Republic of Macedonia
Municipality Rosoman

PROJECT APPRAISAL DOCUMENT

"Construction of 250m^3 water supply reservoir in the Municipality Rosoman"

World Bank
Municipal Services Improvement Project

Skopje, November 2014

The Project's Appraisal Document was prepared by the Center for Promotion of Sustainable Agricultural Practices and Rural Development – CeProSARD

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TABLE OF CONTENTS

TABLES

Figures

1.

INTRODUCTION

The project envisages construction of a new water reservoir with a capacity of 250m^3 in the Municipality Rosoman. Implementation of this project will provide drinking water for the population in the local communities Rosoman, Manastirec and Ribarci. Water that is presently used in these areas is not potable and can be used only for sanitation. The population that lives in these areas usually buys bottled water for drinking. Therefore, providing water for the population who live in the municipality is considered mandatory and urgent priority for the Mayor and municipal administration.

Presently, the supply of water in the existing reservoir is provided from wells that are located near the river Crna. This water is transported by pumps to the reservoir with capacity of 150m^3 and then through gravity is provided in the existing water supply network to the local communities. With the construction of the newly designed reservoir the consumption of electricity for the pumps will be reduced. In that way, the project has positive impact on the environment, with providing significant energy savings.

The quality drinking water in sufficient quantity will be provided from the source of "Lukar" and the river "Bunarska" from the Municipality Kavadarci. There is already constructed new system with filter station for water supply of the Municipality Kavadarci with the capacity of 30l/s. Municipality Rosoman also participated in this project. At the same time, a new pipeline system called “Rosomanska line” is built as a part of the existing pipeline system and transport the water from Kavadarci to the location where the new reservoir should be built. The water will supply the reservoir in the Municipality Rosoman after purifying it in the filter station in Kavadarci. The projected capacity of the new reservoir of 250m^3 together with the existing reservoir of 150m^3 will provide the planned quantity of clean water for the target population.

The technical documentation for the construction of the new reservoir is approved by CSE "Rosoman", which after the construction activities will operate and maintain the reservoir.

The financial and cost-benefit appraisal showed that the project is desirable for implementation.

Furthermore, it is very difficult to relate the benefits of Projects of this kind with the economic development and poverty levels in a certain municipality in a short-term. However, taking into account that providing safe potable water for all is directly linked with decreasing poverty, the project will definitely have a wide positive impact on the economic growth and the poverty level, not only in a short term but also in the longer term perspective as well.

2.

PROJECT DESCRIPTION

2.1 General Information on the municipality

The Municipality Rosoman is located in the central part of Macedonia, in the lower reaches of the river Crna (the largest right tributary of the river Vardar). Its neighbouring municipalities are municipalities Kavadarci, Negotino and Chaska. The territory of the Municipality Rosoman is mostly located in the plain area, except for small parts that are mountainous.

Rosoman Municipality belongs to a group of smaller municipalities because of the area and the number of people that live on that area. The area of the Municipality Rosoman is 134km^2, according to the statistics from the last Census of population and households conducted in 2002 in the Republic of Macedonia and revised in 2005.

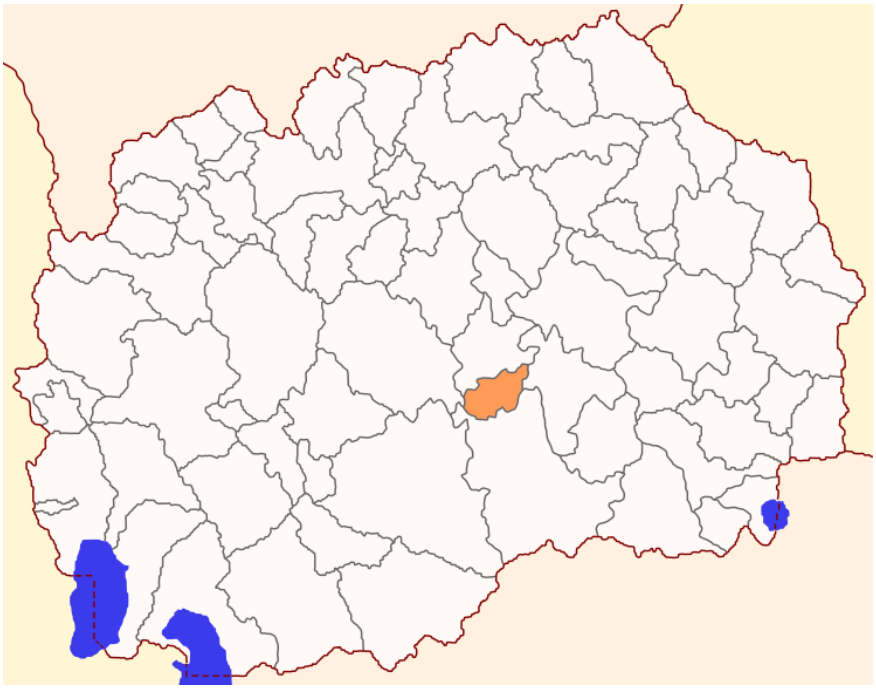

Figure 1: Location of the Municipality Rosoman
Source: State Statistical Office

Throughout the territory of the Municipality Rosoman passes regional road P-106 that connects the Vardar Valley Pelagonia, specifically cities Veles and Prilep. Road P-106 is directly connected to Corridor 10 highway Skopje - Thessaloniki, passing through the territory of the Municipality Rosoman. The significance of this road is crucial for Rosoman Municipality and its future development for the excellent and quick communication that allows this road. In addition, the Municipality Rosoman features built solid network of local roads with a length of 26km. The railway line Skopje-Veles-Gevgelija also passes through the territory of the Municipality Rosoman and branch leading to the industrial plant Feni-Kavadardi, which serves the needs of the industrial capacity. This fact does not diminish the importance of the branch railway line and development opportunities for the Municipality Rosoman offered by railway.

Power supply is provided through 25kV transmission line from Kavadarci 4MB power station that is not enough for the needs of households and industry because of the frequent restrictions on electricity in the Municipality. Power supply can be a critical factor in the planning of the future economic development and that is why this issue is adequately treated in the strategic plan.

In the Municipality Rosoman there are ten local communities: Debriste, Kamen Dol, Krushevica, Manastirec, Mrzen Oraovec, Palikura, Ribarci, Rosoman, Sirkovo and Trstenik. The population density is 31.1 inhabitants per km^2.

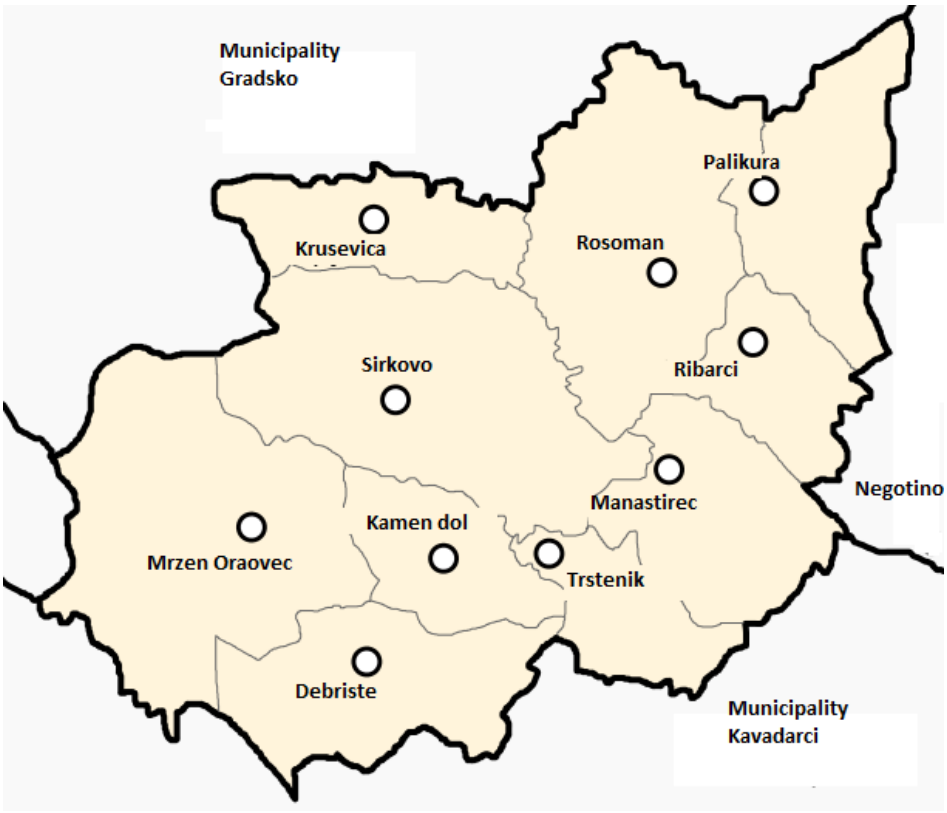

Figure 2: Local communities within the Municipality Rosoman
Source: State Statistical Office

Rosoman Municipality is located in the central part of the Vardar region known for its excellent climate, characterized by a moderate continental climate suitable for growing many fruit and vine crops. July is the hottest month with an average midday temperature of 31.1 Celsius degree. January is the coldest month with an average temperature of -2 Celsius degree. Rosoman has different cold and warm seasons, like cold winters and warm summers. Temperatures drop sharply at night. Winter continues with cold periods, the coldest month is usually January. August is on average the month with most sunny days. Rain and other precipitation have certain specific month in which have their maximum. The annual average wind speed is 2.2m/s.

2.2 Demographic and economic profile

2.2.1 Demographic profile

According to the last revised Census of population and households (2005) the number of inhabitants is 4,141 and 1,284 resident households. From Census the population was decreasing at the rate of 0.2% annually. The ethnic composition of the population is the majority Macedonians (89.2%) and Serbs (9.9%). Other ethnic groups make up less than 1%. There is a larger number of emigrants who leave the municipality compared to the total number of immigrants. Considering infrastructure, there are 5 health and social institutions and only one school. At the municipality operate 117 business subjects, most of which for fruit and vegetable manufacturing. The GDP per capita is calculated on a regional level, since there are no available data on the municipality contribution. Considering the employment, there are 820 employed of the working population with more than 15 years that work in the municipality of who 127 are women, while 792 persons are unemployed. More detail analyses of the macroeconomic indicators of the municipality Rosoman and the Republic of Macedonia are shown in the table below.

Table 1 Main macroeconomic indicators

Macroeconomic indicators	Unit	Municipality Rosoman	Republic of Macedonia
Demography			
Total population	Number	4,141	2,064,032
Natural growth rate	%	-0.2	1.9
Total households	Number	1,284	564,237
Average households members	Number	3.2	3.6
Total dwellings	Number	1,663	698,143
Immigrated residents (within the country)	Number	26	6,475
Emigrated residents (within the country)	Number	31	7,915
Infrastructure			
Local roads	km	40	9,471
Health and social institutions	Number	5	3,315
Water supply and waste management institutions	Number	1	306
Education			
Educational institutions	Number	1	1,025
Children at age 6-14 that attend school in school year 2012/2013	Number	411	195,311
Population literacy at age 10 and more	Number	3,447	1,693,044
Economy			
Active business subjects	Number	117	71,290
GDP per capita	MKD	228,324[1]	223,357
Employment (working population between 15 years and more)			
Total employed	Number	820	460,544
Total employed women	Number	127	174,974
Total unemployed	Number	792	283,132

Source: State Statistical Office, MAKStat database 2013, revised Census of population and households 2005

Contrary to the State Statistical Office, infrastructure data according to the Local Economic Development Plan of the Municipality Rosoman (2013) are updated. In that way, there are two primary schools in the territory of the Municipality Rosoman in the villages Rosoman and Sirikovo, and four district schools in the villages Manastirec, Trstenik, Palikura, Kamen Dol. There are not high schools, but this issue is already considered necessary by the municipality representatives. The opening of the high school will contribute to a better education and increased competitiveness of the labour. The need to build a kindergarten for children in preschool age is quite emphasized that will satisfy the needs of residents and will allow women to find employment.

In the Municipality Rosoman there are five centres for primary care from which four are located in Rosoman, and a clinic for primary health care located in Sirikovo. In Rosoman there are two private dental offices. However, the municipality is geographically small and compact with a solid roads and short distances between villages. Therefore, the provision of primary health care is not a problem of major proportions, except for elderly people identified as vulnerable.

According to the municipal administration, despite the existence of infrastructure, its position in the water supply, sewerage network, as well as in the field of public hygiene and collection of solid waste is very bad. Continuous investments in water supply network for the renewal of infrastructure are necessary. The potable water is not of good quality. The sewerage network was built in all villages. It is necessary to build waste water treatment plant to prevent the discharge of waste water into River Crna and possible pollution of river water and its use for irrigation of crops.

[1] The data show GDP in the Vardar planning region, which includes the municipalities Rosoman, Kavadarci, Negotino, Veles, Lozvo, Gradsko, Demir Kapija, Caska and Sveti Nikole.

An additional problem in terms of environmental protection is presence of illegal solid waste landfills located near the River Crna, schools or homes of the residents of the Municipality Rosoman. Alleviation of this problem requires greater education of the population about environmental protection.

The age distribution and its share of the total population in the Municipality Rosoman and the Republic of Macedonia is shown in the following table.

Table 2 Age repartition

Age repartition	Municipality Rosoman	Share	Republic of Macedonia	Share
	Number		Number	
0	29	0.7	23,133	1.1
1-2	86	2.1	46,267	2.2
3-4	99	2.4	46,716	2.3
5-6	85	2.1	44,844	2.2
7-9	157	3.8	67,790	3.3
10-14	234	5.7	121,033	5.9
15-19	241	5.9	139,531	6.8
20-24	272	6.7	157,352	7.6
25-27	160	3.9	98,525	4.8
28-29	120	2.9	65,833	3.2
30-34	327	8.0	161,602	7.8
35-39	293	7.2	152,914	7.4
40-44	286	7.0	146,373	7.1
45-49	282	6.9	147,435	7.1
50-54	306	7.5	141,479	6.9
55-59	297	7.3	134,495	6.5
60-64	240	5.9	116,906	5.7
65-69	176	4.3	85,217	4.1
70-74	164	4.0	69,620	3.4
75-79	134	3.3	53,915	2.6
80 and more	93	2.3	42,678	2.1
Unknown	1	-	374	-
Total	4,082	100	2,064,032	100

Source: State Statistical Office, MAKStat database 2013

The next table gives an overview of a gender structure in the Municipality Rosoman compared to the Republic of Macedonia. In both samples the male population is bigger than the female population. This difference in the Municipality Rosoman is around 4%.

Table 3 Gender repartition

Gender repartition	Municipality Rosoman		Republic of Macedonia	
	Number	Share	Number	Share
Male	2,127	52.1	1,033,990	50.1
Female	1,955	47.9	1,030,042	49.9
Total	4,082	100	2,064,032	100

Source: State Statistical Office, MAKStat database 2013

Considering that the Municipality Rosoman is a rural municipality and all local communities are rural, there is no urban population and the population repartition is 100% rural. Comparing to the population structure in the Republic of Macedonia, there is 57.8% urban population.

Most of the population in the municipality is Macedonian, 89.2%. From the other minorities there are Serbs with less than 10% and the other minorities with less than 1%. The minority repartition is shown in the table below.

