared that his NGO will strongly oppose to waste disposal on unregulated landfill Brestovac-Krupaške stijene, which by their opinion is more dangerous for nature than Trnovo sewage. Namely, because of lower duties than in regional landfill in Sarajevo, uncontrolled wastes (including ones from SFOR) are disposed on this landfill. Even discussions are held on different levels there are no results.

Attachment: List of Attendees

Uradio ( ): D. Bačić	Ovjerio (Approved by):

Bosna-S Oil Services Company

Druga javna rasprava – Trnovo 09.12.2004 – Spisak prisutnih
Second Public Consultation – Trnovo 09.12.2004 – List of attendants

Ime i prezime ***Name and surname***	***Kontakt/Institution*** ***Contact/Institution***	***Potpis*** ***Signature***
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Bosna-S Oil Services Company

Druga javna rasprava – Mostar 10.12.2004 – Spisak prisutnih
Second Public Consultation - Mostar 10.12.2004 – List of attendants

Ime i prezime *Name and surname*	*Kontakt/Institution* *Contact/Institution*	*Potpis* *Signature*
ŽARKO MARIĆ	GRAD MOSTAR	

Bosna-S Oil Services Company

Drugа javna rasprava – Mostar 10.12.2004 – Spisak prisutnih
Second Public Consultation – Mostar 10.12.2004 – List of attendants

Ime i prezime / Name and surname	Kontakt/Institution / Contact/Institution	Potpis / Signature
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Bosna-S Oil Services Company

Druga javna rasprava – Odžak 10.12.2004 – Spisak prisutnih
First Public Consultation – Odžak 10.12.2004 – List of attendants

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Bosna-S Oil Services Company

Druga javna rasprava – Živinice 09.12.2004 – Spisak prisutnih
First Public Consultation – Živinice 09.12.2004 – List of attendants

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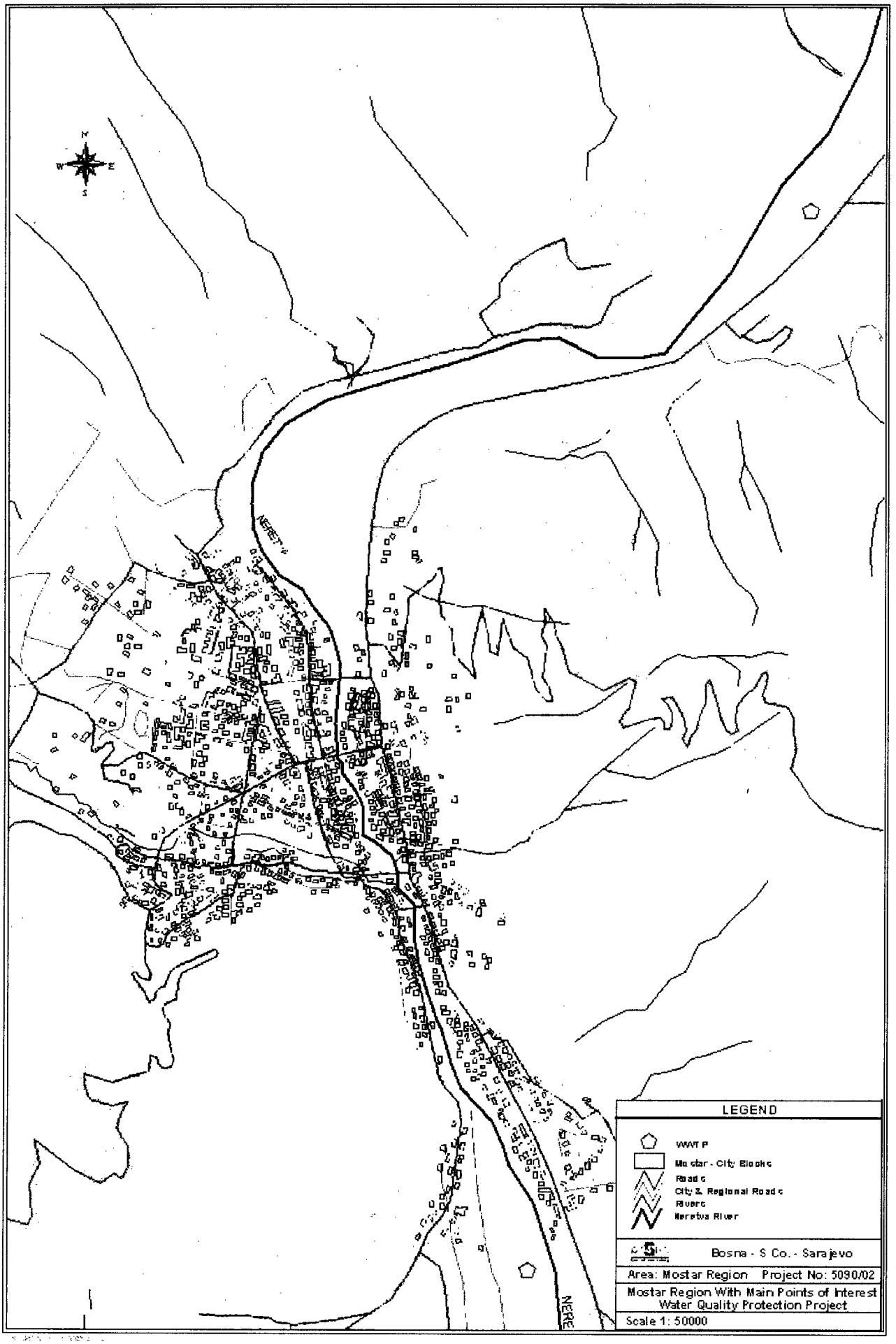
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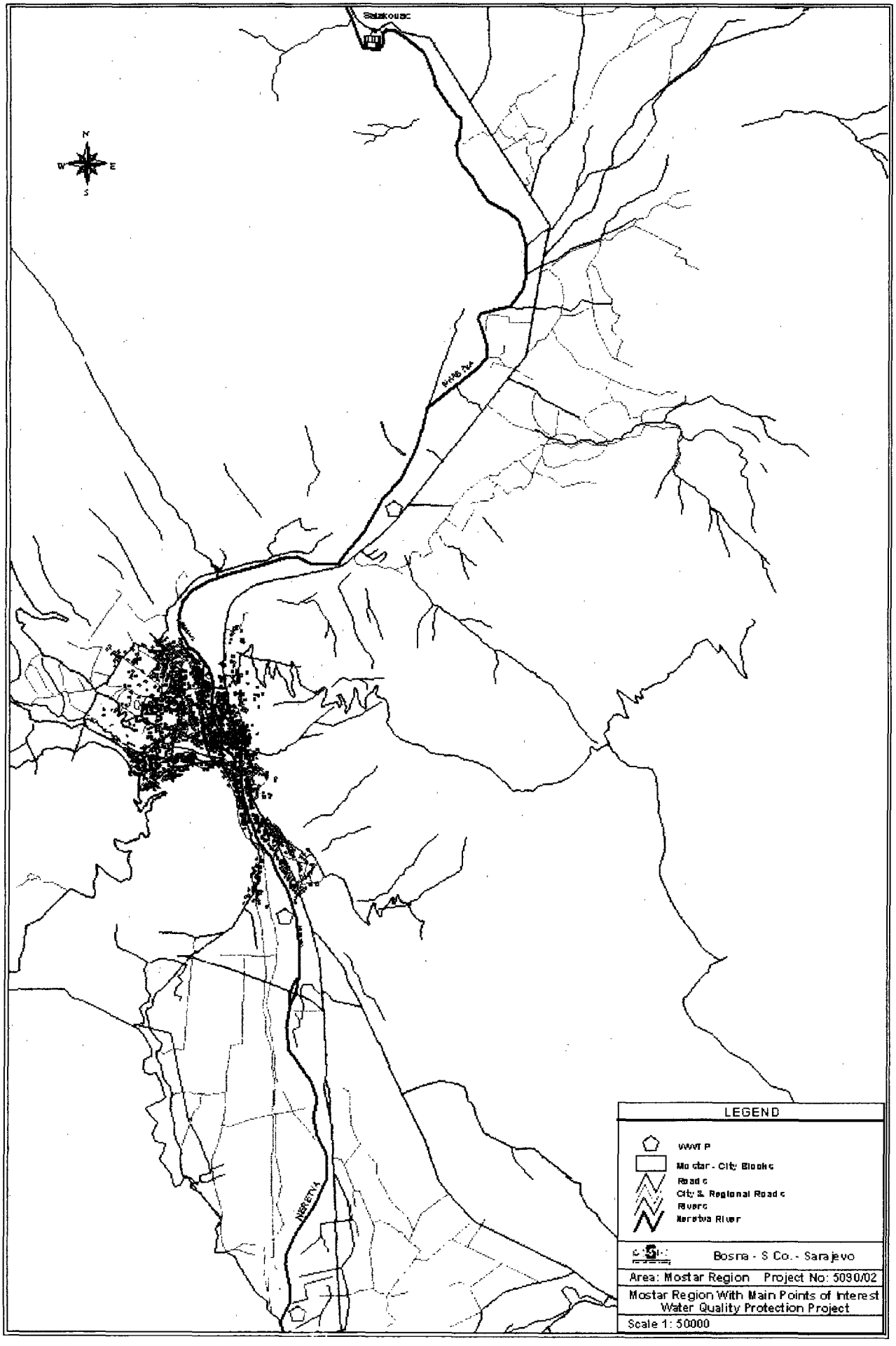
Mostar Region With Main Points of Interest
Water Quality Protection Project
Scale 1: 50000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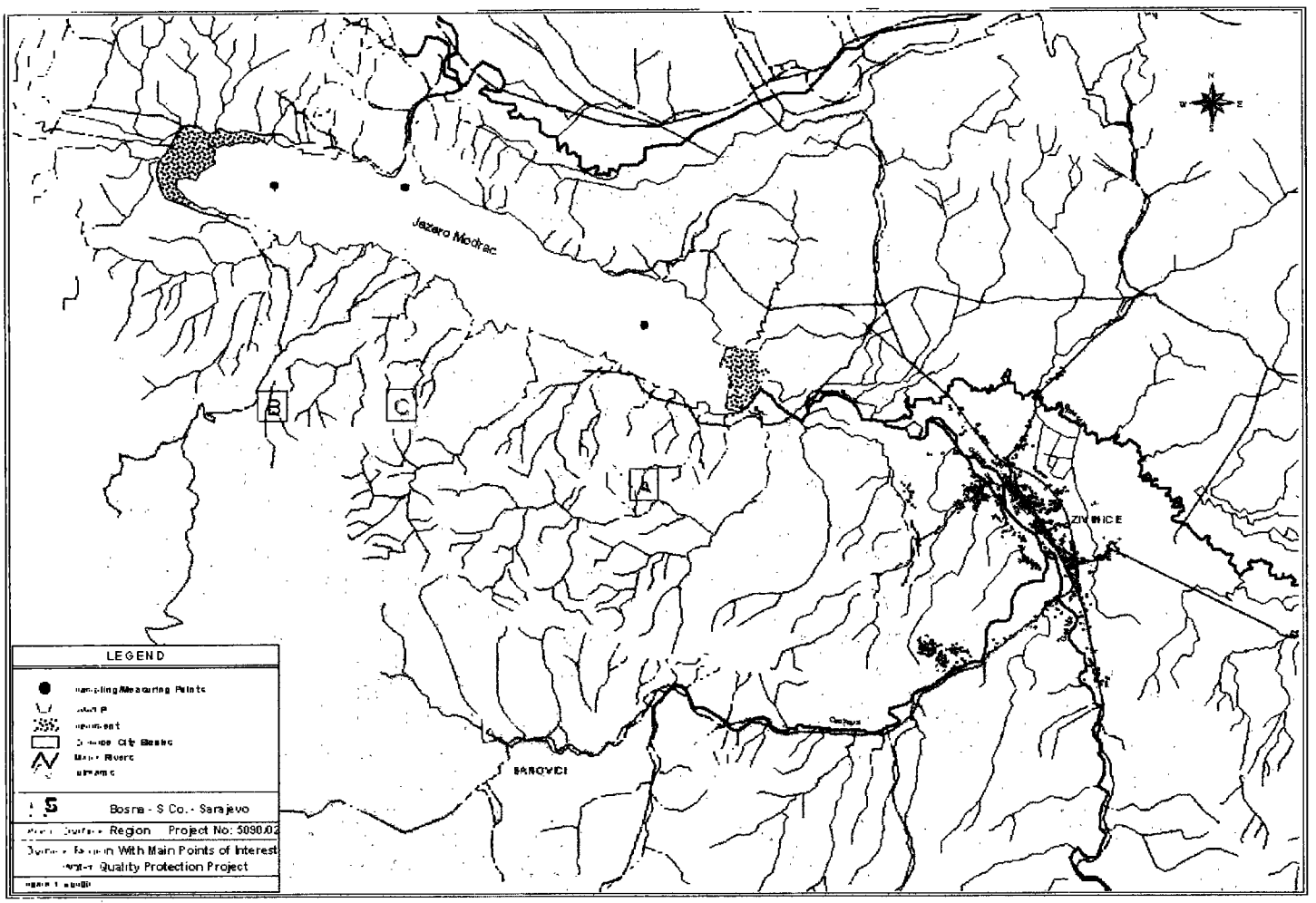
Area: Mostar Region Project No: 5090/02
Mostar Region With Main Points of Interest
Water Quality Protection Project
Scale 1: 50000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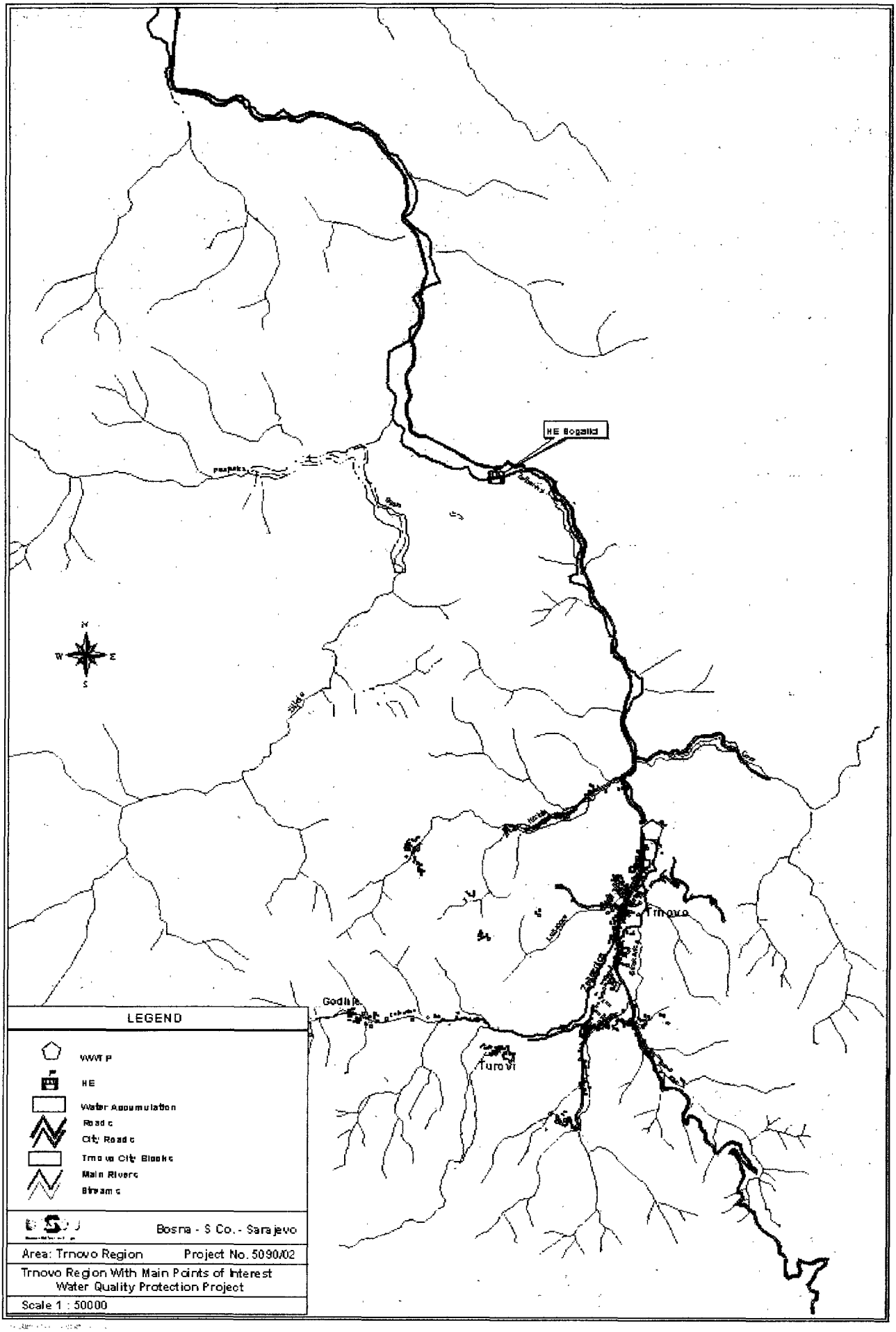
Quality Protection Project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Water Accumulation
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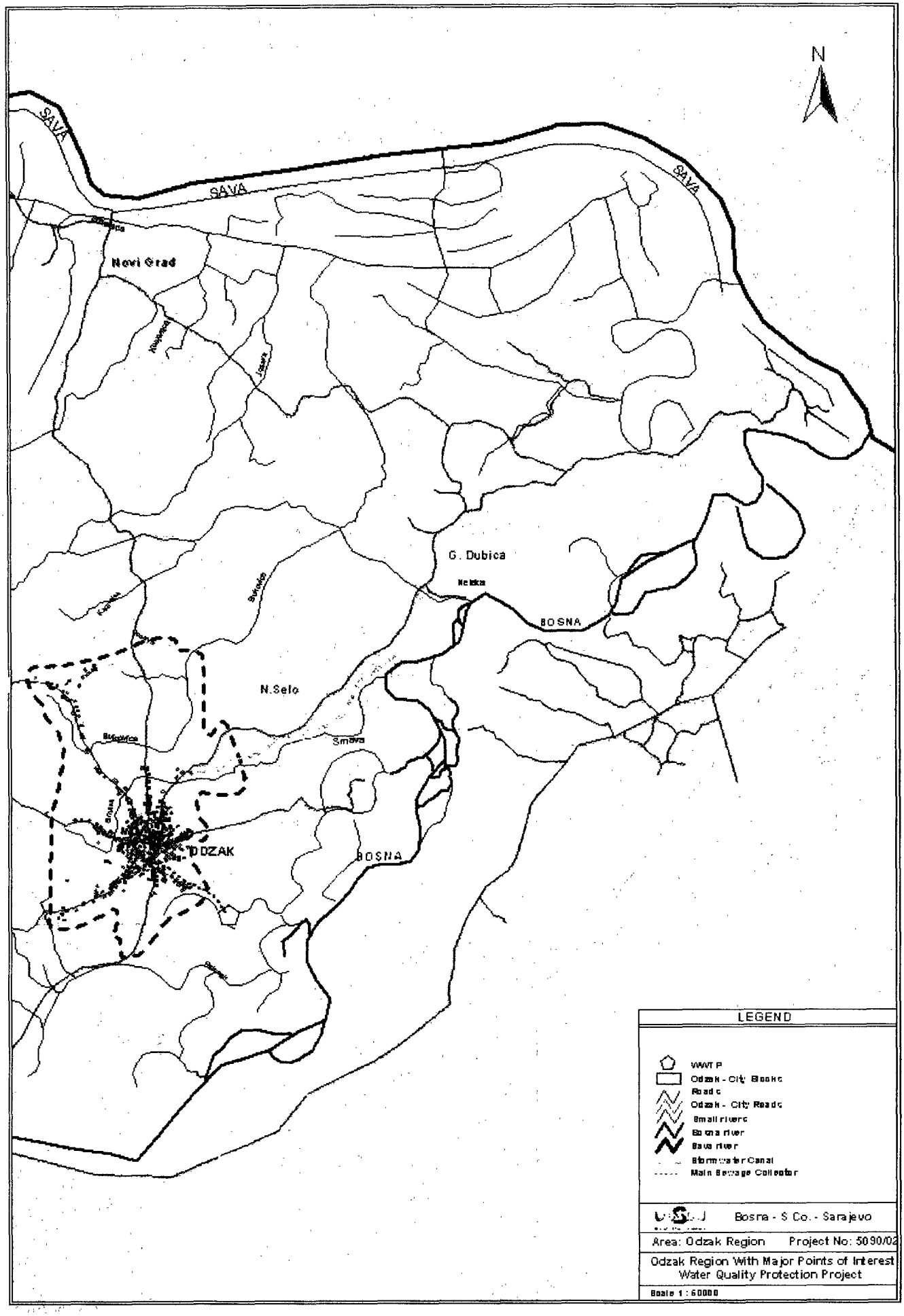
City Roads
Trnovo City Blocks
Main Rivers
Streams
Bosna - S Co. - Sarajevo
Area: Trnovo Region
Project No. 5090/02
Trnovo Region With Main Points of Interest
Water Quality Protection Project
Scale 1 : 50000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WWTP
Odzak - City Blocks
Roads
Odzak - City Roads
Small rivers
Bosna river
Sava river
Stormwater Canal
Main Sewage Collector
Bosna - S Co. - Sarajevo
Area: Odzak Region
Project No: 5090/02
Odzak Region With Major Points of Interest
Water Quality Protection Project
Scale 1 : 60000

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA

Broj (...): 5090/2-04

Datum (...): 28.11.2004	Mjesto sastanka (...):	Mostar –hotel Ero

Sastanak (...): First Public Consultations

Naziv Projekta (...): Water Quality Protection Project

Present for Bosna-s: Domagoj Bačić i Adnan Hodžić, Ivica Katalinić i Goran Krstović

Other present: as per attached lists

Purpose of Public Consultation: Following World Bank procedure sin EIA elaboration it is necessary to organize two Public Consultations. First Public Consultation has as primary goal to establish scope of Environmental Impact Assessment (TOR). In this sense a concept of EIA was made public and consultation was held as follows.

1. Preparatory meeting before First Public Consultation was held in premises of Public Company for water catchments of Adriatic sea. Present were, beside representatives of Bosna-s Oil Services Company, (Žarko Markić, Mr, Đemal Čosić, Ibrahim Šehić, Branimir Krvavac, Semir Mustafić), and Mr. Damir Mrđen Public Company for water catchments of Adriatic sea

2. First Public Consultation meeting was attended by representatives of Mostar municipality headed by the City Mayor, government of HN Canton, Public Company for water catchments of Adriatic sea, representatives of local communities, Mostar University and other citizens, mainly employed in the municipality

3. Before their discussions attendants introduced themselves to the audience,

4. Public Consultation was attended by representatives of three TV stations, local radio station and several newspapers.

5. Discussion:

   - **G.Žarko Markić**, representative of Mostar city, Department Manager for infrastructure and member of work group formed by City Council for this project, opened the meeting with following introductory notes:
     - Former study for Mostar valley sewage system (1996) was abandoned because it was not possible to solve this investment in one phase.
     - With financing by World Bank, company Harza from Chicago ad with participation of local company Integra has elaborated new study for sewage collection and waste water treatment plant in several phases,
     - This study foresee five phases and three main locations: separate solution for central valley, north zone and south zone,
     - As support to this study additional studies were made: Urban and demographic study, and following requirement of World Bank EIA study is now in preparation,
     - City Council has formed work group for follow-up of these activities, which is preparing report for the council in order to make necessary further decisions,
     - According to the study made by Harza total investment would be 83 million US$, and it's first phase (sewage collector in central valley and first phase of waste water treatment plant) would be around 13 million US$,
     - In financing of these 13 million World Bank would participate with 5 millions and city of Mostar with 2,5 millions, whilst remaining financing would be from other sources (and with promised help from World Bank in providing the same).
     - In further procedure City Council shall receive report from work group, including study made by company Harza, in order to enable decisions for continuation of the project.

-g. **Domagoj Bačić** has, following introductory notes, in the Consultant name, given explanation

for need of this Public Consultations, which in short is:

- Because of similar terminology First phase of Water Quality Protection Project should be distinguished from First phase of Mostar city sewage and water treatment project,
- According to positive regulations in BiH Water treatment plants, according to it's capacity have proscribed procedure for elaboration of EIA study and issue of Environmental permit. This permit is based on preliminary environmental study, elaboration of detailed design. A detailed time schedule is foreseen for these activities,
- This phase of Water Quality Protection project, according to World bank procedures requires elaboration of EIA before appraisal mission of World Bank, and it should enable continuation of negotiations for Project financing,
- In the continuation of work in EIA elaboration the Consultant will do his best in order to avoid unnecessary repetition of activities and to enable utilization of the study in the continuation of procedure which follows for this project,
- World Bank and FMPUIO (Federal Ministry for Physical Planning and Environment) are informed about Consultant's activities, and their comments shall be incorporated in the elaboration of EIA study,

After these introductory notes discussion followed:

- **Gđa Marinka Zovko,** Inter Invest Mostar, participant in elaboration of demographic study connected with this project, beside giving full support to this project, noted the following:
  - It is necessary to fix exact locations for WTP, because there is less and less free space due to new constructions,
  - During detailed design and execution of sewage network natural heritage of River Neretva banks should be protected (throughout whole flow through Mostar, Neretva flows in it's natural banks undisturbed by human activities),
  - In further detailed design take into account specifics of Mostar city (as example given reconstruction of old bridge and it's surrounding),

- **Gđa Ozana Bulić,** Županija HNK, department for Urban planning has concurred this discussion

- **G. Škobić,** has pointed out case of special polluter, old cola mine, which is out of operation (and has no legal owner) which is now unregulated waste dump and source for water pollution. Activities on safe closing of this dump are undertaken, but without complete solution of this site there is no solution for waste waters in Mostar city.

- **Ing Sead Pintul**, City council, has declared that:
  - Urban study for city Mostar has envisaged places for WTP and study done by company Harza has taken it into account,
  - He pointed out that recent measurements of water quality gave similar results as ones before the war, which, taking into account that industry is not polluting now, shows that problem of pollution is serious and there is need for quick solving of the same.

In the continuation of the meeting, it was answered on several questions that were not clearly explained in introductory speeches (explanation of procedures according local regulations), and some questions not directly connected with this study, but which have influence on the project as question of solid wastes disposal, intensification of industrial activities and their influence on pollution etc...

Attachments: List of participants and photo

Uradio (D. Bačić	Ovjerio (

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA

Broj (.: 5090/2-01

Datum	Mjesto sastanka	Odžak –hotel
(: 27.11.2004	(:	Euro

Sastanak (: First Public Consultations

Naziv Projekta (: Water Quality Protection Project

Present for Bosna-S Oil Services Company Domagoj Bačić and Adnan Hodžić,
Other present as per attached list

1. First Public Consultation meeting was attended by representatives of Municipality, Mayor, Cantonal government, NGO Fishermen Association, local Hospital and other citizens mainly employed in the Municipality,

2. All present introduced themselves and declared that they are supporting the project.

3. Discussion:

g.Anto Šimić, Mayor of Municipality Odžak

- Has expressed his satisfaction that World Bank has included this project into consideration.
- Unfortunately now there are no industrial polluters in the city,
- Site for WTP unit is reserved and it is located far from populated area (here we talk about reconstruction of existing plant),

Gđa. Mirzeta Čizmić, Cantonal government, Ministry for environment,

- This project is included in NEAP as one of priority projects,
- This project will have positive influence on the environment
- Informed present about the procedure for environmental permit according local regulations and confirmed Consultants approach

g. Dževad Pobrić JP «Komunalac»

- Project has included evacuation of treated waters by separate channel to River Bosna, for which it is necessary to solve land property questions,
- It is necessary to make measurements of sand content in sewage waters which will dictate dimensioning of sand trap during reconstruction of unit,
- Because the fact that region has rainy periods very often, possibility of replacing fields for sludge drying with forced filtration units

Attachments: List of participants and photos

Uradio (D. Bačić	Ovjerio (

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA

Broj (...: 5090/2-01

Datum	Mjesto sastanka	Živinice – sala
(...: 26.11.2004	(...:	BKC

Sastanak (...: Prve javne konsultacije

Naziv Projekta (...: Projekat zaštite kvaliteta voda

Present for Bosna-S Oil Services Company Domagoj Bačić and Adnan Hodžić,
Other present as per attached list

1. First Public Consultation meeting was attended by representatives of Municipality, NGO – «Kontakt plus» (participant in elaboration of LEAP – Local Environmental Action Plan), Public company of water catchments of River Sava, Hydro-technical Institute Sarajevo, factory «Konjuh», «Energopetrol» and other citizens mainly employed in the Municipality,

2. All present introduced themselves and declared that they are supporting the project,

3. Discussion:

- **Gđa. Sabaheta Hafizović,** Public company of water catchments of River Sava:
  - Public company has financed this (notional) project and thus showed interest in solving this problem,
  - Industrial polluters should be further investigated and project completed with that part,

Existing industry is woring on solutions for own waste waters and they are interested to deliver pretreated waters in common sewage system.

- **G. Sead Muratović,** «Energopetrol», declared that company «Energopetrol» has proper unit for oily waters treatment, and that collected oil is treated by specialized contractor,
- **G. Mirsad Aličić,** «Konjuh» declared that company «Konjuh» has prepared project with proposal for pretreatment of waters from Painting Unit and from part for timbers processing,

- **g.Asmir Nišić,** representative of Municipal council has informed and declared that:
  - Site for the new WTP plant is reserved and is located far from the city,
  - It is necessary to regulate banks of River Oskova, in order to avoid flooding.

- **g Dedić Hajrudin**, Hydro-technical Institute Sarajevo has noted the following elements:
  - It is necessary to make measurements of sand content in sewage waters which will dictate dimensioning of sand trap during detailed design of unit,
  - Because the fact that region has rainy periods very often, possibility of replacing fields for sludge drying with forced filtration units
  - One of problems not connected with municipal sewage is coal dust from adjacent coal mine. This dust is deposited at the mouth of Oskova River, and during high waters is flushed further to Lake Modrac.

Attachments: List of participants and photos

Uradio (... D. Bačić	Ovjerio (...

Bosna-S Oil Services Company

ZAPISNIK SA SASTANKA

Broj (: 5090/2-01

Datum (: 25.11.2004

Mjesto sastanka (: Trnovo- city Hall

Sastanak (: First Public Consultations

Naziv Projekta (: Water Quality Protection Project

Present for Bosna-S Oil Services Company: Domagoj Bačić and Fethi Silajdžić,
Other present: as per attached list

1. First Public Consultation meeting was attended by representatives of Municipality, NGO – Association of fishers, Public company for water catchments of River Sava, Factory for hydro equipment, Hydro-technical Institute Sarajevo and other citizens mainly employed in the Municipality,
2. All present introduced themselves and declared that they are supporting the project,
3. Discussion,

Gđa. Senada Mulaomerović, Public company for water catchments of River Sava:

- Since project foresee drying of sludge in filtration fields it is necessary to monitor does dry sludge can be used as fertilizer. If not it should be transported to authorized landfill,
- Exact number of population that shall be covered with sewage system is not known. For proper operation of WTP capacity of unit should be respected,
- Carpet factory should have primary treatment of effluents before their disposal in communal sewage,

g. Hajrudin Dedić, Hydro-technical Institute Sarajevo:

- It is necessary to connect as much as possible local communities that gravitate to this WTP,
- It is necessary to make measurements of sand content in sewage waters which will dictate dimensioning of sand trap during reconstruction of unit,
- Existing plant has fence but upstream of unit there are houses in the close vicinity of WTP,
- Because of above mentioned and the fact that region has rainy periods very often, possibility of replacing fields for sludge drying with forced filtration units
- In case of revitalization of carpet factory and inclusion of painting unit adequate pretreatment unit should be foreseen,
- In the last period manufacturers of smaller stand alone purification units (type Putox) are marketing their products in the region. Such units are not necessary if sewage system is put into operation and WTP is reconstructed,

g. Mumin Barjaktarević, Trnovo Municipality noted that right bank of rive ris not included in the project, communities Tošići and Rajski Do,

g. Nusret Bajrović, Fishers association has pointed out the need of this project from their standpoint,

g. Drago Bagarić, Factory for hydro equipment, has declared that their factory is capable to deliver all necessary equipment for reconstruction of WTP

Attachments: List of participants and photos

Uradio (D. Bačić	Ovjerio (

Bosna-S Oil Services Company

[illegible] javna rasprava Odžak 27.10.2004 – Spisak prisutnih
First Public Consultation Odzak 27.10.2004 List of attendants

Ime i prezime *Name and surname*	*Kontakt Institution* *Contact Institution*	*Potpis* *Signature*
HASAN HAMZIĆ	[illegible]	[illegible]

Bosna-S Oil Services Company

Prva javna rasprava – Mostar 28.[illegible] Spisak prisutnih
First Public Consultation Mostar 28.[illegible] List of attendants

Ime i prezime *Name and surname*	*Kontakt Institution* *Contact Institution*	*Potpis* *Signature*

Bosna-S Oil Services Company

Prva javna rasprava – Mostar 28.10.2004 – Spisak prisutnih
First Public Consultation – Mostar 28.10.2004 – List of attendants

Ime i prezime Name and surname	Kontakt/Institution Contact Institution	Potpis Signature
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Golo? Mirsada	[illegible] HNK	[illegible]

Bosnia-S Oil Services Company

Prva javna rasprava – Mostar 28.10.2004 – Spisak prisutnih
First Public Consultation – Mostar 28.10.2004 – List of attendants

Ime i prezime *Name and surname*	*Kontakt Institution* *Contact Institution*	*Potpis* *Signature*

Bosna-S Oil Services Company

Prva javna rasprava – Živinice 26.10.2004 – Spisak prisutnih
First Public Consultation – Živinice 26.10.2004 – List of attendants

Ime i prezime / *Name and surname*	*Kontakt Institution* / *Contact Institution*	*Potpis* / *Signature*
MIRSAD [illegible]	[illegible] 035 [illegible] 137	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Bosna-S Oil Services Company

Prva javna rasprava – Trnovo 25.10.2011 Spisak prisutnih

Ime i prezime	Kontakt	Potpis
[illegible]	[illegible]	[illegible]
HAFIZOVIĆ [illegible]	[illegible]	[illegible]