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Čapljina Water Supply Environmental and Social Due Diligence

Environmental and Social Review Summary

D'APPOLONIA

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1 INTRODUCTION

The Federation of Bosnia and Herzegovina (BiH) is one of the potential candidate Countries for the European Union and one of the medium-term priorities set in the Council Decision 2008/211/EC of 18 February 2008 on the principles, priorities and conditions contained in the European Partnership with Bosnia and Herzegovina (repealing Decision 2006/55/EC) is to "Implement strategic plans, including investment strategies, and increase investments in environmental infrastructure, with particular emphasis on waste water collection and treatment, drinking water supply and solid waste management".

Bosnia and Herzegovina has therefore undertaken the process of water sector reform, aiming at harmonization of its laws with those in force in the EU.

The Čapljina Water Supply Project is part of the effort directed toward both water supply improvement and drinking water availability to all citizens of BiH. Therefore, International community is helping Čapljina Municipality and BiH in general to achieve the previously mentioned goal.

In particular, the European Bank for Reconstruction and Development (EBRD) is considering a sovereign loan to the Public Utility Company (PUC) Čapljina (the "Company"), who provides municipal services including water and wastewater, solid waste collection/disposal and maintenance of public areas in the municipality of Čapljina, in the south of the Federation of Bosnia and Herzegovina (FB&H). The total estimated project cost of EUR 13.5 million is for water supply network construction to cover suburban parts of the Municipality in the Dubrave plateau in order to connect approximately 1,300 new households (5,000 inhabitants), as well as for the Trebizat area, adding another 500 households. This will be financed by EU grants of EUR 4.5 million, a local budget contribution of EUR 4 million and the EBRD loan of EUR 5 million.

Aiming to procure water supply for the area of Dubrave plateau, the main Project "Dubrave water supply system" was elaborated by the "Institute of Water Management in Mostar" Ltd. in 1998 (IWMM, 1998). According to the mentioned project, the activities related to the construction of the water supply system are divided in four phases, and the EBRD will finance the works under Phase 2. Phase 1 is being completed and some work on Phase 2 is underway, financed by the local budget. Phase 2 includes the following:

- Dubrave plateau - construction of the second phase, out of 4 phases, of the Dubrave plateau water supply system (including pumping stations, reservoirs, transportation and distribution pipelines) to connect about 1,300 new households (around 5,000 people); and
- Trebizat area reconstruction - expansion and integration of water supply systems in villages in the Trebizat area. This investment should also enable connection of up to 500 additional households.

D'Appolonia S.p.A. has been engaged by the EBRD to conduct an Environmental and Social Due Diligence (ESDD) including a detailed review of the Project documentation to assess the Project's compliance with the Banks PRs, with a particular focus on:

- EU compliance,

- social issues and potential impacts on biodiversity and cultural heritage;
- review of E&S management practices of the current construction works;
- assessment of the E&S contractor management practices of the Municipality; and
- corporate E&S review of other activities of the Company.

1.1 SCOPE OF WORK

Scope of this Environmental and Social Review Summary (ESRS) is to provide a concise and overarching stand-alone report presenting the potential environmental, social, health and safety for both the workers and the community, benefits, impacts and risks associated with the project during the construction, operation and maintenance phase.

The assessed environmental impacts of the project will have to be addressed through a number of mitigation measures covering all pertinent aspects of environmental, health and safety issues in line with local legislation and EU standards.

Overall, it has been evaluated that the Project will have mainly positive long-term social and environmental impacts such as a cleaner water environment, minimizing risk to human health, conservation and recovery of aquatic ecosystems to their original condition, or to meet any specific targets.

1.2 REPORT ORGANIZATION

This Report is organized as follows:

- Section 1 presents the project scope and objectives and the report organization;
- Section 2 briefly describes the current reference situation of the PUC Čapljina, summarizes the baseline conditions of the Čapljina water and sewage network and analyses the urban solid waste management;
- Section 3 presents a brief description of the proposed Project;
- Section 4 analyses the potential positive and negative environmental and social impacts associated with the proposed Project; and
- Section 5 outlines the conclusions and provides recommendations and the main mitigation measures to be implemented in accordance with good construction practices.

2 CURRENT SITUATION

Čapljina Municipality currently has about 23,500 inhabitants distributed over an area of 249 km^2. The city of Čapljina, with about 8,000 inhabitants, forms the urban part of the municipality, while the rest of the population lives in small suburban and rural areas. Public utility Company Čapljina manages services of water supply and sewerage in Čapljina and serves approximately 18,500 users.

The area of Dubrave Plateau is situated on the territory of three administrative units of the Herzegovina-Neretva Canton (HNC), namely municipalities of Čapljina and Stolac as well as Mostar city. In this area there are up to 18,000 residents in small settlements and villages. The region is recognized by a substantial capacity for development of agriculture, but the lack of water is identified as a hampering factor for the development and the return of displaced populations. Therefore, the municipality of Čapljina and the HNC, in 1998 financed a study for the water supply system development for the whole area of Dubrave Plateau.

The settlements of Trebižat, Zvirovići and Prćavci are the suburban areas of Čapljina Municipality and are not connected to the central town water supply system; these settlements use local sources, which often offer poor quality water due to turbidity or bacteriological contamination, which make water risky and dangerous to public health. Therefore, the Čapljina Municipality is interested in expanding the existing water supply network managed by the PUC Čapljina and connecting these settlements to it.