Table 4 Minorities repartition

Minority repartition	Number	Share	Number	Share
Macedonian	3,694	89.2	1,297,981	62.9
Serb	409	9.9	35,939	1.7
Roma	6	0.1	53,879	2.6
Other	32	0.8	676,233	32.8
Total	4,141	100	2,064,032	100

Source: State statistical office, MAKStat database 2013

2.2.2 Economic profile

The total number of people in age of 15 and over (working age population) is 3,378, economically active people are 1,612, of whom 51% are employed, while 49% are still looking for a job. The municipality has 1,766 economically inactive persons.

Table 5 Employment repartition

		Municipality Rosoman		Republic of Macedonia	
		Number	Share	Number	Share
Economically active	All	1,612	47.7	743,676	47.2
	Employed	820	24.3	460,544	29.2
	Unemployed	792	23.4	283,132	18.0
Economically inactive		1,766	52.3	833,325	52.8
Total		3,378	100	1,577,001	100

Source: State Statistical Data, Revised Census of population and households, 2005

The number of unemployed and their percentage in relation to the working-age population needs to be analysed carefully, due to the fact that many residents in the Municipality Rosoman work in agriculture or in individual agriculture households. According to the Local Economic Development Plan of the Municipality Rosoman (2013), 3,170 residents at all ages work on individual farms including all workers engaged in agricultural production whether they are full time or part time employed. Considering the educational level, most of them have completed primary or secondary education or did not finish their education. Additionally, most of the residents work on the individual farms more than 50 hours annually and half of them perform this activity as primary and the other as additional or occasional activity.

The educational structure of the total working-age population is the following: with no educational attainment are 223 people, with incomplete primary education 835 people, 1,123 people have basic education, 1,170 people have completed high school, while with high education are only 27 people. There are not people with Masters and PhDs diplomas, due to the fact this kind of educational structure is not requested by the employers in the industry and services within the municipality. The Municipality faces a shortage of highly-educated people, but unfortunately there are some unemployed with higher education.

In the following table is given a distribution of the economic activities in the municipality considering the number of active business subjects by sectors.

Table 6 Active business subjects by sectors

Sector	Municipality Rosoman		Republic of Macedonia	
	Number	Share	Number	Share
Agriculture, forestry and fishery	30	25.6	2,866	4.0
Mining and quarrying	1	0.9	164	0.2
Manufacturing	4	3.4	7,918	11.1
Electricity, gas, steam and air conditioning supply	-	-	132	0.2
Water supply, sewerage, waste management and remediation activities	1	0.9	306	0.4
Construction	2	1.7	4,322	6.1
Wholesale and retail trade, repair of motor vehicles and motorcycles	41	35.0	25,429	35.7
Transportation and storage	18	15.4	6,095	8.5
Accommodation and food service activities	7	6.0	4,482	6.3
Information and communication	-	-	1,446	2.0
Financial and insurance activities	-	-	390	0.5
Real estate activities	-	-	485	0.7
Professional, scientific and technical activities	2	1.7	5,817	8.2
Administrative and support service activities	-	-	1,514	2.1
Public administration and defence, compulsory social security	1	0.9	258	0.4
Education	1	0.9	1,025	1.4
Human health and social work activities	5	4.3	3,315	4.7
Art, entertainment and recreation	-	-	1,179	1.7
Other service activities	4	3.4	4,147	5.8
Total	117	100	71,290	100

Source: State statistical data, MAKStat database 2013

Rosoman Municipality is predominantly agricultural community. According to the State Statistical Office, the agricultural sector takes more than 25% of all active business subjects. From here, the agricultural sector takes the second place, right after the wholesale and retail trade and before the transportation and storage sector. Municipality Rosoman has 2,185ha available land, of which utilized agricultural land is 2,069ha. Most of this land or 1,667ha is privately owned. The number of individual agricultural holdings in the municipality is 1,444. Their number is expected to increase in the future, due to the subsidies and financial support by the central government.

In the area of utilized agricultural land (2,069ha) dominant are vineyards with 1,037ha, 631ha of orchards and arable land, gardens and kitchen gardens with 351ha. The share of meadows and pastures is insignificant. Since Rosoman Municipality is predominantly a valley community, the livestock breeding is provided at two mountainous local communities (Krushevica and Mrzen-Oraovec), which have around 4,674 sheep. The number of the other livestock is insignificant.

Irrigation of the agricultural land should perform five water communities characterized by low wages and outdated irrigation system. Total irrigated agricultural area is 1,780ha (86% of the utilized agricultural land), including 880ha of vineyards and orchards 624ha. There is branched irrigation infrastructure in the length of 57km^2, of which 20km open channel, 30km closed piping system and 7km grooves. There is a need to renew the old pipe watering system (16km) and to introduce the more sophisticated and rational methods of irrigation, for example “drop by drop” system. However, the introduction of this system requires a large investment in terms of closing the open channel and replacing the old piping system (UNDP, 2008).

Table 7 Agricultural repartition

Agricultural repartition	Unit	Municipality Rosoman	Republic of Macedonia
Individual agricultural holdings	Number	1,444	192,378
Total available land	ha	2,185	321,813
Private property	ha	1,668	222,820
Utilized agricultural land	ha	2,069	264,338
Arable land, gardens and kitchen gardens	ha	351	190,726
Meadows, pastures and nurseries	ha	50	47,034
Vineyards	ha	1,037	17,160
Orchard	ha	631	9,418
Peaches	ha	582	1,039
Plums	ha	17	2,013
Apricots	ha	13	184
Apples	ha	10	4,012
Pears	ha	9	358
Other	ha	-	1,812

Source: State statistical office, Census of Agriculture, 2007

More than 90% of the orchards are sweetened peaches (582ha) with total number of 390,598 trees. Other most common fruits are the plums with 17ha, apricots with 13ha, apples with 10ha and pears with 9ha. Peaches and the number of peach trees in the municipality Rosoman represent more than 55% of the total planted peaches of 1,039ha or 697,900 trees in the Republic of Macedonia.

Therefore, the opportunity for development of fruit grow in the municipality, especially the production of peaches is huge. Municipality Rosoman is recognized by the two dominant crops (peaches and grapes). The vineyards in the Municipality Rosoman are also very important for the future development. The total area of vineyards is 1,037ha and it represents over 6% of total vineyards in the Republic of Macedonia. Most of them are vineyards of wine varieties, while less than 10% of the vineyards of table sorts.

According to the Local Economic Development Plan in the territory of the Municipality Rosoman are registered 128 businesses (mainly small and medium enterprises and sole proprietors), although only some of them are active. Agricultural industry is represented by facilities for processing fruits and vegetables. Most of them, with the capacity to employ hundreds of people, are in the process of restarting. There are five fridges for cooling fruits and vegetables, 4 collection centres that work with seasonal fruits and vegetables. However, the organized agro-stock will allow stable purchase prices of agricultural products and stable sale of the produced quantity. Also, there are a few companies for manufacturing and purchase of grapes, and a winery, which is under construction and except production of wine, will perform purchase of grapes. With the possible construction of agro-stock in the Municipality Rosoman there will be huge development opportunities in the field of fruit growing, especially in organic farming.

Municipality Rosoman has many opportunities to cooperate with other municipalities in the Vardar planning region (Gradsko, Kavadarci, Negotino, Demir Kapija, Chaska and Veles), particularly to develop the joint regional projects that require a regional approach and smart funding.

2.3 General description of the Project

The Project assumes construction of water reservoir with a capacity of 250m^3 in the municipality Rosoman. The goal of the Project is to improve water delivery services in the local communities of Rosoman, Manastirec and Ribarci in the municipality Rosoman, i.e. provide an adequate access to water for the population.

Current situation

The current water supply is from wells' system placed closely on the right side of the River Crna (largest right tributary of the river Vardar) upstream from the bridge. The two wells are with a capacity of 2x15 = 30l/sec.

The water from the wells is pumped and through pressure pipe is led to the reservoir in the local community of Ribarci, which has a capacity of 150m^3. From there onwards, the water from the reservoir flows through gravity

through existing water supply pipeline and is being led to the consumers of the local communities of Rosoman, Manastirec and Ribarci.

The problems that the local communities face with the current solution are the following:

- Water from the wells is not safe according to the analysis of relevant institutions in the country and can only be used for other sanitary needs. Namely, from the tests performed by the Institute for Public Health of the Republic of Macedonia at certain times during the year, nitrites, manganese (Mn) and even arsenic (As) appear in the water known to have high averse environmental and health effects.

- The wells' system is highly inefficient due to the high electricity costs. Namely, the pumps have to work non-stop, which results in high electricity consumption.

- The current reservoir capacity (of 150m^3) is considered ineffective for its purpose as it is small to answer the needs of the population of the local communities of Rosoman, Manastirec and Ribarci and thus, it is necessary to increase.

According to the latest analysis by the Institute for Public Health (IPH) of the Republic of Macedonia, the water from the wells has increased aerobic bacteria in 1ml, coliform bacteria (common for digestive tracts of animals and found in their wastes) as well as presence of bacterium Klebsiella oxytoka (a Gram-negative, rod-shaped bacterium medically known as a cause for colitis and sepsis), which is an indicator for sewage contamination of the water from these wells. Sewage contamination is a large source of waterborne diseases. Infection commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected. In addition, the chemical and physical analyses of water showed increased presence of arsenic, manganese and nitrites. Due to all this, the official expert opinion of the Institute for Public Health is that the water from the wells is not safe for drinking and other uses, as its quality is not in line with positive regulation in Macedonia.

Future situation

In order to provide adequate solution to the above mentioned problems, the Municipality Rosoman decided to implement a project which will involve construction of new water reservoir with 250m^3 capacity, with two wet chambers and a dry chamber.

The new reservoir will be placed right next to the old reservoir. The municipality foresees to replace the current system of using the water from the existing wells' system due to the unsanitary water with using water entirely from the existing water spring 'Lukar' and River 'Bunarska', which are the main water springs supplying the water system in the neighbouring municipality Kavadarci. Water supply for the new reservoir in municipality Rosoman will start from the existing filtering station in Kavadarci where the water from 'Lukar' and river 'Bunarska' will be prepared as potable water. The route (Rosomanska line) from the filtering station in Kavadarci to Rosoman is 12.3km long. Starting from Kavadarci to Rosoman the pipelines are with Ø200mm made from PVC. At the elevation of 263m above the sea level there is a water pressure break chamber. After this chamber the pipelines to Rosoman are made from Ø125mm from PVC. For connecting the water supply pipeline with the new reservoir, the existing connection of the old reservoir as it is nearest to the new one will be used. This means that both the current and the new water reservoir will be filled with potable water from 'Lukar' and River 'Bunarska' ensuring capacity of 400m^3.

It is worth to mention that supplying the existing reservoir of 150m^3 with water from Kavadarci was not possible previously due to the low capacity of the water spring 'Lukar', which capacity was established to be only satisfactory for the water supply needs in the Municipality Kavadarci. However, at the end of 2013 a new water supply system 'Kavadarci-Rosoman' was completed in total amount of Denar 141.5 million or Euro 2.3 million (financed mostly from the national budget and some small contributions from Municipalities Kavadarci and Rosoman) whereby additional 30l/s is ensured for water supply of municipality Rosoman. Given this project, municipality Rosoman has signed a legal mutual agreement with municipality Kavadarci, whereby the municipality Kavadarci has to ensure the quality and quantity of water for the Municipality Rosoman. The location

of the new reservoir will be next to the old reservoir at the elevation of 196m above the sea level and is presented on the following Figure 3 below.

According to the latest water sanitation analysis by the Institute of Public Health of the Republic of Macedonia, unlike the water from the wells, the water coming from 'Lukar' and River 'Bunarska' is recognized as safe and usable for drinking and other sanitation purposes. The water to the reservoirs from the water system in Kavadarci will be supplied through gravity through existing water supply pipeline.

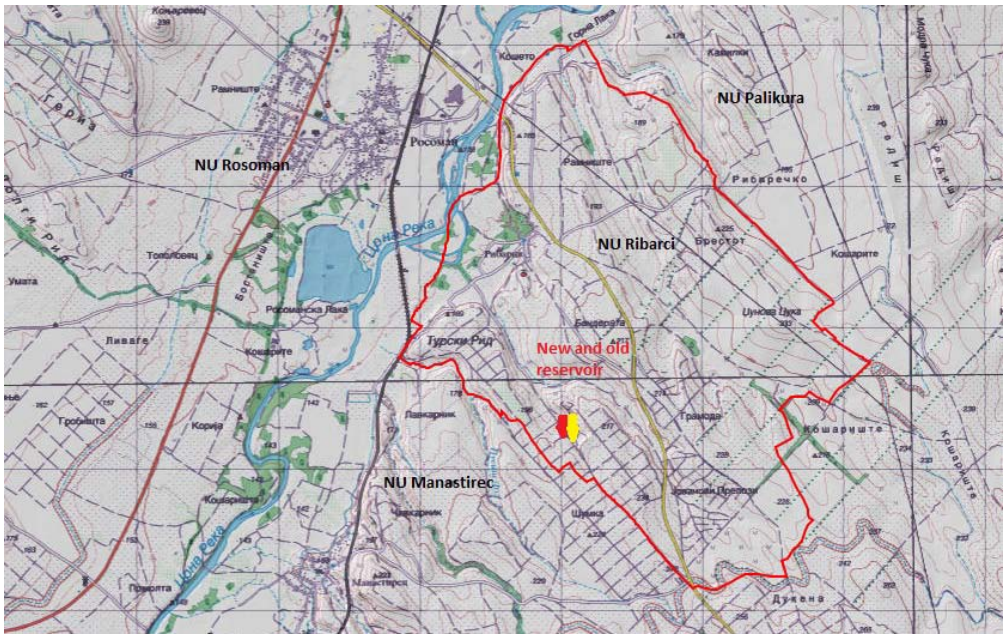

Figure 3 Location of the new and old reservoir
Source: Municipality Rosoman, Agency for Cadastre of the Republic of Macedonia

Strategic goals

In 2008 the Municipality Rosoman with assistance of SNV Netherlands Development Organisation financed project "Millennium Development Based Planning" (implemented by UNDP) and has prepared the Strategic Plan on Local Economic Development. In the process of strategic planning the Municipality identified the following strategic vision: *"Municipality Rosoman is economically developed municipality with complete coverage of transport and utility infrastructure, a Municipality in which the citizens live in a clean environment".* In addition, the following strategic goals were identified:

- Increasing wholesale of agricultural products and increase the quality and quantity of agricultural production;
- Improving the supply of electricity;
- Improving communal infrastructure;
- Rehabilitation of road infrastructure;
- Reducing the level of unemployment;
- Increasing investment and;
- Improving the business conditions for development of family businesses and SMEs.

In reference to third goal, one of the tasks that were identified is ensuring clean and safe potable water for the citizens. Therefore, it can be claimed that this Project envisaged to be financed with MSIP loan meets long run

development municipal objectives. It is part of the 2014 Communal Utilities Programme. According to the information from the municipality, it will be a part of the 2015 Program as well.

3.

SOCIAL IMPACT

3.1 Sociological study

Data collection

The data collection included desk-top review of the relevant documents such as: main project documents, the World Bank Guidelines for assessing the social impact of the project, statistical data about the municipality, municipal documents verifying existing/used citizen participation mechanisms, Local Economic Development Strategy and Law on local self-government.

In addition, face to face semi-structured interviews with key project stakeholders were undertaken with Mayor of Municipality Rosoman, two municipal councillors and the General Director of CSE "Rosoman". One focus group with representatives of ten local communities in the municipality was organized in order to solicit views of various residents. Direct observations during the field visit were used.

Analysis and Findings

The analysis is based on the processed data collected from the various instruments, but also drew upon knowledge from previous experience of the assessor gained during cooperation with the Municipality Rosoman on other projects and initiatives. According to the methodology laid out in the Social Impact part of the project document the research highlights five entry points of social analysis:

- Social diversity and gender;
- Institutions, rules and behaviour;
- Stakeholders;
- Participation and
- Social risk.

3.1.1 Social diversity and gender

Local communities Rosoman, Manastirec and Ribarci comprise around 70% of the total population in the municipality. In ethnic terms the intervention will equally encompass the Serb ethnic minority since this group of citizens is not concentrated in one village but dispersed throughout the villages of the municipality. The settlement of Trstenik is already connected to the Kavadarci pipeline, while the remaining villages do not have the technical disposition to be included in this project. They are at a higher altitude than the reservoir and also on the opposite, mountainous part of the municipality. All interviewed persona stated that since the other local communities have adequate access to water either from natural springs (via pipes) or through water pumps, there is no resistance or tension among the inhabitants in view of the fact that three local communities will be the main beneficiaries of the project. Access to water is considered by all to whom we spoke a basic need and there is solidarity among all citizens for resolving this issue for the citizens living in local communities of Rosoman, Manastirec and Ribarci.

At present, the three local communities where the intervention is planned to be undertaken have access to water through the existing wells' system, however this water is not potable according to the latest analysis from Institute for Public Health of the Republic of Macedonia. The majority of households as well as public institutions such as schools have their own air compressed water tank for access to drinking water. However, this water is not chemically analysed and is not safe for drinking. In addition, citizens regularly buy bottled water for drinking and other uses such as cooking, preparing of food dairy products etc.

Another relevant factor in favour of implementing the project is the occupation of the population in the municipality. Majority of citizens are both formally and informally involved in agricultural production. The main areas of production in the municipality are growing fruits and 90% of the orchards are sweetened peaches while other most common fruits are plums, apricots, apples and pears. Wine growing is also very important for the

future development of the municipality. As a result, the residents of Rosoman spend their days working in the fields, especially in the summer, only to come home and face a lack of quality and quantity of water.

Much of the unpaid family workers in the primary agricultural production are women who also are at the same time mostly responsible for taking care of the home and children. At present most of the women need to bring water from the air compressed water tank located in their yards inside the house in order to perform daily domestic activities such as washing dishes or clothes. As cited by one of the municipal councillors during the interviews *"women will be most thankful for the project"*. The current low pressure of water is a problem for the modern home appliances such as washing machines that can potentially break down causing not only additional work for the women but also increased financial burden for the households for repairs or purchases. A female focus group participant explained how she sits next to the washing machine while in operation, in order to ensure water pressure is enough for it to work. When the pressure lowers she is there to add water from the garden air compressed water tank. Young girls in this rural patriarchal community are brought up with the picture of their mothers burdened with family and agricultural duties in their minds.

It is usually the male members of the family who are responsible for collecting water and take time and effort to buy bottled water, or fill one from small natural springs or public taps, which are also assumed to be not safe for drinking purposes. The majority of households have private air compressed water tank in their yards. Yet, the pump system used at present for the water from the wells to be extracted is costly to maintain for households and local government since it produces high electricity bills for the non-stop running of the pumps. Also, the quality of the water received from the wells is extremely low as according to the national Institute for Public Health analyses, poses risk for all residents.

3.1.2 Institutions, rules and behaviour

Currently the water-supply system is managed by the CSE "Rosoman". It is envisaged that the newly constructed water reservoir of 250m^3 will be included in the existing water-supply system and under supervision of the enterprise. At present there are 12 employees in the public enterprise, which according to the manager, manage to meet the needs of the citizens. Presently owned technical equipment of the company is not enough, yet it is cheaper to use private companies' services for resolving communal problems or to seek assistance from the public enterprise in Kavadarci than to purchase some of the needed machines. There is an initiative submitted to the municipal council by the CSE to raise the price of water, however, the decision has been postponed for the some future council session. It seems that all councillors are reluctant to vote for water price increase given the current situation where health potable water is not available through the water supply network. They all agree that this will further increase the current discomfort and discontent to the citizens in the local communities of Rosoman, Manastirec and Ribarci given the current quality and quantity of water. Both CSE General Director and Mayor argue that there is no economic logic behind the current price of water since the cost for securing the water is higher than the cost the citizens pay. They agree that the current price of the water might be reconsidered upwards after clean water is secured in the system.

Several interviewees pointed out that there are only a few representatives of vulnerable groups that cannot pay for water. These are poor residents, some with disabilities and single parents who are excluded from payment by the public enterprise company and receive the service free of charge. Their consumption is noted by the company but not billed.

The local communities in the past had important role in many rural municipalities for construction and maintenance of water-supply systems. The local communities are now useful as a communication channel for providing relevant information from and to the residents including water access as one of the key issues in the community. All 10 existing local communities have achieved consensus regarding the water-supply question and its resolution in Rosoman Municipality. Only local community Kamen Dol, which consists of 20 households has its own natural water system and takes care of it independently.

Main bodies of the Municipality Rosoman are the Mayor and the Council composed of nine members. The council consists of seven men and two women, both representing the Serb ethnic group. The low number of women in the Council is reflective of the general trend of decrease of women's participation in political life in the country. Participation of women in local councils is 30% following last 2013 local elections. Most of the

councillors come from the biggest local communities in the municipality, Rosoman (seven) with a couple coming from Sirkovo. In terms of political party representation five members are from the ruling VMRO-DPMNE political party, while the remaining four are from different opposition parties. Given the goal of the project, all members support its implementation.

Municipal administration is small and employs six persons of which only one is female. The ethnic composition of the administration is five Macedonians and one Serb. All Local communities' presidents are male.

The problem with water-supply cannot be solved independently by Rosoman since the municipality is connected to the existing Kavadarci water-supply system, which uses water from the Lukar springs. Basically, the three municipalities (Rosoman, Kavadarci and Negotino) are connected to the same system, so it is natural that they cooperate for joint solving of this problem. Currently both Negotino and Rosoman have an agreement with Kavadarci for water distribution. Rosoman pays Kavadarci for the water and Kavadarci is obliged to ensure the quantity of 15l/s.

3.1.3 Stakeholders

All interviewed pointed out that private businesses will benefit from the construction of the new reservoir. It is difficult to encourage private investment (especially foreign) if there is not adequate quality and quantity of water. The type of companies that the municipality is trying to attract would be in the sphere of food processing (fruit processing) such as production of fruit juices for which access to high quality potable and enough quantity of water is crucial. At present some of the bigger businesses such as the tin factory and the milk production plant have their own pumps. With the proposed water reservoir a capacity of 400m^3 of water will be available for investors. Regarding the civic initiatives, there are only 5 officially registered civil society organizations in the municipality Rosoman.

All interviewees and focus group participants without a doubt stated that all citizens will benefit from the project. In the previous years there were regular water shortages in the summer. This year the situation is somewhat better due to the increased rainfall. The CSE Director stated that the citizens regularly complain and demand solution of the water problem from the local authorities.

The approach to apply for a loan for construction of the reservoir was proposed by the Mayor and discussed at a Council session and the councillors unanimously voted for the decision. Some interviewees pointed out that the water issue is so crucial to the citizens that none of the councillors has the will to come in front of the citizens and say that s/he is against the resolution of this problem and against the proposed Project. The main reason for applying for the loan is the fact that the municipality does not have the financial means to resolve it by itself i.e. to provide the full amount at once.

3.1.4 Participation

According to the interviewees the mayor had several meetings with the residents about the water issue. The problem was also discussed at the public activities commission in the municipality and then at the council session.

According to the law, the citizens can participate in municipal council sessions and they can discuss issues with prior announcement. All council sessions are regularly broadcasted on the regional television KTV and there is an announcement board at the entrance to the municipality with all council decisions. The pensioners club is located in the same building as the municipality and has its own announcement board. Meeting with representatives from local communities are used as means for soliciting citizen's problems.

Access to quality potable water has been a major issue for the three municipalities constituting the Tikves region – Kavadarci, Negotino and Rosoman for at least a decade. Over the years citizens have frequently stated their needs for access to quality potable water to all local government authorities have been aware of the problem. Water-supply was the main topic of the inter-municipal forum between Kavadarci and Rosoman, which took place in the fall of 2011 at which around 150 citizens from both municipalities came together to discuss possible solutions. The forum was initiated by the two municipalities, with a decision of both municipal councils that applied jointly for the forum within the Community Forum Program financed by the Swiss Agency for Cooperation

and Development (SDC). In the course of 5 consequent forum sessions held over a period of 5 months, citizens representing different stakeholder groups came up with specific problems on the topic of water-supply and waste-water and proposed solutions. Four project proposals were developed by the citizens:

- Bringing technological water to peripheral parts of the city for watering agricultural land and yards;
- Reconstruction of part of the water-pipe Kavadarci-Rosoman;
- Building awareness – educating population about water savings;
- Replacement of water taps in schools and kindergartens in Kavadarci and Rosoman.

Seventy citizens voted for the reconstruction of part of the water-pipe Kavadarci-Rosoman and both municipalities invested Denar 2,900,000 for this project in addition to the money provided by SDC. As a result the statute of the municipality has been modified to include the forum as a participatory decision-making tool besides other forms of citizen participation declared by law.

According to one of the municipal councillors, Rosoman is a small municipality and the communication with the citizens is direct, taking place in the streets and markets. The council decision was made upon proposal from the local communities of Rosoman, Manastirec and Ribarci. The Mayor holds regular public meetings with citizens in all local communities 3 times a year and hears out their problems. Based on that feedback the budget is drafted and proposed to the Council.

Mayor considers that the citizens are aware of the project since it has been discussed at public meetings, at council sessions and broadcasted on TV, mentioned at meetings with citizens who come to his office daily.

So crucial is the issue of water-supply that residents often find own solution to the problem such as in the village of Debriste they provided their labour as in-kind contribution for constructing their water supply system while the municipality provided them with pipes.

Given the above, it seems that all stakeholders support the implementation of the project given its high impact on their daily lives.

3.1.5 Social risks

All of the interviewees and focus group participants are unanimous that there are no social risks envisaged for the project implementation. The land where the reservoir is planned to be constructed is in the ownership of the state, so no private land needs to be acquired. The project is planned to be completed by next summer at latest, long before the scheduled local elections in 2017, which may bring political leadership changes in the municipality. There is an already signed agreement between the municipalities of Kavadarci and Rosoman about the supply of a quantity of 15l/s of water from Kavadarci to Rosoman.

Residents agree with the view that each service must be charged and an effort must be taken to remove illegal connections because drinking water should only be used for the purposes of the households, not as technical water for irrigation of arable farmland. All interviewees and focus group participants pointed the need for solving the issue of uncontrolled use of water. The low price of water allows people to use the water for cleaning yards, watering gardens burdening the already weak system of water supply.

The current lack of water also brings about certain households from the higher parts of the local communities at specific times of the day not to have water, and when they get water the pressure is lower and does not allow operation of electrical appliances.

3.2 Other fields of considerations

Construction of reservoir in the municipality Rosoman will contribute for the citizens to have chemical and bacteriological clean and safe potable water in their homes. In that way, the present situation of buying bottled water will be overcome and it will contribute to saving the money and growth of revenues in the households. The

increased pressure of water will contribute to safety usage of household's appliances. It will minimize the appliances breakdown, which will save money for maintenance and repair. All of this will improve the living condition, especially of the rural women and will save their time spent on home activities.

3.3 Resettlement issues

When actions are undertaken within development initiatives they may induce physical or economic displacement, which in turn can lead to long-term hardship and impoverishment. For that purpose, appropriate measures need to be carefully considered and carried out within the project development cycle. The current project under assessment in the municipality Rosoman does not impact any resettlement issues because it refers to the construction of a water reservoir on an empty state owned land and does not envisage expropriation or purchase of privately owned property. Water supply for citizens will continue through the existing network of pipes. Citizens will be receiving the water in their current locations. The local communities, which are not directly impacted by the project are scarcely inhabited ranging from 50-200 households and already have access to water.

However, one of the reasons for migration of the citizens from the villages to the big cities is the bed infrastructure and a lack of water, which is the case in the municipality Rosoman. In that way, the implementation of this project will cause better living conditions followed by the expectation of reduced migration.

3.4 Conclusion on the project potential success and recommendations

On 28 July 2010, through Resolution 64/292[2], the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights.

In November 2002, the Committee on Economic, Social and Cultural Rights adopted General Comment No.15 on the right to water. Article I.1 stated that "The human right to water is indispensable for leading a life in human dignity". It is a prerequisite for the realization of other human rights". Comment No.15[3] also defined the right to water as the right of everyone to sufficient, safe, acceptable and physically accessible and affordable water for personal and domestic uses.

The project for constructing new water reservoir in the municipality Rosoman affirms this human rights ideology and adheres to its basic principles. Its aim is to ensure sufficient, safe, acceptable and physically accessible and affordable water for personal and domestic uses.

The main drivers of the change that will bring about prosperity are the municipal authorities (mayors, councillors, public enterprise managers) who have initiated and made the decision for seeking funding from the World Bank financed MSIP. Since the problem has been around for more than a decade it has been publicly declared and discussed on many occasions. The main beneficiaries of the project are the citizens in the three identified local communities whereby the majority (70%) of the municipal population is concentrated. Part of the vulnerable and poor groups identified by the municipality and the public enterprise (disabled and single parents) are allowed water access and not billed, while others (such as users of social benefits) pay their water bills by providing free labour. There needs to be a more economically viable approach for covering these expenses despite the fact that they are not high. Gender balance needs to be incorporated in the strategic approach of the municipality and public communal enterprise towards all development efforts.

High socials risks for carrying out this project cannot be perceived. There are no issues connected with ethnic distribution of population or inter-village rivalry: the action will allow benefits for both Macedonian as well as Serb population, it will cover the majority of citizens in the Municipality and there are no land ownership (expropriations and resettlements) concerns that need to be resolved.

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2 Resolution A/RES/64/292. United Nations General Assembly, July 2010

3 General Comment No. 15. The right to water. UN Committee on Economic, Social and Cultural Rights, November 2002

4.

ENVIRONMENTAL IMPACT

The project envisages construction of a new water reservoir with a capacity of 250m^3 in the municipality Rosoman (located in the central part of the Vardar Region) providing sufficient quantity of drinking water as well better water quality for population in the settlements: Rosoman, Manastirec and Ribarci. The project will directly contribute to minimization of health risks and water borne diseases.

Currently, the water supply network comprises wells system, water supply pressure pipeline and water reservoir with capacity of 150m^3. The two wells are with a capacity of 30l/sec. The water from the wells is pumped and through pressure pipe is led to the reservoir in the local community Ribarci. From this point, the water from the reservoir flows through gravity through existing water supply pipeline and is being led to the water consumers of the settlements Rosoman, Manastirec and Ribarci.

The main current problems that occur during water supply are related to the following:

- The latest water analyses based on samples taken from the well system show non-compliance with the sanitary requirements especially microbiological parameters (presence of coliform group of bacteria due to sewage contamination). Also, the physico-chemical parameters (increased concentrations of arsenic, manganese and nitrites ions in drinking water) are above max. allowed concentrations;
- The low quality of water from the wells has high adverse environmental and health impact on the local population (water borne diseases);
- The official expert opinion is that the water from the wells is not safe for drinking and other use, as its quality is not in compliance with the Rulebook for safety of drinking water (Official Gazette of RM No.46/08);
- The wells system is highly inefficient due to the high electricity consumption and related energy costs;
- Due to the low capacity of the reservoir and lack of water, the pressure in the pipes is low and the water does not reach the households;
- The current reservoir has a capacity of 150m^3 (placed at elevation of 196m above the sea level) and does not satisfy the current needs in terms of water supply of the populations of settlements Rosoman, Manastirec and Ribarci.

In order to overcome these challenges the municipality Rosoman has decided to implement a project which will involve construction of new water reservoir (250m^3), feed both reservoirs in total capacity of 400m^3 with the water coming from well 'Lukar' and river 'Bunarska' filtering through Water purification plant in the municipality Kavadarci.

The new reservoir of 250m^3 is designed with a circular (cylindrical) shape consisting of two wet chambers (for water) and a dry chamber between the two circular wet chambers where all needed pipes, fittings and valves will be placed. Two wet circular (cylindrical) chambers will be with a diameter of D=6.5m and height of H=4.5m.

Implementation of this project will provide drinking water with good quality preventing water borne diseases and will also eliminate the consumption of electricity for the pumps.

4.1. Location of the project

All project activities are located in rural area of the municipality. The regional road R1 107 is passing through the project location. This road connects municipality Rosoman with municipality of Kavadarci. In vicinity of the project are located: agricultural areas, facilities for housing from village Ribarci (550m from project location), river Crna (1.1km), north-west is located village Rosoman (1.7km), west is located national road A1, south-west is village Manastirec (2.5km), north is located village Palikura (3.3km), north-east is village Kurija (4.5km) and south-east is located village Sopot (5.13km). In the wider surrounding of project activities are located City of Kavadarci, industrial plant "FENI Industries", artificial water accumulation "Tikvesko Ezero", City of Negotino and international road E-75. Location of the project is shown in Figure 4.

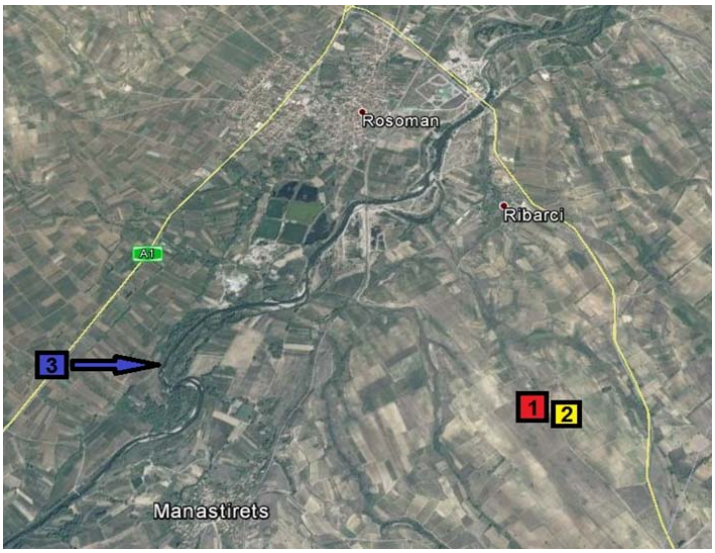

Figure 4: Location of construction activities in Municipality of Rosoman

Legend of Figure 1:
1 – New water reservoir with capacity of 250m^3;
2 – Existing water reservoir with capacity of 150m^3;
3 – River Crna (largest right tributary of the River Vardar)

The new reservoir will be placed near the old existing water reservoir. Water supply for the new reservoir in municipality Rosoman will start from the existing Water purification plant in municipality Kavadarci where the water from well “Lukar” and River Bunarska will be prepared as drinking water with good quality and will pass 12.3km long water supply route.

After the construction activities, the main responsibility for regular maintenance and everyday usage of the water reservoirs is the CSE "Rosoman".

The location where the new reservoir is planned to be constructed (and the existing stands) is not under any national /international regime of protection in respect to nature and culture heritage.

4.2. Main sub-project activities with environmental impact

The project envisages construction of a new reservoir with a capacity of 250m^3, with two wet chambers and a dry chamber.

Main project activities will include: a) marking out the construction site, b) construction of the water reservoir and c) maintenance during the operational phase. The construction works are mainly focused on: civil works (mechanical excavation of the soil), reinforced concrete works, insulation works, installation works and other works. All the construction elements are reinforced concrete class MB30 with additives for water tightness. Hydro-insulation is being envisaged around the entire reservoir surfaces.

In the preparatory phase air emissions will be produced by cleanup and removal of ground, soil, dust emissions during loading and transport of excavated material, emissions from mobile sources of pollution - operation of construction machinery. In the constructive phase, there will be additional fugitive emission of dust from excavation around the buried water supply PVC pipeline.

Waste water from construction activities will be produced by the use of mobile toilets and maintaining hygiene by workers (hand washing) and refreshments.

Different waste streams will result from construction activities (waste from combined excavation, the cutting of trees and branches, communal waste (paper, glass, plastic etc). To avoid any environmental impacts and

consequences of improper waste management the Contractor needs to communicate with municipal staff at the beginning of the project in order to get instructions where to dispose the waste streams. The Contractor must provide transportation and final disposal of the inert, communal and hazardous waste by the licensed collector for waste. The keeping records of temporary and final disposal of waste are important as well. According the EIA Report the quantity of exceed soil as inert waste will be around 1000m^3.

Impact on the quality of soil during the preparatory phase and the constructive can be expected in case of leaks of fuels and lubricants from construction machinery which are used in construction work. In the operational phase there will be no degradation of the soil and soil vegetation.

The noise will appear by the result of the operation of construction machines that will be working during the construction phase or vehicles for transport and delivery of construction materials and machinery for the implementation of construction activities. The main receptors of noise will be the workers who will operate the machinery, the living organisms that inhabit the area and population living nearby construction site. Limit values for basic indicators of environmental noise are defined in Law on noise sensitive protection ("Official Gazette of RM" No. 79/07, 120/08, 1/09). According to the prescribed levels, the construction activities are located in the area of the fourth degree of protection against noise and the maximum allowed noise level should be70dBA for day and evening and 60dBA for night.

In or near the project location there are no registered endemic, protected and endangered animal or plant species or protected areas and habitats that will be negatively affected by the construction activities.

Very important issue is the quality of drinking water coming from the Water purification plant, so regular sampling and testing of drinking water are essential for minimization of human health risks.

In April 2012, the Environmental Impact Assessment Report for construction of new water reservoir for drinking water with capacity of 250m^3 in the municipality Rosoman was prepared and it was approved by the Mayor (Mr.Stojance Lazov). The Report contains the main project goals, photos of the locations where the construction activities will be performed, project activities and very general environmental mitigation measures for construction of new water reservoir for drinking water.

The detailed relevant Environmental Mitigation Plan and Monitoring Plan are presented in following Tables.

4.3. Environmental Mitigation Plan

Potential impact	Impact scale	Proposed mitigation measures	Responsibility
Project activity: Marking out the location for construction of 250m^3 water supply reservoir in municipality Rosoman			
Possible social and health impact on workers because: - Unsafely start of construction works; - Not compliance with health and safety at work procedure.	Local/ Municipality Rosoman Short term/minor	• Providing adequate marking of the construction site • Ensuring warning tapes and signs (especially important to prevent enter of animals into the construction area) • Not allowed entrance for non-employed in the site where the construction activities are provided • Health and Safety measures should be applied: a) Security measures like: perimeter fence, life jackets, use of proper protective clothing and equipment by employees, warning signs for the public around the construction site; b) Maintain a good level of personal hygiene-have on site installations for washing, cleaning; c) Health protection-fist aid kits and medical service on sites d)Apply the emergency and normal first aid procedure for any injury if such occur through construction work; • The roads which are leading to construction site should be kept clean	• Contractor • Supervisor • Municipal staff (PM and Environmental inspector)
Project activity: Construction of 250m^3 water supply reservoir in municipality Rosoman			
Possible impacts on landscape and visual aspects	Local/ Municipality Rosoman Short term/minor	• Minimization of the construction area as much as possible (carefully planning and design of the project activity); • Fully clean-up of the construction site immediately after accomplishment of construction activities; • Collection of the generated waste on daily basis, selection of waste, transportation and final disposal on appropriate places.	• Contractor –Bidder • Supervisor
Possible emissions by transportation vehicles and impact on air quality	Local/ Municipality Rosoman Short term/minor	• Reconstruction site, transportation routes and materials handling sites should be water-sprayed on dry and windy days; • Construction materials should be stored in appropriate places covered to minimize dust; • Vehicles and construction machinery will be required to be properly maintained and to comply with relevant emission standards; • Vehicle loads likely to emit dust need to be covered; • Restriction of the vehicle speed within the construction location; • Burning of debris from ground clearance not permitted.	• Contractor –Bidder • Supervisor
Possible noise disturbance as a result of outdoor equipment usage and transportation vehicles driving	Local/ Municipality Rosoman Short term /minor	• The construction activities are located in area with IV degree of protection against noise, therefore the level of noise should not exceed 70dB during the day and evening and 60dB during the night; • The construction work should be not permitted during the nights, the operations on site shall be restricted to the hours 7.00 -19.00; • The workers should be provided with ear protective devices (ear muffs and/or ear plugs);	• Contractor –Bidder • Supervisor

Potential impact	Impact scale	Proposed mitigation measures	Responsibility
around the construction site.		• Use of appropriate and technically functional equipment and mechanization.	
Possible adverse environmental impact and health effects could occur as a result of generation of the different waste streams and its inappropriate management	Local/ Municipality Rosoman Short term/minor	• Identification of the different waste types at the construction site; • Classification of waste according the national List of Waste (Official Gazette No.100/05); • The main waste would be classified under the Waste Chapter 17 "Construction and demolition wastes (including excavated soil)" with the waste code 17 05 04 – Excavated soil, 17 09 04 – Mixed waste from construction site; • Small amount of solid municipal waste could be found (food, beverages), as well as packaging waste (paper, bottles, glass, etc.); • Transportation and final disposal of the inert and communal waste by the Communal Services Enterprise (CSE) "Rosoman"; • The contract with the company for waste collection and transportation should be signed for collection and transport of waste to the municipal legal landfill in the municipality Rosoman; • The construction waste should be promptly removed from the site, should be re-used if possible; • The materials should be covered during the transportation to avoid waste dispersion; • Burning of construction waste should be prohibited; • Fulfilment of the Annual Report for non-hazardous waste management by the Mayor and reporting to the Ministry of Environment and Physical Planning; • Possible hazardous waste (motor oils, vehicle fuels) should be collected separately and authorized collector and transporter should be sub-contracted to transport and finally dispose the hazardous waste	• Contractor –Bidder • Supervisor • Communal Services Enterprise (CSE) "Rosoman" • Municipality staff (PM, Communal Inspector, Environmental Inspector)
Lack of drinking water during the commissioning of the new water reservoir	Local/ Municipality Rosoman/ Settlements Rosoman, Manastirec and Ribarci	• Just in time information release about the break in water delivery for certain time period in front of local population; • Announcement of the information through local radio; • Delivery of drinking water with water tanks reservoirs to the local population for the period when the commissioning of the new reservoir is taking place.	• Contractor –Bidder • Supervisor • Communal Services Enterprise (CSE) "Rosoman"
Soil pollution The negligible impacts on soil arising from construction	Local/ near the river Crna and village Ribarci, Rosoman and Manastirec in rural area	The possible mitigation measures for minimization of the soil pollution could be: • Transportation vehicles should be enclosed to avoid potential leakage; • Promptly clean-up spills of transported material on construction sites; • Proper positioning of the water drainage system on the construction site;	• Contractor –Bidder • Supervisor

Potential impact	Impact scale	Proposed mitigation measures	Responsibility
activities are expected.	in municipality Rosoman Short term /minor	• All roads and asphalt surfaces should be maintained clean in order to prevent runoffs from them into the ground water and other water flows; • Not to keep fuel, oil or lubricants along the alignment, especially not in the vicinity of draining structures; • To be set portable toilet that will be cleaned and maintenance on time.	
Operational phase	No adverse environmental risks are expected. Very positive impact is expected supplying the population of three settlements in municipality Rosoman with safety drinking water. The CSE "Rosoman" should prepare the Plan for preventive and regular maintenance of the whole system for drinking water supply including the newly constructed reservoirs and its components. The possible incidental breakdowns of the water pipeline could cause very limited micro adverse impacts and the municipality Rosoman should ask the Contractor to take care about the proper marking of micro location, proper waste management and the most important to organize the water supply in the breakdown period. The residual chlorine in the drinking water should be ensured in order to supply the residents with safety, clean water.		

4.4. Environmental Monitoring Plan

What Parameter is to be monitored?	Where Is the parameter to be monitored?	How Is the parameter to be monitored?	When Is the parameter to be monitored (frequency of measurement)?	Why Is the parameter to be monitored?	Cost		Responsibility	
					Constr.	Oper.	Construction of 250m^3 water supply reservoir	Operations of new water supply reservoir
Project stage: Start-up of the Project activity "Construction of 250m^3 water supply reservoir in municipality Rosoman" (marking construction site)								
The occupational health and safety measures applied for the workers	On the reconstruction site	Visual check	Before start of the project activities and each of working day	To avoid occupational and safety risks (injuries)			Contractor - Bidder Supervisor Communal /Environmental Inspector at the Municipality of Rosoman	
Project stage: Construction of 250m^3 water supply reservoir in municipality Rosoman								
Separated hazardous and non-hazardous waste	On the construction site	Visual monitoring and reporting	During the project activities	To avoid disposal of hazardous waste on municipal landfill			Contractor - Bidder / Municipal staff (Communal inspector and Environmental Inspector)Director of the CSE "Rosoman"	
Fulfilled Annual Report for transportation and disposal of waste	Local self-government administration	Review of documentation – Identification waste List	After the accomplishment the task of collection, transportation of waste on daily/monthly basis	To improve the waste management and hazardous waste management on local and national level			Mayor of Municipality of Rosoman /Director of the CSE "Rosoman"	

What Parameter is to be monitored?	Where Is the parameter to be monitored?	How Is the parameter to be monitored?	When Is the parameter to be monitored (frequency of measurement)?	Why Is the parameter to be monitored?	Cost		Responsibility	
					Constr.	Oper.	Construction of 250m^3 water supply reservoir	Operations of new water supply reservoir
Noise level	On the construction site	Monitoring of the noise levels dB(A) with appropriate monitoring devices	On regularly basis during the work, through site visits, in accordance with the national legislation	To monitor if the noise level is above/or below the acceptance noise level (not exceed 70dB during the day and evening and 60dB during the night).			Contractor – