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Plava Voda Regional Water Supply System

Non-Technical Summary

July 2011

Document Control Sheet

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1 INTRODUCTION

Plava Voda, a Special Purpose Company established as a Public Company by the municipalities of Travnik and Zenica will be implementing the project of construction of water intake structures at the Plava Voda spring with a design capacity of 23.6 million m3, the construction of main transport pipeline, about 34 kilometres long, from the spring through Novi Travnik, Vitez and Busovaca to the town of Zenica, and facilities to enable connections to the existing water distribution networks of the five municipalities.

This Non-Technical Summary (NTS) describes the project and summarises the results of various environmental and social studies carried out. The completed documentation can be accessed for more information and detail at the Plava Voda Company offices.

It is intended that the project will be partly financed by the European Bank for Reconstruction and Development (EBRD) in the amount of EUR 15 million. In order to finance the Project, the EBRD seeks to ensure through its environmental and social appraisal and monitoring processes that the project is developed and implemented in accordance with the EBRD Performance Requirements.

2 PROJECT DESCRIPTION

The purpose of “Plava Voda Regional Water Supply” project is to extract water from the Plava Voda spring, located in the town of Travnik to serve other four municipalities of Novi Travnik, Vitez, Busovaca, and Zenica. The maximum of 550 l/s will be abstracted and divided between municipalities as follows: (i) 80 l/s for Travnik Municipality (40 l/s for Dolac n/l and 40 l/s for Nova Bila), (ii) 40 l/s for Novi Travnik Municipality, (iii) 40 l/s for Vitez Municipality, (iv) 40 l/s for Busovaca Municipality, and (v) 350 l/s for Zenica Municipality.

The route of the transport pipeline begins at the Plava Voda spring in Travnik Municipality, and it then passes through the parts of Travnik, Vitez, Busovaca and Zenica Municipalities. In the Municipalities of Travnik, Vitez and Busovaca, the route is largely located along the old railroad “Jajce - Donji Vakuf“. In the area of Zenica Municipality, the route is in one part passing along the “Šamac-Sarajevo” railroad, and “Doboj-Kaonik” road, up to the Janjici village, where it crosses the M17 trunk road and the Bosna River, and goes up toward the “Putovici” water tank in Zenica Municipality. On its way, transport pipeline will cross roads, rivers, intermittent streams by suspension on the bridge or digging the trench below the road/stream or inside them. The total length of the route is cca 33 km. For all branches, the pumping to the existing or new distribution water tanks has been foreseen.

The structures currently found on Plava Voda spring are water intake structure, chlorination station and pumping station. The existing water intake structure will be enlarged to include facilities for abstraction of second spring and additional automatic chlorination station.

Works related to construction of main transport pipeline, branches, and accompanying facilities include preparatory works, construction works, concrete works, installation works, asphalt works and final works.

3 LEGAL CONTEXT AND APPLICABLE STANDARDS

3.1 Regulatory Framework, Standards and Guidelines in the Federation of Bosnia and Herzegovina

The EIA process

National legislation in the Federation of Bosnia and Herzegovina (FBiH) requires Environmental Impact Assessment (EIA) as a part of the environmental permitting procedure for installations that have or might have negative impact on environment. The EIA procedure is detailed in the *Law on Environmental Protection(Official Gazette of FB&H, No. 33/03)* and *Law on Amendments to the Law on Environmental Protection (Official Gazette of FB&H, No. 38/09)*, Articles 53-64 and 16-24. The list of installations for which EIA and environmental permits are obligatory is found in the *Rulebook on Plants and Installations for which the Environmental Impact Assessment is Obligatory and the Plants and Installations which may be Constructed and Put into Operation only if Entitled the Environmental Permit (Official Gazette of FB&H", No. 19/04")*.

The later provides a list of activities and industrial facilities subject to mandatory EIA and permitting procedures at FBiH level, as well as activities and facilities that undergo individual evaluation concerning the EIA requirement. When evaluating the EIA requirement, the Ministry takes into account individual project characteristics (e.g. industrial plant/facility size, waste generation, pollution, etc.), project location and environmental sensitivity, as well as characteristics/size of potential impacts (e.g. impact extent, probability, etc.).

According to the Long-term Water Supply Program (Institute for Water Management, 1987), Balance of Ground Waters (Institute for Geology, 1985) and Draft Water Management Strategy (Institute for Water Management Sarajevo and Institute for Water Management Mostar, 2010) Plava Voda is considered to be of a karst aquifer and current water intake is referred to as overflow spillway from the underground accumulation. According to the article 4 dž) of the Rulebook "Groundwater abstraction activities or artificial groundwater recharge schemes in cases where the annual volume of water to be abstracted or recharged amounts to 3 million cubic metres or more" is considered a project for which EIA is obligatory. According to the Article 109 of the *Law on Water (Official Gazette of FB&H, No. 70/06)* water abstraction for the purpose of domestic water supply is considered as a project that needs to obtain relevant water acts including preliminary water approval, water approval and water permit.

3.2 Applicable International Regulatory Framework, Standards and Guidelines

EBRD's Environmental and Social Policy and Performance Requirements (PRs)
The Environmental and Social Policy is a key EBRD document, which details the commitments of the Bank's Funding Agreement "*to promote in the full range of its*

activities, environmentally sound and sustainable development." The EBRD expects the projects it finances to meet good international practise related to sustainable development. To help their clients to achieve this objective, EBRD has defined specific PRs for key areas of environmental and social issues and impacts.

EU Directives
Since Bosnia and Herzegovina has signed several European Union (EU) agreement protocols and needs to fulfil different environmental requirements in order to become a member of EU, it is gradually adopting all requirements listed in relevant EU directives.

4 BASELINE DATA OF ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Potable Water Source, Supply and Distribution

Travnik. Water sources are used by Water Utility Company "Bašbunar" are springs of "Plava voda" (200 l/s) and "Bašbunar" (65 l/s). Currently, Public Water Utility Company "Bašbunar" has concession to 200 l/s from "Plava Voda" spring. Turbe settlement has its own water springs Goleš (22 l/s) and Runjici (8 l/s) while settlement Nova Bila is supplied by gravity from the Trebišnjica spring (11 l/s).

The review of about 500 reports on analysis of raw and tap water quality from springs "Plava voda", Bašbunar, Goleš, and Runjici from 2010 show that water is mainly of excellent quality with the few oscillation in presence of E. Coli in different periods of the year and turbidity There are no water treatment facilities in Travnik municipality except automatic chlorination at source.

Domestic water consumption per capita, according to estimates of the Water Utility Company "Bašbunar" is about 200 l/c/day. The estimated total loses in water supply distribution system are higher than 70%.

At present, 90% of population in Travnik town and 30% of population in Turbe settlement is served by municipal sewer system with no wastewater treatment plant. The sewerage is discharged through 54 individual discharge points to Lašva River.

Novi Travnik. The Public Water Utility Company "Vilenica" supplies drinking water to its consumers from two water supply systems: Oparac system consisting of six different water sources Lupežovac (20 l/s), Dusina (50 l/s), Tocak (10 l/s), Vrelo I&II (6 l/s), Oparac (30 l/s), Dalecko Vrelo (20 l/s), and Jaglenica system which is surface water intake at Jaglenica stream (53 l/s). Sources are not equipped with flow meter, thus the information of water yields is based on estimations. The whole supply system is gravitational.

Latest data on physical-chemical and bacteriological quality from 2010 show that *raw water sample* from Dusina, Pavlovica, Lupežovac, Oparac and Jaglenica is of good quality

Current consumption per capita can be calculated at approximately 114 l/c/d, and future demand per capita is estimated to be up to 310 l/c/d. Having in mind that the water supply network is in bad conditions with significant losses in the system and the fact that the existing wells are not used to their maximum, it can be concluded that serious intervention in reconstruction of network and reduction of losses must be undertaken prior to supplies from Plava Voda in order to provide adequate supply in the future.

At present, 30% of population in Novi Travnik municipality is served by sewer system with no wastewater treatment plant. The sewerage is discharged directly into river Grlovnica in the settlement Novo naselje Ratanjska.

Vitez. Vitez Municipality is supplied with water from two sources: spring Kruščica and spring Kremenik. Spring Kruščica is water source for inter-cantonal water supply system for Zenica and Vitez towns. The spring has yield capacity of 520 l/s of which 23% is supplied to Vitez (about 80 l/s) and the remaining 77% to Zenica. The minimum yield of Kremenik source in 20 years return period is 160 l/s, of which 50 l/s is currently used. Water is of good quality with occasional bacteriological pollution and turbidity in case of Kremenik source. Water from both Kruščica and Kremenik is treated with chlorine.

The future consumer demand is estimated to be up to 300 l/c/d. Total of 130 l/s of water is abstracted from two water sources used currently. Source Kremenik has one spare well with additional 50 l/s, or more, that can be included in the water supply system if needed. It seems that available water sources can cover water demand in the planning period till 2020.

At present 30% of population in Vitez Municipality is served with combined sewer system with no wastewater treatment plant. The untreated sewage is discharged directly into river Lašva.

Busovaca. Busovaca town is supplied with water by gravity from two sources or open surface water-streams: Topolovica (12 l/s) and Duboki Potok (30 l/s). There is also Crni potok (20-25 l/s) water-stream which serves as alternative source. About 2000 m^3 per day is produced and distributed to the supply network. The entire distribution network is gravitational.

The main problem is the turbidity at water sources to a degree to cause disruptions in continuous water supply. Losses are estimated to about 60%. Water from Topalovica and Duboki potok are treated by filtration before their distribution to consumers. Water samples taken at the tap meet requirements of the Rulebook on sanitary conditions for drinking water (Official Gazette of SFRJ no. 33/87 and 23/91).

The future consumer demand is estimated to be up to 330 l/c/d. Currently available water from sources Topalovica potok, Duboki potok, and Crni Potok (to be added soon) is 12+30+25 = 67 l/s. It is clear that available water sources will not be able to satisfy future need and that water from regional water supply system will be alternative to provide continuous water supply to inhabitants of Busovaca Municipality.

At present, 30% of population in Busovaca Municipality is served by combined and separate sewer system.. Busovaca municipality has no wastewater treatment plant. The sewage is discharged untreated to Kozica and Ivancica rivers.

Zenica. Zenica municipality is supplied with water from four main water sources: Kruščica (255-300 l/s), Babina Rijeka (72 l/s), Strmešnjak well (20 l/s), and Klopce (2 l/s).

The Water Utility Company has prepared Elaborates of water protection for Kruščica and Babina Rijeka sources. Being the surface water stream, Babina Rijeka and the water intake are highly vulnerable to pollution from household sewage, fertilizers, disposal of solid wastes, and erosion[1]. Raw water samples for Babina Rijeka source show frequent increases in suspended solids and ammonia. All bacteriological analyses of raw water from the source Babina Rijeka done in 2010 show contamination with Escherichia Coli, while in some analyses presence of streptococcus fecalis is identified. No information on the catchment areas and existing polluters of Strmešnjak well and Klopce was available. he results for Kruščica indicate occasional increase in turbidity and presence of bacteria to a lesser degree. Water at Strmešnjak well and Klopce is chlorinated with automatic chlorinators. The surface water from Babina River undergoes water treatment by filtration in a 200 l/s capacity plant.

It is evident that Zenica Municipality will need additional water source in the future as well as work on reduction of water losses that would significantly lower the water deficit. The unaccounted for water is estimated to be 40% because no valid data exists on water abstracted (no water meters installed).

At present, 60% of population in Zenica Municipality is served with sewer system, including Zenica City and surrounding settlements of Klopce, Tetovo, Mala Broda, Velika Broda, Podrbežje, Gradišce, Donja Gracanica, Ricice and Pehare, Hamida and Lukovo polje. Zenica Municipality has no wastewater treatment plant. The sewage is discharged untreated to Bosna River.

4.2 Socio-economic Profile

Demographic profile

Taking into account that the last census was carried out in 1991, there is no precise data on current population number in Bosnia and Herzegovina and its lower administrative levels. All official data is based on estimates. Population size in 2009 for the respective municipalities, as reported by Federal Statistical Institute, is in total 248,205 inhabitants.

Population size as reported by the Federal Statistical Institute

Municipality	Item	2005	2006	2007	2008	2009
Travnik	Population	55,590	55,195	55,217	55,093	55,000
	Growth %	-	-0.71	0.04	-0.22	-0.17
Novi Travnik	Population	24,753	24,826	24,840	24,834	24,859
	Growth %	-	0.29	0.06	-0.02	0.10
Vitez	Population	24,906	24,982	25,010	25,070	25,052
	Growth %	-	0.31	0.11	0.24	-0.07
Busovaca	Population	16,005	16,065	16,114	16,095	16,073

[1] Elaborate of Babina rijeka water source protection, Hydro-Engineering Institute Sarajevo, 2002

Municipality	Item	2005	2006	2007	2008	2009
	Growth %	-	0.37	0.31	-0.12	-0.14
Zenica	Population	127,646	127,307	127,334	127,113	127,105
	Growth %	-	-0.27	0.02	-0.17	-0.01
Total for the region	Population	248,900	248,375	248,515	248,205	248,089
	Growth %	-	-0.21	0.06	-0.12	-0.05
FB&H	Population	2,328,000	2,325,000	2,328,359	2,327,195	2,327,318
	Growth %	-	-0.13%	0.14%	-0.05	0.01

Ethnic mix

The overall estimate of national structure of population that will be connected to Plava Voda regional water supply system is given in the table below. Data demonstrate that the social impact of the Plava Voda project will be very positive as the supplies will also be extended into the rural irrespective of ethnic mix. In fact, there was no indication of bias or discrimination in the process of selection of settlements to be connected to Plava Voda.

Overall assessment of Population Structure

Municipality	Population	Ethnic mix				Total
		Bosniaks	Croats	Serbs	Others	
Travnik	Total population estimate (2003)	46491	4115	482	*	51369
	Population to be connected to Plava voda	5911	9352	181	215	15659
Novi Travnik	Total population estimate (2003)	11426	12584	1153	*	25198
	Population to be connected to Plava voda	4.819	12749			17568
Vitez	Total population estimate (2003)	11700	8427	734	*	21354
	Population to be connected to Plava voda	3053	1014	8	292	4367
Busovaca	Total population estimate (2003)	760**	10421	260	*	11451
	Population to be connected to Plava voda	3392	4002	1019		8413
Zenica	Total population estimate (2003)	99776	17277	12685	*	133861
	Population to be connected to Plava voda	43845	4033	2391	151	50420
TOTAL population per ethnic groups to be connected to Plava voda		126582.8	83974	3599	658	

* Available population estimates did not include estimate of other ethnic groups such as Roma people.
** Number of Bosniaks in Busovaca should be taken with reserve because total population estimate in 2006 is significantly higher and amounts to 17.545. However, no data on ethnic mix is available for 2006.

Household size

Latest estimates on the household size in Travnik municipality are 3.91, Novi Travnik 4, Vitez 3.6, Busovaca 3.7 and Zenica 3.22 members.

Employment and Wages

The trends in the structure of employment by cantons show the dominance of manufacturing activities. As a result of karstic nature of soils, agriculture activities account for a very modest proportion of employment.

In an average middle income economy, labour participation ratio is usually around 30 and employment rates amongst economically active population are between 50% and 60%. The statistics summarised above show the labour participation ratio and employment rate to be about half of an average middle income economy. Unofficial estimates have indicated that estimates of household incomes should be at least increased by a half to take account of the non-monetary contributions, remittances, and earnings from the shadow economy. Iit is assumed that there are 1.5 wage earners per household.

	Travnik	Novi Travnik	Vitez	Busovaca	Zenica
Total population	55.000	24.859	25.052	16.073	127.105
Total employed	11.207	2.476	4.939	1.569	26.043
Labour participation ratio	20.4	10	19.7	9.8	20.5
Economically active population (15-64 years)	37.479	16.818	16.563	10.372	85.709
Employment rate	30%	15%	30%	15%	30%
Average monthly wages KM	644	677	570	696	737

Source: Federal Institute of Statistics

Consumers affordability

Percentage of monthly water and wastewater bill based on average net income of the households is different for each municipality and ranges from 2.2% for Novi Travnik to 3.0% for Travnik. On the basis normally adopted international criteria for affordability, the households should not have to spend more than 4% to 5% of the monthly disposable income on water and wastewater services. This indicates that current services appear to be within the affordability boundaries.

Public Health

Some waterborne diseases are observed in the concerned municipalities including Enterocolitis, Hepatitis A, Dysentery Bacilaris but the number is not considered significant.

Affected Persons and Groups

The regions that are of concern for this project have no specific cultural characteristics that distinguish them from the rest of the region of the B&H. No indigenous population live in this region and similarly, no resettlement of the local population is envisaged in the phase of the project construction.

Groups that may be directly affected by the project in the pre-construction phase are owners of the land who will be subject of complete or incomplete expropriation. Some of the landowners will also be affected in the operational phase, as the construction of buildings on their plots will be forbidden in the pipeline right-of-way. The Census carried out in June 2011 revealed that a total of 230 private land plots will be affected by the Project, of which there are:

- 10 affected businesses,
- 66 households (with 158 household members in total),
- 126 private land plots with no structures.

The Socio-economic Survey showed that there are 10 businesses (all legally registered) with total of 153 employees mainly located in Lašva valley (e.g. along the main pipeline and the branches).

The affected population consists mostly of Croats (75%), followed by Bosniaks (23%) and Serbs. Pension are the primary source of income for 65% of households; salaries are the source of income for 33% of households, and other sources for 2% of households. 31% of all surveyed households reported having difficulties in meeting the basic living needs.. The majority (88%) of the affected population grow fruit or vegetables on the affected plots for their own needs.

The analysis has also shown that the project in its operational phase might also directly affect the following people: citizens of Travnik and tourists coming to the area due to the amenity value of “Plava Voda”; owners of restaurants on Plava Voda in Travnik who benefit from visitors to “Plava voda”, as well as, fisherman associations that catch fish on the Lašva river and can be affected by decrease of fish population, if any.

Vulnerable groups that may be affected by the project were identified during the collection of the data for the Census report. These comprised people with chronic diseases, physical disability and elderly persons. The biggest concern were those below the poverty line who may not be able to afford to pay for any potential increases in tariffs. Identified social categories that live below the poverty line are: recipients of the social welfare benefits (disabled persons, war veterans, displaced persons, children receiving child allowance), recipients of pension, and Roma people. However, it is not necessary that tariffs would be necessarily increased as a consequence of operating cost savings that are likely to be made by the operating utilities.

5 DESCRIPTION OF THE ENVIRONMENT

Climate. Project area of Regional system Plava Voda is under the influence of moderate continental climate with strong influence of mountain climate in the high sea areas. In general, the climate of this area is favourable, with medium humidity, moderate temperatures, and significant sunshine without strong stormy winds and basically it is favourable for various human activities, urbanization, agriculture, tourism, sport and recreation, etc.

Geology. In chronostratigraphic terms, the researched area of the "Plava Voda" regional water supply system, is a very complex area, both structurally and tectonically. The oldest formations (Sillurian-Devonian), that build the researched area, have been identified on the right side of the Lašva River valley, southeast from Novi Travnik. In spatial terms, their presence is large, while in lithostratigraphic terms, they belong to the complex of metamorphites, built of chlorite-muscovite, quartz-sericite and sericite schist, meta-sandstones and greywacke. Only in some places the dolomites, quartz-graphite and tremolithic schist may also be found.

Hydrological data and quality of surface waters. In the area of interest for this project three major water courses can be found: the Lašva River, Plava Voda spring and the Bosna River.

"Plava Voda" is a specific karst spring, with typical karst basin and is most probably the overflow type of water source. Its overall minimum capacity of 20-year return period is determined to be 700 l/s. Due to the scarcity of data available, the environmental flow of Plava Voda was defined on the basis of correlation between the environmental flow and minimum flow of 20-year return period of the Lašva River as 926 l/s.

Lašva River basin is mainly located on the territory of municipalities: Travnik, Novi Travnik, Vitez and Busovaca. Using the hydrological analysis of the Merdani gauging station for the period of thirty years (1959-1988), mean discharge was defined as 16.5 m^3/s. Lašva River is classified as river of mainly II and III category[2] but its quality do not meet the requirements of the II class watercourse. The results show slight increase in the concentration of nutrients, nitrates and nitrites, as well as oxygen saturation and consumption of KMnO4. It is also observed that Plava Voda with its significant flow dilutes pollutants in the Lašva River. The environmental flow of the Lašva River at Merdani gauging station is calculated statistically as minimum monthly discharge of 95% probability, according to the valid analysis of the Merdani gauging station, and it amounts to 1.321 m^3/s.

The Bosna River belongs to the Sava River catchment area. The natural length of the Bosna River on the concerned section of the motorway, from the confluence with the Lašva River to the river crossing toward Putovici water tank, amounts to about 3,709.17m. The main hydrologic parameters are: average yearly flow 20.6 m^3/s and average minimum flow 20.6 m^3/s. The Bosna River, along the concerned section, is classified as III category of water. The latest analysis confirm that it mostly satisfy prescribed class while some of the parameters show improvement of the quality.

[2]Classification is done in accordance with the "Regulation on the classification of waters and coastal sea of Yugoslavia within the boundaries of SR B&H" ("Official Gazette SR B&H", No. 19/80), and the Regulation on Classification of Watercourses ("Official Gazette SR B&H", No. 42/67

Flora. The project area is characterized by the following ecosystems: forests, lawns and arable land. Broadleaf-deciduous forests and meadows are present in this region. A typical picture of hilly landscapes is provided by forest communities Sessile Oak and Hornbeam forest with a large number of variations. Azonal types of forest vegetation consisting of Manna Ash and Oriental Hornbeam appear in habitats with a pronounced slope, shallow humus-accumulative soils on the geologic permeable layer. Ecosystems of higrofile forest communities such as willow, walnut and scrubs of purple willow are creating a narrow, often discontinuous belt along the bank of the Lašva and Bosna Rivers. In a large area of the future regional water supply system forest stands are converted into a variety of agricultural areas. These are mostly arable lands, followed by meadows and pastures.

Fauna. Pronounced anthropogenic influence in the project area had a direct impact on retreat of fauna into wild parts of the ecosystem. Plava Voda represents fish spawning site from its source to the confluence with the Lašva river. Salmonid species migrate into Plava Voda where they spawn between 1 October and 1 March. Lašva River is mainly inhabited by salmonid fish species, cyprinid species such and presence of crabs as well. The Bosna River is inhabited by 28 species of fish, mainly cyprinid. The other aquatic fauna here is represented with two-winged insects, well-segmented worms, leeches as typical inhabitants of polluted streams.

Air quality. No data about emissions or air quality exist for municipalities Busovaca, Vitez, Novi Travnik, and Travnik. Based on information on air quality taken from Local Environmental Action Plan, air quality in Zenica Municipality has significantly deteriorated by elevated concentrations SO_2 and dust PM_{10}.

Soil and agricultural land. Total area of agricultural land in Travnik Municipality is 22.774 ha or 43.1% of the total area of municipality. Land is classified in classes from II –VII.

Total agricultural area in Novi Travnik Municipality is 6.330 ha. Agricultural areas of the municipality are classified into land capability classes II-VII.

In the area of Vitez Municipality, in its northern part, total agricultural area is 4642 ha, or 29.5% of the total area of the municipality. Within agricultural areas, in the area of Vitez , there is no land class I, while all other classes may be found

Agricultural land in Busovaca Municipality covers 5246 ha or 33.28% of the territory. The largest part of the territory is covered by forest (62%) while arable land for food production is represented by only 18 %. Land is classified in capability classes from III-VI.

In the area of Zenica Municipality there are no significant areas of highly valuable and protected agricultural land from the viewpoint of agricultural production. The area of concern for this project, in Spatial Plan for Zenica-Doboj Canton, is identified as urban area with a small industrial zone along the Bosna River.

Protected natural areas. No protection natural areas are located on the route of Plava Voda regional water supply system.

Cultural-historical heritage. None of the cultural-historical monuments will be endangered by the construction of regional system. On contrary, a separate Project entitled “Restoration and urban planning of Plava Voda greater area” is initiated in June 2011 that will contribute to preservation and improvement of cultural-historical nucleus of Travnik town.

Infrastructure. Four main infrastructure objects that are planned in the same area as the regional water supply system are gas pipeline Zenica-Travnik, high-speed road Lašva-Donji Vakuf, Bosanski Šamac-Sarajevo railway and highway on corridor Vc. Beside them regional water supply system will cross existing and planned water supply and sewage collection pipes in several places.

Noise. The noise level in the project area is mainly determined by traffic frequency and car speeds, as well as noise associated with urban activities especially in industrial zone of Vitez Municipality.

Mines. The planned route of Plava Voda regional water supply system mostly follows the old railroad and goes through urban areas, and therefore, no land mines are found in the project area.

6 ANALYSIS OF ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS OF PROJECT

A. Environmental Impacts

Stability of the terrain. Unstable terrains can be found in the alluvium of the Bosna River as well as on the slopes toward the Putovici water tank in Zenica Municipality. In such terrains, construction works should be carried out in shorter intervals in order to avoid soil disturbances and surface runoff, which can also have wider negative impacts on water quality and workers' safety.

Water quality. The rivers crossings and construction works on both sides of the river or on the water intake structure at "Plava Voda" source can cause negative impacts such as increased turbidity and organic and suspended solids load. Pollution of the watercourses can also be caused by improper disposal of solid waste and waste fluids as well as excavation material. The above mentioned impacts are all of temporary nature, can be minimised by mitigation measures and are reversible after the construction works are finalised. The project will not deplete groundwater supplies or significantly disturb groundwater recharge. No contamination of the ground water is expected. The route will pass nearby Kremenik spring but the works will not be performed in the recharge zone as the catchment area is on the right bank of the Lašva River.

Calculated reduction in dilution effect in the river Lašva will range from 11% during the spring period with high water flows and up to 25% during the dry summer period. Comparing the pollutants concentrations upstream and downstream from the confluence point it can be concluded that even in cases of dilution effect complete absence, the quality of Lašva River downstream from the confluence point would not significantly worsen compared to the upstream quality. It is expected that the dilution effect will be preserved throughout the year, as the probability of occurrence of low waters at Lašva River and "Plava Voda" stream at the same time is very low.

Impacts on flora and fauna. The impacts on flora and fauna in the phase of construction are assessed as insignificant. Water supply system route mainly passes tertiary types of ecosystems. The branches leading to Kula, Hrastova glavica, and Gradina water tanks will pass through the forest area but this impact was not considered to be significant and will not cause habitat loss or fragment forest

ecosystems. Crossing of the Bosna River will have minimum negative impacts on the river ecosystems that are likely to occur due to the presence of machines and workers on the site. Other river crossings will be excavated by open-cut trenching method preferably during dry period. All impacts caused by construction work are of temporary and reversible nature and can be mitigated by appropriate good working practices.

Impact on "*Plava Voda"*, downstream from the intake in the exploitation phase reflects through possible reduction on spawn rate and quantity of salmonids that migrate to Plava Voda to spawn between October and March and can be stressed in case that the environmental conditions in "Plava Voda" change. The table below gives observed flows at "Plava Voda" in the spawning period as well as calculation of remaining flows after the extraction of maximum demands for regional water supply system.

Parameters	Average	Autumn	Winter	Spring
Observed flow in "Plava Voda" downstream from the intake (m^3/s)	2.33	2.03	1.90	3.01
"Plava Voda" floes after abstraction for regional water supply 550 l/s (m^3/s)	1.78	1.48	1.35	2.46

Bearing in mind that the calculated environmental flow for "Plava Voda" downstream from the intake is 0.926 m^3/s, it may be assumed that most of the time the environmental flow will not be endangered and will be sufficient to maintain natural balance and ecosystems in "Plava Voda" waters. Once in 20 years when minimum capacities of 20-year return period might occur at "Plava Voda", the impact may be significant on ecosystem and specifically fish population causing reduction of offspring. Such impact will be of temporary nature and with implementation of mitigation measures can be mitigated and reversed.

Based on similar calculations for *Lašva River* downstream for the confluence point after extraction from "Plava Voda" it is determined that most of the time the environmental flow will not be endangered and will be enough to maintain natural balance and ecosystems in Lašva River. Moreover, hydrological study indicates that probability of occurrence of minimum flows at both streams at the same time is very low. Once in 20 years when minimum capacities of 20-year return period might occur at Lašva River, the remaining flow will still greater then calculated environmental flow of 1.321 m^3/s.

Decrease in dilution effect will not be significant and should not have negative impact on fish population. Lack of data on biological monitoring makes it difficult to estimate the possible percentage reduction in fish population on both watercourses with any confidence. Again, if assumed that above assumptions are correct and that environmental flow will be satisfied in all situations, it is expected that environmental conditions in both watercourses will be adequate to support same conditions for spawning. Nevertheless, mitigation measures propose fish planting in case of any possible reduction of fish population.

The impact on ichthyofauna in other municipalities following project implementation phase is assessed to be insignificant.

Impact on air quality. The impact on air quality is expected as a result of construction works. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high quality fuel, etc.

Impact on soil quality. Impacts originating from the presence of machinery, vehicles and workers on site can be mitigated by good working practices. Temporary road networks will be reinstated to the pre-existing conditions upon termination of the construction works. Implementation of mitigation measures such as use of temporary banks, fences and ditches will restrict and limit pollution caused by soil erosion and sediment run-off. Reinstating the land will be carried out above a pipeline once it is welded and buried in the ground. During construction, the correct preservation of topsoil to maintain fertility will be carried out.

Impact on infrastructure. The regional water supply system will cross roads, telecommunication cables, and existing water distribution pipelines at several places along its route. The mitigation measure for this impact would be timely contacting of relevant institutions and obtaining of appropriate approval with conditions for works in the vicinity of underground structures/roads.

According to the present plans of municipalities and their water utility companies, 550 l/s of water from “Plava Voda” will primarily serve to replace water from currently used sources (usually limited for the supply of the city centres) which is either of insufficient quantity to meet the needs over a year (especially in the dry seasons) or of poor quality and requires treatment. It is not expected significant additional volume of water will be used as a result of Plava Voda supplies and consequently no more pressure on sewer system is to be expected in these settlements.

In addition to improvements in the quality and quantity of supplies in the existing urban, Plava Voda supplies will also be used to provide safe water to the inhabitants of the suburbs and/or nearby settlements. However, most of these settlements rely on septic tanks or discharge directly to local water courses and the volume of wastewater discharges will increase.

A project for development of adequate wastewater collection and treatment in smaller municipalities is currently being implemented by an IFI with the support of the EU both in the Federation and the Republika Srpska. It is expected that the development of wastewater infrastructure will gain momentum in the future.

Level of noise. Noise will originate from the construction works themselves, including presence of machines, vehicles and workers on site will be mitigate in order to keep noise at the acceptable level as prescribed by the relevant laws on protection from noise in two cantons.

B. Socio-Economic Impacts

Land Acquisition

230 private plot owners (business, households and individual plots with no owner or structure identified during the Census) will be directly affected by the project in the pre-construction and operational phase. The Project foresees only land acquisition, without resettlement of the households or businesses. Land acquisition will mostly be temporary (“incomplete expropriation”) for the purpose of placement of the main transport pipeline and its branches, even though several cases of permanent land

acquisition ("complete expropriation") are foreseen for the purpose of building permanent structures such as pumping stations and water tanks. Landowners whose land will be expropriated for the purpose of pipeline placement will be permanently impacted as the construction of buildings on their plots will be forbidden in the pipeline right-of-way. Nevertheless they will be no restriction to use the land for agriculture purposes.

According to the Census report, the perceived losses and frequencies of responses are presented in Table:

Perceived Losses and Frequencies

	Most important	Less important	Least important
Loss of livelihood	2	2	5
Property disturbances	26	9	0
Loss of right to build	9	12	6

The responders gave themselves the weight of the perceived losses presented in Table here above. The crucial issue for household owners is the loss of right to construct additional structures and disturbances caused by pipeline construction works. 50% of the respondents stated they had plans to build additional structures on the affected plots in the future.

In addition, the majority of the respondents stated their wish to be informed about the exact route of the water pipeline which will cross their land plot. 90% of the respondents stated they would require cash compensation, while 10% stated they would wish to be connected to the water supply system.

The key issues regarding land acquisition procedure can be summarised as follows:

- No resettlement or physical displacement or people will be required as the alternative project designs were considered to avoid physical displacement as well as tearing down of physical structures. The design team took into consideration all suggestions of municipal representatives proposed after the preliminary meetings with land owners;
- Having in mind that the route of the regional water supply system is partially passing through the privately owned land, it will be necessary to initiate the land expropriation procedure;
- For the purpose of placement of the main transport pipeline and its branches, it is necessary to carry out the **incomplete expropriation** of privately owned parcels that are located within the pipeline route;
- For the purposes of building of permanent structures such as pumping stations and water tanks, it is necessary to carry out complete expropriation of the privately owned parcels positioned in location of planned structures. It is to be noted that municipal representatives suggested locations for permanent structures. The Census Report reveals that no problems are expected with regard to expropriation. However, the EBRD principles from

Environmental and Social Policy should be considered wherever it is possible;

- There is a possibility that it will be necessary to temporarily expropriate the land for purpose of construction of access roads and placement of staff, machines, material, but not longer than one year. For this purpose, mainly public land will be expropriated;
- Considering that the project will be implemented on the territory of two cantons – Central Bosnia and Zenica-Doboj Canton, the Proposal for Determining of Public Interest will be filed to the Government of the Federation of Bosnia and Herzegovina. The Proposal is to be filed by the expropriator – Public Water Utility Company Plava voda. With this Proposal, it is also necessary to file the Expropriation Study, the content of which is prescribed by the Law on Expropriation;
- In the phase of preparation of the Proposal for Expropriation, it is necessary to inform all private owners about planned activities, and try to, by mutual agreement, solve all the issues relating to the value of the compensation for expropriated land.
- After the legal validity of the Decision on Expropriation, the municipal administrative department shall, with no delay, schedule discussion for purpose of reaching an agreement about the compensation for expropriated property. The compensation should be calculated at replacement cost (market value plus any registration, administrative and transfer taxes).
- Consultations with the local community should be carried out concerning loss of public amenities. It is to be noted that one stage of consultations is already carried out in the framework of national EIA/environmental permitting procedure carried out by Federal Ministry of Environment and Tourism in March 2011.
- Considering the EBRD principles, it is necessary to prepare the LRF according to PR 5 in the early phase of the expropriation process.

The exact locations and information regarding land ownership will become more precise in the phase of development of the Expropriation Study. The expropriator should prepare another document apart from the Study, the so called LRF document where the mitigation measures regarding possible impacts will be further elaborated,

Finally, it is the project objective to fully compensate all owners for the loss of their assets and livelihood regardless of their legal ownership over land and assets.

Culture of Travnik

The representatives of local community showed concern related to the reduction of flow rate on visual/ambient effect of Plava Voda stream. This issue will be further investigated and elaborated within the (related) project “The detailed design of river regulation of the Plava Voda from the source to the (river)mouth in Lašva”.

Economic Impacts

10 businesses were identified in the Project area, employing a total of 153 employees. All businesses actively use their land plots for business purposes. The crucial issues for the businesses include loss of customers, disturbance due to construction works, loss of right to build additional structures and loss of income in the course of construction works due to access restrictions. The owners of the restaurants along the

Plava Voda stream and representatives of fisherman associations did not have any objection to the project.

The vulnerable groups are divided in seven categories in the Census report. The frequencies of vulnerability are presented in the following table.

Types and frequencies of vulnerability

Type of vulnerability	Frequency
Physical disability	5
Mental disability	3
Chronic disease	8
All household unemployed	2
Elderly	3
Elderly and single	5
Other	5

Vulnerable groups that may be affected by the project are social categories that live below the poverty line that may not afford to pay for any potential increases in tariffs as a result of connection to Plava Voda regional water supply system. None of the municipalities subsidise water costs for any social categories.

On the other hand, the Plava Voda project will have positive impacts on all inhabitants of municipalities supplied water from Plava Voda system. The system will provide increased quantities of high quality water and more reliable services to the populations of the towns: Novi Travnik, Busovaca and Zenica Municipalities and inhabitants of sub-urban and rural area in all five municipalities.

Impacts on health. No specific negative impacts on health of workers or population are expected as a result of construction and exploitation of regional water supply system. There is potential hazard risk from open trenches in the vicinity of populated areas that should be mitigated by appropriate signalisation and fencing. In the phase of exploitation, only potential risk identified is for workers that operate chlorination station at Plava Voda spring. This risk is to be mitigated by ensuring that workers wear protective clothing while handling chlorine. On the other hand, based on the information on current status of water supply in concerned municipalities, it can be assessed that the project will have positive health impacts on population served by the water from “Plava Voda” regional water supply system.

Impact on public amenities. It is identified that the project will have negative impact on feature that increases attractiveness or value of recreation of “Plava Voda. It seems that based on determined minimum capacities, the current requirement for maximum consumers demand and calculated environmental flow might not be satisfied in all hydrological conditions, and that “Plava Voda” might dry up downstream from the intake in the period of maximum demand. In order to sustain the amenity value mitigation measures related to changes in the stream bed including decrease of bed slope, construction of cascades that will decrease the flow velocity and produce desirable visual effect of flow richness. Additionally special condition in Concession Agreement will be included, requiring from concession users to modify (i.e. lower) the abstracted quantities of water in accordance with hydrological situation in order to

satisfy environmental flow. On the other hand, the project will also have positive impact through increased reliability and quantity of good quality of water supply for hospitals, dormitories, nursing homes, and for future extensions of the water supply system to suburbs and surrounding villages currently without reliable and poor quality water supplies.

7 ENVIRONMENTAL ACTION PLAN (EAP)

Environmental mitigation measures

Phase	Issue	Action to be taken/ Mitigation measure	Comments	Responsibility	Timeframe	Cost
Following Preliminary Design Development	Permits and agreements	Obtain urban permit and environmental permit as well as agreements for construction in the vicinity of ground installations and roads.	Federal Ministry of Physical Planning issues urban permit, Federal Ministry of Environment and Tourism issues preliminary water permit. Other authorizations are to be obtained by relevant governmental authorities and companies (water and sewerage utility companies, BH Telecom, cable TV companies and road directorates).	Public Regional Company Plava Voda	Request are to be submitted following completion of Preliminary Design	2500 €
Following Preliminary Design Development	The detailed design of river regulation of the Plava Voda from the source to the (river)mouth in Lašva	Approval of ToR and carrying out this study according to the agreed ToR.	The detailed design will be carried out to assess the adequacy of the pre-defined flow rate value of 200l/s and to make necessary adjustment to that flow. The detailed design should be verified by an engineering bureau authorised by the relevant Ministry. The design of this section is an extra input for the water approval request, the step required in the water permit obtaining procedure.	Public Regional Company Plava Voda	The estimated implementation costs are to be available together with the detailed design of Plava Voda project. The detailed design to be finished before the tendering procedure.	50.000 €
Pre-construction/ Construction /	Organisation of monitoring	Organisation of continuous monitoring of flow	Public Regional Company Plava Voda should on basis of this report and according to the Water law of FBiH organise	Public Regional Company Plava Voda	Prior to construction works and during construction and operation	5.000 € per year.

Phase	Issue	Action to be taken/ Mitigation measure	Comments	Responsibility	Timeframe	Cost
Operation	activities related to the biological minimum	rates and seasonal monitoring of selected upstream and downstream representative species of the ecosystem.	monitoring program. This mitigation measure aim not only to ensure the minimum ecological flow but to mitigate possible risk raise from future changes in the water flow due to the climate changes.			
Pre-construction	Organization of construction works with least impact on environment	Implement general requirements, measures related to supply and transport of materials, and measures related to organization of construction site, all listed after this table.	Public Regional Company Plava Voda should include these mitigation measures in the Contract for Execution of Works	Contractor	Prior to construction works	Usually, these measures are not implemented at extra cost and are included in construction cost
Construction	Prevention of water, soil and air pollution, impact on flora and fauna, and increased noise level	Implement mitigation measures related to execution of construction works listed after this table.	Public Regional Company Plava Voda should include these mitigation measures in the Contract for Execution of Works	Contractor	During the construction	Usually, these measures are not implemented at extra cost and are included in construction cost
Construction/Operation	EHS training	All workers shall be given ESHS	Public Regional Company Plava Voda should include these mitigation measures in	Contractor/ Plava Voda	During the construction and operation	

Phase	Issue	Action to be taken/ Mitigation measure	Comments	Responsibility	Timeframe	Cost
		training and be informed of their obligations described in this ESAP, as appropriate, as part of a training plan. As a minimum all workers on site must attend an EHS site induction and records of training must be maintained	the Contract for Execution of Works and develop their own training programmes for operation.			
ROW Reinstatement	Prevention of negative impact on habitat deterioration and soil erosion	Implement mitigation measures related to organization of construction site after completion of works, listed after this table.	Public Regional Company Plava Voda should include these mitigation in the Contract for Execution of Works	Contractor	Immediately after competition of works on concerned sections	Should be included in decommissioning costs
Operation	Environmental, Health and Safety Management System	Develop, implement and maintain an Environmental Management System (EHSMS) in line with International good practice.	Implementation of a formal EHS management system at the corporate level will reduce environmental risks and improve overall management.	Public Regional Company Plava Voda with help of Consultants	Prior to putting Regional Water Supply System in use	

Phase	Issue	Action to be taken/ Mitigation measure	Comments	Responsibility	Timeframe	Cost
		Develop corporate EHS management structure. This should include clear designation of responsibilities at every management level and for every site. Develop EHS corporate manual available for all employees.				
Operation	Reduction of losses in water supply network in all concerned municipalities	Develop a Leak Detection Study and reconstruct the network according to recommendations from the study	The project of detection of losses in concerned municipalities has already started. Grant for networks reconstruction is pending development of Studies	Public Regional Company Plava Voda	Prior to putting Regional Water Supply System in use	To be determined by a Leak Detection Study
Operation	Establishing of biological minimum	Develop and implement an adaptive management approach to establish biological	The monitoring results of continues monitoring of flow rates will be used to adjust available/requested rates.	Public Regional Company Plava Voda	After the completion of data series of five years monitoring	1.500 €

Phase	Issue	Action to be taken/ Mitigation measure	Comments	Responsibility	Timeframe	Cost
		minimum flow.				
Operation	Preservation of environmental flow	Include special condition in the Water Buying Contract according to which water buyers (municipal water utilities) should modify (i.e.) lower the abstracted quantity of water.	The variation in abstracted quantity of water will be based on results of the adaptive management approach to establish biological minimum flow.	Public Regional Company Plava Voda	Following full establishment of Public Regional Company Plava Voda	Free of charge
Operation	Preservation of fish species in Lašva River	Fish planting	In case fish loss is observed compensation in form of fish juveniles should be ensured	Public Regional Company Plava Voda in cooperation with fisherman associations	In the years when fish decreased is observed	20,000 €

List of measures related to organisation of construction works with minimum impact on environment:

General requirements

- Contractors shall be obliged to follow practice of good ecologic construction during all construction activities, and to reduce to the minimum the damage caused to vegetation, soil, groundwater, surface water, landscape, as well as disturbance of settlements and local communications.
- Application of environmental protection and mitigation measures as well as monitoring will be implemented in parallel with construction activities. They will start at the time when workers, equipment and/or material are moved to the construction site, and they will end with the termination of construction works, when all workers, equipment and/or material leave the construction site, and when environment in restored to previous condition.
- The contractor has obligation to appoint a Health, Safety and Environment Coordinator who will be responsible to ensure compliance with the laws and objectives of the environmental protection, occupational safety and fire protection.
- Contractor is to ensure order, discipline and professional responsibility of all employees on the construction sites. Work and residence must be restricted exclusively to the zone of construction works and damage to private property, land and crops must be avoided. He is to ensure regular contact with the representatives of local inhabitants (local community council) with purpose of information exchange or in order to find solutions to possible disputes (originating from violation of ownership rights, damage caused during construction works, etc.).
- **Waste Management Plan** with special concern about the hazardous waste is to be made as an inseparable part of the contract

Supply and transport of materials

- While buying construction and rehabilitation material for water tanks, the contractor will choose supplier that operates in accordance with valid environmental permit or other environmental standard recognized in B&H and/or EU.
- Aiming at prevention of dust emissions, the contractor shall transport asphalt, gravel, stone, earth and other material in trucks covered with tarpaulin. Transport of stone and gravel shall be carried out in moist condition. The speed of transport vehicles shall not exceed 30 km/h. The contractor shall avoid unnecessary driving of vehicles.

Organisation of construction site

- Construction should start (if possible) at the time of the year when the advantages of dry soil conditions can be utilized, i.e. when compacting and degradation through use is at minimum level.
- Adequate machines shall be used and/or protection plates that would prevent compaction during soil removal, for example with rails or low pressure pneumatics in locations that indicate possibility of compaction. Adequate procedures for separate removal, handling, storage and replacement of humus and subsoil shall be used.
- The contractor shall establish temporary disposal sites for construction materials, area for rinsing of concrete pumps and mixers, and area for washing of vehicle tyres with adequate cleaning agent. Temporary disposal sites for excavation material (topsoil) shall be reduced to maximum 2 m of height, in order to prevent compaction caused by weight of the soil, and storage time is to be reduced to minimum.
- Contractor shall ensure that all construction equipment has been licensed and approved in accordance with local regulations, and if possible, certified in compliance with the EU standards.
- The contractor shall use modern machines and vehicles that fulfil environmental standards in terms of emission of harmful gases (complete combustion). He also shall use filters for reduction of emissions of soot particles, and fuel with favourable chemical structure (low sulphur content) and efficient/safe decantation.
- The contractor shall use modern machines and vehicles that have enclosed sources of noise (engines, exhaust system). This mainly implies supply of new machines or measures for installation of additional sound insulation, as well as its constant maintenance. In addition, it is recommended that machines should only operate in the period from 07-20 h in all sections of the route whose distance from nearest residential houses is less than 60 m).
- The contractor shall use biodegradable lubricants and gear oils. Maintenance, filling and cleaning of machines must be carried out off the site and outside of the area with surface water.
- Contractor shall specify and follow the control measures for dust generated through handling of equipment and/or during rehabilitation works. Contractor must submit the plan in which the above proposed paths for transport of material have been listed, and he also needs to give statements about proposed method of dust control in places where transport through settlements may not be avoided.
- Develop a project of construction site organization with the appropriate solutions of drainage and treatment of sanitary wastewater as well as storm water from the construction site zone. Receive used water from the construction site by appropriate systems sewage, collect in waterproof tanks and threat in the prescribed manner (whether on-site, or at the remote location), and prior to discharge into the recipient or the city sewage system.
- Contractor shall ensure that machines and vehicles parking places and worker's residence containers are not located inside the forest areas, that they do not impact watercourses and do not affect endangered flora and fauna.
- Contractor shall ensure protection of areas sensitive to erosion with stabilization agents (temporary banks, fences, ditches) and replanting after termination of construction works.

Execution of construction works

- In order not to endanger land stability, in the unstable or conditionally stable terrains, construction works shall be carried out in shorter intervals.
- During earthworks, humus layer shall be deposited in piles no more than 2 m high and be protected from pollution to maintain its fertility.
- In order to reduce negative impacts on the river and river banks to the minimum, activities on construction located in or near the surface water bodies, should be carried out during the low water season, which is most often in the period from July to September. It is recommended to take this into account during preparation of timetable of activities.
- All manipulations with oil and its derivatives in the process of construction and supply of machinery, shall be performed with maximum protection measures to avoid spills. All packaging for oil and other oil derivatives must be collected and carried away on controlled landfill of contractor from where it will be carried away by the authorized municipal enterprise. In the case of accidents, spills of fuel or lubricants in the environment, urgent intervention in accordance with the Procedures for the discharge of fuel and lubricants is required.
- Machines and vehicles shall not be washed in the area of work.
- Wastewater from worker's toilets shall not be discharged on land or in the water streams.
- Waste shall be managed in accordance with Waste Management Plan (details given below).
- Deposition of excavated material and any other solid waste in water bodies shall be forbidden.
- Driving of machines inside the rivers, streams, or on their banks should not be allowed except in situations when that cannot be avoided due to construction of some special structure.
- Bottoms of the river beds shall be protected and shall not be completely blocked during trenching in order to protect the existing water-corridors for unobstructed communication between the original species living at the bottom and those freely swimming. Further natural restoration of existing banks should be ensured through planting of damaged areas with adequate vegetation.
- Contractor shall implement adequate traffic control measures, in accordance with the law, during contract period, and such measures must first be approved by the Supervision Engineer. Traffic safety management measures shall include temporary illumination and adequate signalization during trenching and rehabilitation works.
- Contractor needs to appoint permanent staff that would be engaged on traffic safety issues, and would be responsible for implementation of traffic safety measures and implementation of traffic measures as prescribed by the national laws, which would include: (i) inspection of the condition and position of the equipment for traffic control in use; (ii) design review – part

related to traffic control equipment necessary to provide safe and efficient traffic flow; (iii) correction of all traffic deficiencies where that is applicable; (iv) inspection of work areas, handling of equipment and storage, handling of material and storage related to traffic safety.

- The contractor shall not leave trenches unattended and shall fence and signalize all open trenches to prevent accidents.
- The Contractor shall develop a chance find procedure, which includes a stop work requirement in the event of a cultural heritage chance find.

Organization of construction site after completion of works

- The contractor shall also remove all special objects and sites that are used to support construction including temporary buildings and their foundations, temporary installations (electric power, water, sewage) and equipment (sedimentation tank,) reinstating of temporary roads (especially in the forest area and on private properties) and the working plateaus, removal of fences, signs and notices.
- Contractor shall remove all construction waste.
- All construction areas and other influential areas during construction shall be reinstated depending on future use of land.
- Reinstating activities shall start immediately after the pipe is buried.
- Construction area shall be seeded with species preserved in topsoil and supplemented by adequate material if needed.
- Agricultural areas shall be returned to a state fit for landowners to re-plant their own seed crops.
- Chlorine solution used to disinfect pipeline system shall not be discharged to surface waters. It shall be stored in a tank until dissolution of chorine is obtained and residual chlorine measures maximum 0.5 mg/l.

8 SOCIAL ACTION PLAN

Social impact mitigation measures

Phase	Issue	Vulnerable groups/affected persons	Action to be taken/ Mitigation measure	Responsibility	Cost (€)
Pre-construction	Land acquisition and economic displacement	Private land owners (households and business) as identified by the EBRD Census Report and the Expropriation Study	A Resettlement Action Plan (RAP) and/or Livelihood Restoration Framework (LRF) and Expropriation Study are to be prepared which shall outline the principles for compensation for and mitigation of impacts. . Compensation for the loss of assets is to be provided at replacement cost., Resettlement activities will be implemented with appropriate disclosure of information, consultation and informed participation in line with the RAP or LRF and prepared in accordance with EBRD requirements. Identified vulnerable individuals will be assisted by social workers and legal advisers to represent them and their best interests, if needed. The Public Regional Company is obliged to provide an adequate dissemination of informationa e.g. an opportunity to all stakeholders to express their opinions or concerns and accordingly and timely respond to such demands (according to SEP).	Public Regional Company Plava Voda	Preliminary assessment: 517,367 €
Construction	Working conditions and employment/ Grievance mechanism	Establish and maintain HR Policy, retrenchment policy and worker grievance mechanism compliant with PR 2 requirements.		Public Regional Company Plava Voda Contractor	

Phase	Issue	Vulnerable groups/affected persons	Action to be taken/ Mitigation measure	Responsibility	Cost (€)
		The Contractor will provide a grievance mechanism for workers to raise reasonable workplace concerns and a process for their resolution. This shall be monitored by Company at least quarterly during construction.			
Construction /Operation	Implementation of SEP	All affected groups/persons defined in SEP		Public Regional Company Plava Voda	
Construction Operation	Restrictions on land-use Prohibition of building construction on pipeline right-of-way	Private land owners	Adverse impacts on land-use to be compensated in cash, as defined by the FBiH Expropriation Law. Compensation for occupation of land is determined in the amount and in the manner prescribed by the Law on Expropriation for established lease, i.e. determined to equal the amount of market rent. Also the construction site after completion of works is to be reinstated to the original condition in accordance with good working practices listed under Environmental Mitigation Measures.	Public Regional Company Plava Voda	Estimate not available
Operation	Health impacts	Schools, child day-care centres, hospitals, nursery homes, special care centres, as well as all residents of concerned municipalities especially Novi Travnik and Busovaca	Project will have positive impact on health by providing significant number of public institutions and citizens with high quality water thus no specific mitigation measures are necessary. Prohibit any construction on pipeline right-of-way in order to eliminate possibility of pipe breakage that could lead to transported water pollution.	Public Regional Company Plava Voda	No cost
Operation	Potential increase of water tariffs	Recipients of the social welfare benefits, retired, and Roma people, as well as people who will not be willing to pay	Monitor affordability and implement mechanisms for stakeholder engagement.. Develop a mechanism to alert the responsible organisations once there is a risk of non-affordability.	Public Regional Company Plava Voda	Estimate not available

Phase	Issue	Vulnerable groups/affected persons	Action to be taken/ Mitigation measure	Responsibility	Cost (€)
Operation	Preservation of amenity values	Citizens of Travnik and tourists	Implement project “Restoration and urban planning of Plava Voda greater area” related to reconstruction of cultural historical areas in location of Plava Voda which includes measure to construct cascades, decrease of bed slope to decrease flow velocity downstream from “Plava Voda” spring. Implement other environmental mitigation measures serving to preserve environmental flow.	Public Regional Company Plava Voda	Will be available when ToR gets prepared
Operation	Workers health and safety	Workers of Public Regional Company Plava Voda	Wear protective clothing while handling chlorine	Public Regional Company Plava Voda	500 €
Operation	Hazardous materials	Workers of Public Regional Company Plava Voda	Define operational control procedures and implement a training program for operators who work with chlorine/hazardous materials regarding safe handling practices and emergency response procedures.	Public Regional Company Plava Voda	
Operation	Emergency Response	Public Regional Company Plava Voda and Contractor	Develop and implement Emergency Preparedness and Response Plan/ procedures to deal with emergencies on and off site, major incidents contamination issues and health concerns. The procedures shall include measures of how the public are informed of incidents with a potential public health impact and the requirement for at least one exercise to test the effectiveness of the procedures on an annual basis	Public Regional Company Plava Voda	
	Minimising impacts of Land acquisition and economic displacement	Private land owners (households and business) as identified by the EBRD Census Report and the Expropriation Study	Each affected household and/or business shall be shown the final designs and how their land shall be affected so as to allow for micro re-alignments so as to reduce impacts on future use of land		

9 MONITORING PLAN

Programme of monitoring emissions from construction site

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
Elevated levels of noise that cause disturbance for nearby residents	Noise level	Near the nearby house in affected settlements, especially in Nova Bila, Stara Bila, Kremenik and Krcevine, Katici, Janjici, Putovici, Pribilovici, Hrastova Glavica. Monitoring is to be extended to other settlements in case of complains as well as to any other sites prescribed by environmental permit.	In accordance with YUS U.J6.039	Dynamic of monitoring is to be adjusted to the dynamics of construction - conduct monitoring at the time when the work is performed in specific section. Monitoring is to be performed once in the period of intense works at corresponding sections	100€/ measure ment	Authorised laboratory/ company
Impact on ecosystem in Lašva river	Continuous measurement of flow rate in Plava Voda stream and seasonal measurement of selected species in Lašva	Flow rate in Plava Voda stream is to be continued on the location already used for hydrological measurements within the project. The measurements of the ecosystem according to the rules prescribed in secondary legislation related to the biological monitoring.	Monitoring should be done according to the secondary legislation related to the monitoring of mentioned parameters.	The frequency of monitoring is defined in the secondary legislation related to monitoring of mentioned parameters.	5000 € per year	Authorised company (defined in secondary legislation)

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
Impact on water course downstream from Plava Voda intake up to the convulsion with Lasva river	Turbidity, total suspended matter, mineral oils, dissolved oxygen, temperature, pH, conductivity, nutrient (ammonia, nitrites, nitrates, total N, total P) and hydrobiological analyses of quantity and quality of zoobenthos and phytobenthos	100 m downstream from water intake construction site	Hydro-biological and standard physical-chemical methods used by authorised laboratories	Hydrobiological analyses should be carried out at least once in three months and other analyses at least once a month in the period of construction works	250 €/sample	Authorised laboratory/ company
Pollution of water and land with oils and fats, increase of suspended solids in a watercourse, etc. due to inadequate storage of materials, disposal of waste, construction near or inside the river bed, and the like	Turbidity, total and volatile suspended solids, mineral oils	Upstream and downstream of sections where the works are performed at watercourses of interest (Plava Voda downstream of the intake, Lašva, Bila, Kozica and Bosna rivers) as well as any other site prescribed by environmental permit.	Standard physical and chemical methods used by authorised laboratories	Dynamic of monitoring is to be adjusted to the dynamics of construction - conduct monitoring at the time when the work is performed in specific section. Monitoring is to be performed soon after the beginning of construction in specific section and after a complaint has been submitted	250€/ sample	Authorised laboratory/ company
Pollution from transport and earthworks dust	Control of vehicle coverage during the transport, control of the application of prevention measures to reduce dust-splash	Along the construction zone, especially in residential areas and near agricultural land	Visual monitoring	Daily	N/A	Supervising Engineer for environmental, health and social issues

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
Waste management	Waste type and quantity	Along the construction zone, especially in residential , at agricultural land and in forest areas	Visual and by measurement	Daily		Supervising Engineer for environmental, health and social issues

Monitoring of implementation of environmental management provisions

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
Life cycle is not closed	Possession of valid approvals and permits for operation	For all suppliers of materials used during construction	Inspection of documentation provided by supplier in the selection procedure	During supplier selection procedure	Included in the monthly salary	Supervising Engineer for environmental, health and social issues
Water, air and soil pollution , increased noise levels	Compliance with good working practices from the Contract including supervision of emissions monitoring (compliance with the planned scope of tested parameters, sampling sites, sampling methods and frequency).	At all sections where works are performed	Visual inspection	Daily or unannounced inspection during construction works	Included in the monthly salary	Supervising Engineer for environmental, health and social issues, representative of Public Regional Company Plava Voda.
Waste management	Separate collection, transport, temporary storage and disposal of waste and other aspects defined by the Waste Management Plan.	At all sections where works are performed, especially temporary disposal sites and camps for workers	Visual inspection	Daily or unannounced inspection during construction works	Included in the monthly salary	Supervising Engineer for environmental, health and social issues, representative of Public Regional Company Plava Voda
Traffic regulation	Traffic regulation in accordance with the Agreement obtained from responsible road directorate	At the section along roads and at road crossings	Visual inspection and comparison with the Agreement	Daily monitoring at the time when the work is performed at specific crossing. Monitoring is to start soon after the beginning of construction in	Included in the monthly salary	Supervising Engineer for environmental, health and social issues

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
				specific section and finish when the section is completed.		
Impact on underground infrastructure	Execution of works in accordance with the Agreement obtained from responsible utilities/companies	At the section crossing underground installations	Visual inspection and comparison with the Agreement	Daily monitoring at the time when the work is performed at specific crossing. Monitoring is to start soon after the beginning of construction in specific section and finish when the section is completed.	Included in the monthly salary	Supervising Engineer for environmental, health and social issues
Staff safety during construction	Use of protection equipment, on-site work organization in accordance with regulations on safety at work	At all sections where works are performed	Visual inspection	Unannounced inspections during construction works	Included in the monthly salary	Supervising Engineer for environmental, health and social issues
Public safety	Signalisation, fencing of trenches and construction areas	At all sections where works are performed	Visual inspection	Unannounced inspections during construction works	Included in the monthly salary	Supervising Engineer for environmental, health and social issues
ROW reinstatement	Reinstatement of land and surrounding areas after completion of works in accordance with Reinstatement Plan	At all sections where works are performed	Visual inspection	Unannounced inspections during reinstatement works	Included in the monthly salary	Supervising Engineer for environmental, health and social issues
Preservation of amenity values	Construction of mild slopes and cascades	Downstream from “Plava Voda” water intake	Visual inspection	Prior to putting Regional Water Supply System in use	Included in the monthly salary	Supervising Engineer for environmental, health and social issues

Monitoring of environmental and social conditions after the project is put in use

Potential impact	Which parameters is to be monitored?	Where will the monitoring of parameters are performed?	How will the monitoring be performed?	When will the monitoring be performed?	Cost	Who will monitor?
Decrease in drinking water quality at Plava Voda source	All parameters in accordance with Rulebook on Sanitary Conditions for Drinking Water (Official Gazette of B&H no. 40/10)	At Plava Voda spring and water discharge points intended for human consumption in all supplied municipalities: Travnik (Dolac-15 samples and Nova Bila 15 samples per year), Novi Travnik 15 samples per year, Vitez – 15 samples per year, Busovaca – 15 samples per year and Zenica – 94 samples per year[3]	Using standard methods for analysis	Plava voda spring: at least once per month. Water discharge points: At least once per month in each municipality. The final number of samples per month in each municipality should be determined respecting the total number of samples per year as indicated in column 3 (e.g. Dolac should choose on which months 2 samples should be taken to satisfy total of 15 samples/year).	500 €/sample	Authorised laboratory
Impact on ecosystem and amenity values due to the decrease in environmental flow	Flow in order to regulate abstracted water quality	Upstream and downstream from "Plava Voda" intake[4]	Measurement of flow by available methods	Daily	Included in the monthly salary	Engineer Responsible for managing water intake structure

[3] Number os sample is determined in accordance with Article 6 of Rulebook on Sanitary Conditions for Drinking Water (Official Gazette of B&H, no 40/10)

[4] At the same time, monitoring at Merdani gauging station should be continued by Water Agency for Sava river Watershed Area and data exchanged between two institutions.

Decrease in fish population in the Lašva River	Fish population	Along Lašva river downstream from convulsion with “Plava Voda”	Observation	During fishing season	N/A	Fisherman associations
Decreased affordability to pay for water	Affordability	Tracking data and trends on accounts receivable of municipal water utilities and monitoring of local economic data as proposed in the ESIA	Tracking data and trends	Contnous	Included in the monthly salary of water utility employees	Municipal water utilities in cooperation with Regional Company Plava Voda.

10 AFFORDABILITY ISSUES

The monitoring of affordability should include:

- **Tracking data and trends on accounts receivable** - relatively large receivable balance or a rapidly increasing level of receivables suggests that customers are less able to pay, and similarly, if the balances past due are increasing with age then this would be another indication that overall affordability is diminishing.
- **Monitoring of local economic data** can be used to estimate e.g. the burden of payment for the family by calculating the share of water charges in the income of individual households or groups of households (deciles or quintiles, regions or cities, family types such as social security recipients), i.e. at the household level.
  For any of the tracking methods, it is important to carefully evaluate the information. Because none of this data is precise measure of affordability, a review of the information and any related trends may assist in separating the effects of the utility bills from other possible causes of the observed trends.

  Feasible and achievable institutional covenants. Currently available subsidy schemes in B&H are public budget subsidies for water utilities and cross-subsidies. It would be fair to expect that the currently available subsidy schemes will not be abolished unless the Company and municipalities make decision to introduce economic price for regional water supply based on the preliminary surveys on affordability and willingness to pay. The step forward would be to work on improving cost recovery methods and decrease dependence on subsidies by introduction of adequate accounting system, efficient billing and collection, constantly work on reduction of losses and installation of water meters. The liaison with communities served should be established which will possibly increase willingness to pay. Proposed monitoring program should be immediately put in place in order to enable periodic review of tariff, with possible updating as conditions change.

11 STAKEHOLDER ENGAGEMENT:

The Project intends to ensure precise and timely identification of potential negative environmental and social impacts. In accordance with the Project objectives and for the purpose of informing and engaging stakeholders in the Project, the Pubic regional company Plava Voda is responsible for the preparation and implementation of the Stakeholder Engagement Plan (SEP).

The key issues from the proposed Plan are:

- Toe ensure clear and on-time communication to all interested parties according to the stakeholder engagement program defined in the Plan throughout the entire project cycle and via appropriate media.
- In addition to providing clear and understandable general information to all parties to inform them about on-going and future project activities (e.g. information from the constructor) and its potential impacts
- To provide an opportunity to all stakeholders for conslultations e.g. to express their

opinions or concerns, and accordingly enable the Company to take into account and timely respond to such requests.

- To develop mechanisme for formal request to information
- To develop grievance mechanism, which will be used throughout the entire project cycle.
- To develop monitoring and reporting systems regarding stakeholder engagement

Besides the acitivities mentioned in SEP, the Public Regional Company will be responsible for the following activities:

- Sending monthly information on drinking water quality stapled to water bills,
- Creating the “call centre” that will provide information on work of the Company and its services,
- Setting up the web site with real time data on water quality and status of delivered water, as well as all other relevant information on the work of the Company and quality of services delivered,
- Presence in communities with community based programs, e.g. in schools aimed at water conservation, and alike,
- Formation of user groups and regular consultations, with meaningful participation of community stakeholders for each capital activity related to operation of the Company and delivery of services.

Capacity building programs:

- Regional utility management – new approaches to service delivery (accessibility and affordability of service, quality of product and service, accountability for service, sustainability of services, etc.),
- Pro-poor Water Governance,
- Local economic development,
- Monitoring and assessment of affordability,
- Reduction of unaccounted for water,
- Establishment of liaison with communities including communication methodologies – pro-community orientation.
- Capacity building program for concerned community members, especially members of users group on public engagement processes.

12 ALTERNATIVES

Alternative Sources

The technical and economic justification for using the Plava Voda source for supplying the long term water requirements of the five municipalities is presented in detail in the “Plava Voda Regional Water Supply System Feasibility Report – BCEOM JACOBS 2007. The study examined the all available water sources in the region and concluded that supplies from the Plava Voda source was the only viable alternative available for the five municipalities. While it is always possible to argue that other technical alternatives may exist that have not been fully explored, it would be almost

impossible to demonstrate that these could be economically justifiable or financially sustainable over the long term.

"No project" option. Securing additional water sources to five municipalities will have short and long term positive impact on (i) improving hygiene and health conditions by providing high quality water to their consumers, (ii) bringing relief to the current pressure on existing wells and reduce the waiting period for supply during peak hours or the summer months; (iii) extending water supply without restriction and/or cuts to new connections (surrounding villages, residential buildings under construction, future industrial consumers); (iv) maintaining the economic momentum.

The economic evaluation analysis has demonstrated that in the absence of the project, the conditions in the project areas would be characterised by continuous water shortages, further deterioration in drinking water quality and prevalence of increasing incidence of waterborne diseases. In the long-term, the "no-project" scenario might lead to a social and economic crisis in the area.

Alternative routes. The alternative routes including preferable route of high-speed road Lašva-Donji Vakuf and gas pipeline Zenica-Travnik, and route of the Plava Voda regional water supply system designed in 1991 were used for comparative analysis with the new proposed route from 2009. The following conclusions were made:

- The route of the gas pipeline was assessed as unfavourable, as it does not provide for gravitational water supply from the Plava Voda spring to the "Putovici" water tank.
- Route from 2009 has smaller share of private property than the route from 1991, which is an advantage from the aspect of expropriation process and most probably from the aspect of capital costs of construction of regional water supply system.
- The route of the regional water supply system from 1991 was assessed as unfavourable, especially because of necessary traffic interruptions on the existing M5 trunk road, during construction, and because of the newly constructed buildings along the M5 trunk road, process of expropriation and increased expenses of construction.
- The route of the high-speed road was still not definitely adopted so it has not been considered from the aspect of placing the regional water supply system along it (in its safety zone or outside of it, but parallel to the route of the high-speed road). Every connection to the route of the high-speed road, in terms of following it, was unrealistic and uncertain, as in that case with every change on this route, it would be necessary to change the route of the "Plava Voda" regional water supply system.
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Based on the above, the proposed route from 2009 was selected as most favourable alternative.