2.1 PUBLIC UTILITY COMPANY ČAPLJINA

As already mentioned, the company responsible for management and maintenance of water supply and sewerage systems is the PUC Čapljina, which is entirely owned by the Čapljina Municipality. The main activity of the company is the collection, treatment and distribution of water, but the company is also registered for other services.

PUC Čapljina is therefore responsible for:

- drinking water supply;
- collection and treatment of wastewater;
- water supply and sewage network maintenance;
- municipal waste management;
- maintenance of public areas (green areas); and
- public lighting.

The Company currently employs around 85 employees.

2.2 EXISTING WATER AND SEWAGE NETWORK

2.2.1 Water Supply Network

At the moment, approx. 18,500 inhabitants are included into the water supply system, which is almost 80% of the overall population in the Municipality.

The Čapljina Municipality water supply network consists of two separate main systems:

- Central municipal system; and
- "Dubrave" system.

The Central municipal water supply system is fed by the "Bjelave" aquifer, from two wells – one drilled well through a 20 m deep, and other 8 m deep well reached by digging, both located on the right bank of the Neretva River, immediately upstream of the city of Čapljina. From the first (drilled) well, water is transported by siphon method in central well, after which the water is maintained, chlorinated and distributed to the "Čapljina" water tank. From the Čapljina reservoir, water is conveyed toward south to the settlements of Tasovčići, Gabela, Dračevo, Pribilovci, Sjekose, Svitava, Gabela Polj and Visici through a distribution network including three water tanks, one located in Gabela (operating only when the water consumption is large, during summer months) and the remaining two in Dračevo. The northern part of the Municipality is supplied with the water from the "Čapljina" water tank by means a gravitational pipeline flowing to the settlement of Dretelj, Surmanci and Krucevici.

The "Dubrave" water supply system is currently under construction. Water feeding this system is pumped from the "Bjelave" aquifer trough a 20 m deep well located in the immediate surroundings of the "Bjelave" PS and used in the past as a back-up well for the central system. The water extracted from this well to the newly constructed "Tasovčići" PS for the disinfection process performed using the gas chlorine. From the "Tasovčići" PS, the water is transported through a pressure pipeline to the water tank "Hotanj". From this reservoir, according to the design, water is transported through gravitation pipeline to the junction for the settlement "Šuškovo" in the first phase, and further to the "Domanovići" PS. The construction of the "Domanovići" PS is under way, therefore, this structure is not operating at the moment.

Water supply of "Trebižat" settlement is carried out through two small local systems. The settlement of Donji Trebižat is supplied with water from the Trebižat River, which is collected immediately downstream of the settlement, without any treatment. Two local wells installed 30 years ago are instead used for water supply of Gornji Trebižat:

The Zvirovići settlement is not provided with any water supply system. Water is collected in small water tanks installed next to the houses or supplied by water tank trucks. In the settlement of Prćavci there is a water supply system fed by water from the Studenčica aquifer. This source is heavily polluted, and therefore the water supplied is only used for technical purposes.

PUC "Čapljina" is conducting regular analyses of groundwater quality at the "Bjelave" source and throughout the distribution network. Physical-chemical analyses include determining of turbidity, color, odor, taste, temperature, pH value, $KMnO_4$ consumption, ammonia, nitrates, nitrites and chlorides. Bacteriological analyses include determining of total coliform bacteria of faecal origin, streptococcus, total number of aerobic mesophylic bacteria and Pseudomonas.

Analytical results show that water at the Bjelave source satisfies the conditions defined by regulations in force. Water at the source has no color, odor or taste, it is not turbid or it is occasionally just slightly turbid (up to 1.6 NTU). Electric conductivity is around 450 μS/cm, while the pH ranges from 7.40 to 7.50. The content of organic matter in the water is very low ($KMnO_4$ consumption up to 1.0 mg O_2/l), as well as the content of nitrogen compounds (ammonia to 0.01 mg NH_4^+/l, nitrates to 6.0 mg NO_3^-/l).

Good water quality is also found in the samples taken in the distribution network. The tested samples are mainly within the limit values defined by regulations in force.

The bacteriological analyses show that the water from the source satisfies the regulations in force, as no bacteriological irregularities, concerning the tested parameters, have been registered. Similar results are found in the distribution network.

2.2.2 Wastewater

The development of the wastewater collection system in Čapljina Municipality, as well as in other parts of BiH, did not follow the development of water supply system. Organized wastewater collection system exists only in the area of the Čapljina city, while the suburban and other settlements in the area of the Municipality do not have sewerage systems.

The central sewerage system is a combined type system: the old part of the town has a mixed sewerage system, while the new part of the town has separate system. The overall length of the mixed system is 2.3 km, while the length of the separate system is 19.5 km (17.2 km of this system is for sewage).

No wastewater treatment is being performed in the central municipal system, and the untreated water is directly discharged into the Neretva River and its tributaries. As the sewerage system has still not been unified, the wastewater is discharged through four large outlets.

In the part of Municipality outside of the central town area there is no sewerage system, and wastewater is discharged into the septic tanks or directly into the soil. PUC "Čapljina" provides the septic tank cleaning service, upon costumers' call.

2.3 SOLID WASTE MANAGEMENT

PUC "Čapljina" is responsible for solid waste management in the area of Čapljina. In addition to the area of Čapljina city, the organized waste collection is carried out in the settlements of Gabela, Višići, Dračevo, Gnjilišta, Čeljevo, Klepci, Tasovčići, Dretelj, Grabovine, Gorica, Struge, Gornji (Upper) and Donji (Lower) Trebižat, and Zvirovići.

Waste collection service has been provided since 1950. Collection of waste has been procured throughout individual and communal metallic containers. Total estimated quantity of the collected waste during 2007 amounted to 11.443 tons, from which 11.073 tons of communal waste, 20 tons of waste generating from cleaning of streets and parks and 350 tons of other waste.

The collected waste is disposed of at the municipal disposal site "Ada", located near the urban zone of the city of Čapljina, on the right bank of the Neretva River, downstream of the bridge of Dr. Franjo Tuđman. The municipal waste disposal site "Ada", like the waste collection service, was established in 1950.

The basic characteristics of the waste disposal site "Ada" are the following:

- estimated quantity of diurnal waste disposal: 38 t/day;
- estimated depth of waste layer on the waste disposal site: up to 5 m;
- distance of the waste disposal site from the settled area: 800 m;
- distance from the river: 20-25 m (Neretva River);
- categories of the disposed waste: 96.8% communal waste, 3 % construction waste and 0.2 % of waste generated from the cleaning of streets and parks.

The municipal waste disposal site "Ada" is officially used by the PUC "Čapljina" for waste disposal; however no environmental protection measures are being applied at this site.

In the area of Čapljina Municipality there are numerous illegal waste disposal sites, which are most often located near settlements along the roads, both main roads and local roads, as well as near the water courses. Almost every settlement has at least one illegal waste disposal site.

3 ČAPLJINA WATER SUPPLY PROJECT

The Strategic Plan for Water Supply System Development is based on the long-term solving of consumer water supply on the territory of Čapljina Municipality, and neighbouring municipalities of Mostar and Stolac, in the area of Dubrave Plateau.

At present, approximately 5,000 people on the territory of Čapljina Municipality belonging to the area of Dubrave Plateau and settlements of Trebižat, Zvirovići and Prćavci, are not connected to the water supply system. The central water supply system only supplies town and settlements. Along with the settlements of Čapljina Municipality, in the area of Dubrave Plateau located on territory of Stolac and Mostar Municipalities, there are additional 6,000 people who are not connected to the water supply system.

The water supply system project includes the following three areas (see Figure 3.1):

- Dubrave Plateau;
- Zvirovići, Prćavci and Trebižat; and
- central town system.

For each project area, a brief design summary is presented in the following Sections.

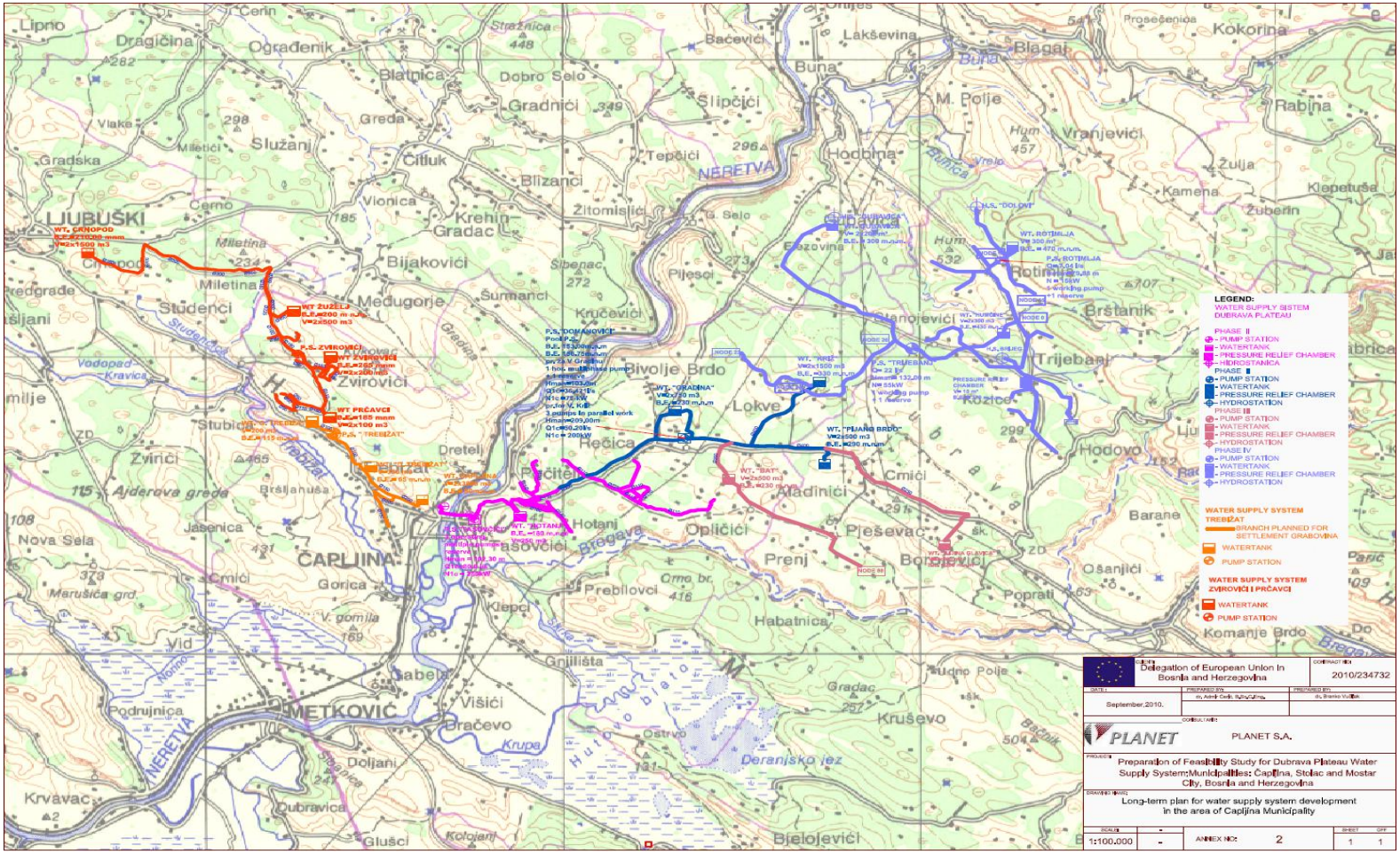

Figure 3.1: Project Location

3.1 DUBRAVE PLATEAU WATER SUPPLY SYSTEM

The construction of Dubrave Plateau water supply system is planned in 4 phases and the EBRD will finance the works under Phase 2.

Phase 1 includes the construction of the following structures and pipelines:

- "Bjelave" PS;
- the pressure pipeline from the "Bjelave" PS to "Tasovčići" PS;
- "Tasovčići" PS;
- pressure pipeline from "Tasovčići" PS – "Hotanj" water tank;
- "Hotanj" water tank; and
- Gravity transit pipeline from "Hotanj" water tank to "Domanovići" PS.

The first phase ensures water supply of the following settlements: Hotanj, Ševaš Njive, Počitelj-Muminovača, Krčevine, Gaj, Gusti Grm, Ćiberovina and Nakovanj-Ivanjuša.

The second phase includes the installation of another well at Bjelave source and another pumping generator unit in the Tasovčići PS. Additionally, the construction of the following pipelines and structures is foreseen:

- gravity transit pipeline from the "Hotanj" water tank to "Domanovići" PS;
- "Domanovići" PS;
- "Gradina", "Križ" and "Pijano Brdo" water tanks;
- pressure pipeline "Domanovići" PS – "Gradina" water tank;
- gravity distribution pipeline from "Gradina" water tank to settlements of Bivolje Brdo I, Lokve Village, Strmac, Hadžiomanovina, Glavica, Vinarija, Rečice, Domanovići, Greda, Krč, Andrunovina;
- pressure pipeline from "Domanovići" PS to "Bat" water tank;
- pressure pipeline from "Domanovići"PS to "Križ" PS;
- gravity transit-distribution pipeline from water tank "Križ" to settlements of Bivolje Brdo II, Kevčići – Strojnice, Doboj Smarlovina; and
- gravity distribution pipeline from "Pijano Brdo"water tank to settlements of Potkosa I and II – Bobanovo Selo (Boban's Village), Brestovača, Šušnjevac and Hadžibegovina).

For the third phase, it is foreseen the installation of the third well at the Bjelave source and of the third pumping generator unit in the "Tasovčići" PS. Afterwards, the planned constructions of pipelines and structures are the following:

- installation of electro-mechanical equipment in "Domanovići" PS;
- construction of water tank "Bat";
- construction of one part of the pipeline from the "Domanovići" PS to the "Bat" water tank;
- construction of "Ilijina Glavica" water tank;
- construction of gravity transit-distribution pipeline to "Ilijina Glavica"water tank; and
- construction of gravity-distribution pipeline from "Ilijina Glavica" water tank to settlements of Brnadi, Japija, Drašje, Sjenokos, Masline, Opeša, Zabrđe, Kremenac, Kućišta, Podglavica, Obradovići, Grivna, Rivine, Plješevac Greda I and II.

Phase 4 includes designing and construction of structures and pipeline, as follows:

- water tanks: "Gubavica", "Humčine", "Rotimlja";
- booster pumps: "Trijebanj", "Rotimlja";
- hydro-stations: "Gubavica", "Brijeg", "Dolovi";
- pressure relief chamber; and
- distribution network for all settlements supplied with water from water tanks: "Rotimlja", "Humčine", "Gubavica".

Within the Dubrave Plateau water supply system Project, the first phase has already been completed, and the second phase of system construction has started. This phase will be implemented in three stages. Until now, the first stage has been implemented, including the construction part of "Domanovići" PS and the construction of gravity transit pipeline of "Hotanj" water tank - "Domanovići" PS. The second and third stages still need to be implemented.

3.2 WATER SUPPLY SYSTEM OF SETTLEMENTS ZVIROVIĆI, PRĆAVCI AND TREBIŽAT

According to the Project design, the water supply of Zvirovići and Prćavci settlements with drinking water is done from the Studenci source, via the "Vakuf" PS and pressure pipeline. The source is located on the territory of neighbouring Ljubuki Municipality.

Water for settlements of Zvirovići and Prćavci is supplied from water tank "Crnopod", which has not been constructed yet, and its design is currently under way.

From the "Crnopod" water tank, water is transported to the water tank "Žuželj". The route of the pipeline from water tank "Crnopod" to water tank "Žuželj" is located along local roads on the territory of Ljubuški Municipality up to the Miletina settlement. From the Miletina settlement to the water tank "Žuželj" (Čapljina Municipality), the route is in one part located along the regional road Međugorje- Čapljina, while the connection to the "Žuželj" water tank has been designed along the slope of the hill with the same name. From the water tank "Žuželj", via the transmission-distribution pipeline, the settlements from Miletine to PS "Zvirovići" are supplied with water (Zvirovići settlement, Zvirovići Industrial Zone, Kapulari, Bitunjani).

In the settlement of Bitunjani, a pumping station "Zvirovići" has been foreseen. From the water tank "Zvirovići", via the return pipeline, the entire area of Zvirovići settlement is being supplied.

Bank will also finance the works foreseeing the expansion and integration of water supply systems in villages in the Trebizat area. For this area, according to the Project design, from water tank Čapljina, water will be transported by gravity pipeline, to the branch for water supply of Grabovina settlement.

From the branch for water supply of Grabovina settlement a gravity pipeline will transport water to water tank "Donji Trebižat".

From the tank "Donji Trebižat", water will be supplied to the inhabitants of the settlement Donji Trebižat. Also, necessary quantities of water will be transported to settlement Gornji Trebižat. From the water tank "Donji Trebižat", water will be transported by means of gravity pipeline to the pump station "Trebižat", which will be further conveyed through the pressure pipeline to the water tank "Gornji Trebižat".

3.3 CENTRAL TOWN SYSTEM

In the forthcoming period, the investments into the central water supply system of Čapljina Town are aimed at the reduction of losses in the system.

In particular, the proposed activities include development of the water supply network register, detection of leaks and their repair, supply of leak detection equipment for the company, optimization of water supply network operation and control of losses by successive application of the information system.

Additionally, this long-term development plan has also foreseen the construction of a new chamber of the existing water tank Čapljina.

4 ENVIRONMENTAL AND HEALTH AND SAFETY IMPACT ANALISYS

The proposed project might have certain influence on the environment, primarily during the construction phase related to the extension of the existing water supply network.

The potential environmental impacts of the proposed project are presented and analyzed in this Section with respect to the following aspects:

- flora and fauna;
- water and groundwater;
- soil;
- air;
- noise;
- solid waste;
- cultural heritage; and
- impacts on people.

4.1 FLORA AND FAUNA

The most significant impacts of the proposed project on flora and fauna are expected during the construction phase, i.e. during the installation of the water pipelines and of other kind of structures (water tanks and pumping stations); while, during the operation and maintenance phases, no significant effect on these particular environmental components is expected.

Excavation of the ground, which will cause violation of flora and fauna on local basis, will be performed during the construction of the structures. Since pipeline route will mostly pass through populated areas and run toward local roads, where the human-altered ecosystem already predominates, no negative impacts on flora and fauna are expected. Thus, in general, all the impacts during the execution of construction works will be temporary, reversible and susceptible to moderation by means of adequate and good working practices, which will be presented in Section 5.

The most important natural heritage in the area of Čapljina Municipality is the protected Nature Park "Hutovo Blato". By the Decision of the Government of Herzegovina-Neretva Canton, Hutovo Blato was in 1995 proclaimed to be the Nature Park, and this status was confirmed by the Law on Nature Protection (Official Gazette of FB&H, no. 33/03). Hutovo Blato occupies an area of 7,411 ha and was placed on the list of specially protected areas in compliance with Barcelona Convention of 1964. International Council for Bird Preservation (ICBP) has placed Hutovo Plato on the list of wetlands of international importance (Ramsar, 1971), as well as on the preliminary list of protected areas of the Mediterranean (Athens, 1980). In addition, Hutovo Blato is the first location in BiH placed on the list of wetlands of international importance in compliance with the Convention on Wetlands of International Importance, especially as habitats of wetland birds (Ramsar, 1971).

Biological diversity of vegetation pertaining to Hutovo Blato is extremely valuable, thanks to the vicinity of Adriatic Sea and the abundance of water surrounded by karstic mountain terrain. The overall number of vascular plants amounts to 28. Fauna of Hutovo Blato is characterized with unique diversity of species with representatives from filogenetic groups of birds, fishes, amphibians, reptiles and mammals.

The proposed project area does not overlap the area which belongs to the Nature Park, hence there are no direct impacts on this protected area.

Furthermore, mitigation measures ought to be applied in the areas of concern during the construction of water supply system components, since there is the possibility of mutual hydrologic connections of certain areas, i.e. the Dubrave Plateau with the afore said Nature park.

Because the construction of the structures which would serve as a crossing site over constant water courses of major importance is not foreseen in this project, there will be no direct influence on the water ecosystems.

Mitigation measures defined in Section 5 will significantly minimize temporary impacts on flora and fauna during the construction phase. Thus, impacts of the future project in this specific segment of the environment are considered to be insignificant.

4.2 SOIL

Construction works related to the removal of superficial layer of humus, excavation of the ground, as well to the presence of mechanization units and workers on the construction site will cause appearance of certain negative impacts on soil. Thus, the following impacts were identified:

- mechanical impacts during excavation works;
- amplification of erosion effects by means of wind and water;
- contamination of soil as a result of spills of oil and its derivatives, motor oils and similar waste materials, which originate from the operation of mechanization units and vehicles on the construction site;
- soil contamination resulting from uncontrolled disposal of solid waste on the ground;
- soil contamination resulting from uncontrolled disposal of the wastewater pertaining to the toilets from the construction sites on the ground; and
- soil recovery executed not on time.

Impacts which result from the presence of mechanization units, vehicles and workers on the construction site might be mitigated with good working practice. Finally, it is estimated that with the application of these measures, impacts on land will not be significant.

Execution of the construction works on the terrains with significant inclination might cause erosion of the land and removal of the erosion drift. The implementation of proper mitigation measures would minimize aforesaid impacts on the soil and environment in general.

Top soils re-utilization should be done using the best available procedures and techniques. Before the construction works the top soil should be removed and stored beside the excavation site and properly protected to avoid loss and/or degradation. After the construction works have been completed, the soil should be replaced and pre-construction conditions reinstated.

If fill material is needed (e.g. sand, aggregate, etc.), it should be supplied from licensed quarries and/or licensed subcontractors authorized to use approved quarries.

Top soil and sub soil that is then re-used for reinstatement should be stored at suitable locations that do not result in nuisance to the general public and protected so to preserve its chemo-physical characteristics.

Spare soil (if not contaminated) and other inert waste that needs to be disposed of could be used as cover or as reinstatement material at the local landfill site. In addition, non contaminated subsoil could also be used for the reinstatement of other construction sites.

Thus, impacts on the ground are considered to be negligible, once aforesaid measures would be applied.

4.3 AIR

The Law on Air Protection (Official Gazette of FB&H, no. 33/03) regulates technical conditions, measures for prevention or reduction of the air emissions which are caused by human activities on the on the FB&H territory. Furthermore, the Law implies planning strategy for the air quality protection, special emission sources, cadastre of emissions and air quality.

Certain impact on air quality is expected as a consequence of the construction works. Processes which cause emission of air pollutants are the following:

- construction of access roads on temporary basis;
- transportation of uncovered dusty material;
- earth works;
- exhaust emissions from the machinery and vehicles used; and
- movement of mechanization units and vehicles on the construction site.

Neither significant influence on the local population nor pollutant emission above the values set by legislation in force is expected. Therefore, all impacts related to the air quality are of temporary nature, reversible and precisely located. Furthermore, it is expected that the influences on air quality will be insignificant if certain mitigation measures would be applied such as dust suppression techniques (e.g. soil damping, trucks covering, etc.), regular vehicles maintenance, use of high quality fuels, etc..

Therefore, no negative impacts of the project on air quality are expected during the exploitation period.

4.4 WATER AND GROUNDWATER

Since the planned pipeline routing passes either beside or over smaller water courses on several different points, the reduction in surface and groundwater quality during execution of construction works might occur in the project area.

Identified impacts are mostly related to the following features:

- enhanced erosion and precipitation caused by the execution of ground works, which might affect the stability of the water course and quality as a consequence;
- contamination of the surface and groundwater as a result of accidental release of substances like fuels, oil and its derivatives, grease and other pollutants pertaining to the mechanization units and vehicles on the construction site;
- reduction of the surface water quality as a result of uncontrolled disposal of excavated material in the river beds; and
- reduction of the surface water quality as a result of solid waste disposal of in the river beds.

Construction of the crossing sites over the water courses will include excavation activities in the river bed, possibly enhancing the erosion and precipitation of suspended materials in the

water body, if the rehabilitation of the river course back to the original conditions could not be performed before the wet period of the year. However, the aforesaid impacts are of temporary and reversible nature and mostly arise after the termination of executed works. Hence, mitigation measures proposed in Section 5 will serve not only for the reduction of negative impacts, but also for the restitution of original conditions in the water courses.

4.5 NOISE

Increased noise level is expected during the execution of construction works as a result of presence of people and vehicles and operation of mechanical units.

Since the location of the activities is governed by the need to provide the water supply system for the Municipality it is unavoidable that some noisy works will be undertaken in sensitive residential areas.

Construction works will mostly be executed during the day, but depending on both the type of work and the deadline for termination of the construction works, the execution of some nocturnal activities can not be excluded.

The FB&H and the EU have legislation in force regulating the levels of permissible noise from mobile plant and machinery. These limits shall be respected in the course of any construction activities through the implementation of mitigation measures presented in Section 5, which help to maintain noise level on acceptable level.

During the operational phase, increased noise level is not expected.

4.6 SOLID WASTE

During the construction activities, the following solid materials will likely to be generated either as waste or for temporary storage pending their use for reinstatement:

- topsoil;
- subsurface soil;
- tarmac; and
- concrete.

Top soil and subsoil that is then re-used for reinstatement should be stored at suitable locations that do not result in nuisance to the general public.

Spare soil (if not contaminated) and other inert waste that needs to be disposed of could be used as cover or as reinstatement material at the local landfill site. In addition, non contaminated subsoil could also be used for the reinstatement of other construction sites.

In addition to inert materials, a certain amount of biodegradable waste (e.g. vegetation, tree roots, etc.) will also be a by-product of the project activities. This type of material should be disposed of to the local landfill.

Hazardous wastes associated with the project may include a wide variety of materials such as oil contaminated material, solvents and similar. These materials should be segregated in appropriate, dedicated and sealed containers placed under a roofed and protected area. Furthermore, hazardous waste should be, when feasible, re-used and/or recycled (i.e. recycling of waste oils) or handled and/or disposed of in properly engineered (e.g. lined) landfills by licensed contractors. Non-hazardous waste can be disposed in communal landfills and, if needed, should be previously treated and disposed of according to EU regulations.

The Law on Waste Management (Official Gazette of FB&H, no. 33/03) regulates the following issues:

- all categories of waste with the exception of following categories: radioactive waste, gases released into the atmosphere or waste waters; and
- all kinds of waste management activities, operations and facilities.

The Law is also applicable on:

- waste generated from the resource examination, extraction, treatment and usage of mineral row material as well as quarry functioning;
- liquid waste,
- animal waste and other harmless materials of natural origin which could be used for the agricultural purposes,
- disposal of explosive materials, if the same is not regulated by specific regulation.

The Federal Ministry of Environment and Tourism (FMET) is the competent authority for the Law enforcement.

All provisions of the cited law as well as of EU Regulations requirements and standards on solid waste management will be applied throughout the Project implementation.

4.7 CULTURAL HERITAGE

The water pipeline installation will be carried out in Čapljina Municipality, where a considerable number of buildings of cultural heritage importance is present. Although none of these sites would be directly affected by the project activities, care should be taken to avoid any undue disruption to them during construction. In particular, competent authorities shall be consulted prior to commencement of construction activities. In addition, it is recommended to develop a "Chance Find Procedure" relevant to the excavation phase.

4.8 IMPACTS ON PEOPLE

Potential impacts of the project on the people include the following aspects:

- disturbances caused by the presence of noise, odor and dust;
- traffic and local road network nuisances; and
- health and safety aspects.

4.8.1 Disturbances Caused by the Presence of Noise, Odor and Dust

Local population will withstand certain disturbances which will occur due to the presence of noise, odor, dust and other phenomena which will arise during the construction of facilities. These impacts have been described in the previous sections.

However, aforesaid impacts will occur mainly during construction phase, which has a limited duration, while the same are not expected in the course of the operational phase.

4.8.2 Traffic and Local Road Network Nuisances

The expected impacts on the traffic can be generated by the transport of:

- new pipes;
- excavated and backfilling material (sand, asphalt, etc.); and
- new mechanical and electrical equipment and construction material of pumping stations.

Additionally, the construction of the water supply system will require the complete closure of specific street sections to both vehicles and pedestrians. This measure is likely to give rise to significant problems and disturbance to local residents and businesses and will have an impact not only on the street under construction, but also on the inhabited areas as a whole (e.g. traffic overload of adjacent streets, re-routing of traffic, etc.). In order to minimise these disruptions, the phasing of the project and the traffic management needs to be carefully considered in a specific Traffic Management Plan so that free flow of vehicles and pedestrians remains possible. Advance notice of any diversion should be given and high visibility signage will be required.

4.8.3 Health and Safety Aspects

Major number of the factors related to the health and safety aspects on the project area will occur during construction works. Related risks are mostly connected with the emissions of pollutants in air, water and on the land. During construction, workers will need to be supplied with the necessary health and safety equipment to prevent accidents.

In addition, the traffic increase during construction activities may represent a risk for local population in residential areas. Truck movement should be carefully planned and discussed with local Authorities and population adequately informed prior to work commencement.

Particular attention should be finally given to public safety by installing safety fences and warning signs at all critical work areas (e.g. open trenches, excavations, material and equipment staging areas, etc.).

5 MITIGATION MEASURES

The implementation of the proposed activities will have long term positive impacts on the overall conditions of the Čapljina Municipality, since, during the operational phase, the population and other consumers will have continuous water supply service of quality drinkable water, which is particularly important for the settlements which do not posses centralized water supply systems at the moment (Zvirovići, Prćavci, Trebižat and settlements on Dubrave plateau). The advantages of the proposed project may be either direct consequences of the project implementation or indirect consequences that arise from new service implementation and can be divided into the following categories:

- economic;
- health;
- environment; and
- ecological.

Direct economic advantages of the project of water supply network extension in the area of Dubrave plateau are improved water supply services and the opening of the short-term jobs, while the indirect economic advantages may include avoiding the costs of construction and maintenance of wells and water tanks in households. Indirect advantage is also the increase of the potential of economic development due to the provision of a fundamental infrastructure for any industrial and/or commercial activity.

Direct health advantage of this project is the improvement of the quality of the water used for drinking purposes, and thus a reduction in disease and a prolongation of life expectancy of the population in the project area. The indirect health advantages here are the reduction of expenditures for medicines and the improved water quality for other civil purposes.

With reference to the advantages related to the environment, the implementation of the project will rationalize groundwater extraction in the Municipality territory, leading to a better use of a fundamental natural resource for the territory and for the conservation of environmental heritages and valuable habitats. The project implementation following EU environmental protection standards will help reducing pollution of rivers and groundwater resources.

As previously mentioned, a direct advantage of ecological type is the improvement of public use of natural resources, leading to indirect advantages like protection of biodiversity, conservation of natural resources and avoidance of the cost of unknown adverse effects.

On the other side, there are a number of short term negative impacts mainly associated to construction activities that need the implementation of mitigating measures. These measures could be classified as:

- mitigation measures before the execution of the construction works;
- mitigation measures during the execution of the construction works; and
- mitigation measures during the operational phase.

As said, the impacts during the operational phase are mainly positive; therefore, in the following Sections, only mitigation measures to be adopted before and during the construction works are presented.

5.1 MITIGATION MEASURES BEFORE THE EXECUTION OF THE CONSTRUCTION WORKS

Mitigation measures to be implemented before the execution of construction works are mainly related to the acquisition of necessary permits and approvals, which include the following:

- environmental permits (usually included in the urban permit) and water permits, which serve to regulate environmental and water protection; and
- approvals from the competent authority and public companies, like the competent utility companies, telecommunication companies, state directorate for the roads, etc..

All technical and other requirements defined in the mentioned permits and approvals must be included in the documentation regarding investment background and technical features of the project, i.e. in the future tender/contract documentation needed for the execution of construction works.

It should be noted that, according to the information provided, all the permits requested by local legislation for this project (i.e. urban and water permits) have been already obtained.

5.2 MITIGATION MEASURES DURING THE EXECUTION OF THE CONSTRUCTION WORKS

Mitigation measures during the execution of the construction works are usually related to a good working practice, which reduces negative influences on the water and land quality and noise level as well. Since the implementation of such measures is direct responsibility of the Contractor, specific requirements for both execution of works and implementation of mitigation measures ought to be included in the tender/contract documentation.

Mitigation measures regarding materials supply and transport include the following:

- construction materials should be supplied by the existing quarries, material storehouses and asphalt plants which operate in accordance with local regulation's requirements; and
- in order to avoid dust emission, trucks should be equipped with suitable covers while transporting asphalt, stone and gravel or other dusty materials as well should be used. Transportation of stone and gravel should be performed ensuring that the materials are sufficiently damped.

The following mitigation measures should be adopted for the construction site:

- use of adequate machinery (e.g. tyred vehicles) and/or protection devices to prevent excessive compaction of the soil at sensitive sites. Furthermore, proper procedures for separate removal, manipulation, storage and exchange of humus and underlying fertile layers should be used, while all the construction materials previously used should be removed;
- installation of temporary disposal sites for the construction material, and an area which would serve for rinsing of concrete pumps and mixers (if used), as well as the area for washing wheels with adequate purification treatment;
- procure licenses and approvals for all the equipment, which should be in accordance with the local legislation and if possible, with EU standards;
- use of modern machinery and vehicles which fulfill environmental standards regarding emission of the gaseous pollutants (more complete combustion), usage of filters which serve for the reduction of soot particles, provision and usage of the fuels with an adequate chemical composition (low content of sulphur);

- use of modern machinery and vehicles, which has isolated noise sources (motors, exhaust system). This predominantly includes either acquisition of new machinery, or implementation of measures which include application of the additional sound isolation systems, as well as continuous maintenance of the same. Besides the implementation of such measures, machinery functioning in time range from 07am to 08pm (especially on all sections of the route which are less than 60 m distant from the settlements and residential areas) is recommended;
- use of biodegradable lubricants and oils for proper functioning of change gears. Furthermore, the maintenance, filling and cleaning of devices will be performed outside construction site in a paved area adequately separated from surface waters. Moreover, all the machinery should be parked in strictly designated areas. Specific protection measures for the prevention of land contamination with oil, crude oil and its derivatives should be undertaken on previously mentioned parking places. In a case of land contamination, due to the accidental oil spills or as a result of some other incident, contaminated layer of the soil should be removed and transported to the designated disposal site;
- the use of dirt, unpaved roads should be minimized;
- used waters from the construction site should be collected by means of either adequate sewage system, or watertight water tanks and should be treated (right on the place or on distant location) before the discharge to the water receptor or to the municipal sewage system;
- every kind of temporary or permanent disposal site of waste materials beside river banks should be strictly prohibited. All the excavated material, which will not be used in construction procedures should be disposed on proper locations;
- only clean material, like gravel without presence of soil particles or any other impurities, should be used for dam construction in the vicinity of the water courses; and
- hinterland areas, which are susceptible to erosion, should be protected with both stabilization agents and plants which serve for the prevention of the same.

During the construction activities, the following mitigation measures should be adopted:

- vehicles operating inside river streams or on the banks of the same should not be allowed, except in the cases where it could not be avoided due to the construction of some particular structures;
- the bottom of the river bed and its inflows should be protected during the execution of construction works in order to preserve existing hydrological corridors for unobstructed communication of the species which originally live on the bottom of the river. Further natural restoration of the existing river banks should be guaranteed by repeated plantation of adequate vegetation in the certain areas;
- traffic control measures should comprise temporary lighting and proper signalling;
- refueling should be performed in proper areas with maximum attention in order to avoid spills. All the wrapping material for crude oils and its derivatives should be collected and disposed of on licensed disposal sites. In case of accidents, i.e. oil and lubricant spills in the environment, adequate emergency response actions (i.e. spill confinement/containment) should be carried out;
- cleaning of the machines and vehicles should not be allowed on the construction site; and

- before the execution of the earthworks, humus and fertile layers of the soil should be removed and stored with adequate protection from the contamination for subsequent reuse.

The Client will establish and implement monitoring procedures to assess the project compliance with environmental and social requirements.

Monthly and weekly progress reports should be prepared by the Supervisor and sent to Municipality/Company HSE management for approval.

In addition, during the construction works, the Contractors will submit quarterly information regarding the progress of works, which will be disclosed on the Municipality website.

The work schedule and its potential amendments will be submitted to the Local Community Offices approximately two weeks prior to the commencement of the construction activities. The schedule will provide information on the timing of commencement and finalization of the works which may impact the affected groups (such as temporary access limitations, noise and dust emissions).

The opportunity to raise grievances shall be provided to the public; contact details for disclosing information or allowing expressing concerns will be presented. The notification will be disclosed on the website, on the bulletin boards, and at LCOs. Details on grievance procedure are reported in the Stakeholders Engagement Plan developed as part of this assignment.

In summary, the Contractor will:

- contact directly all parties in order to provide information on the construction works at least two weeks prior to commencement of works, disclosing the schedule of works;
- quarterly update the information on the progress of works (to be delivered to the Company and Municipality for online disclosure, and affected peoples via mail or personal contact); and
- disclose information on any delays to affected persons.

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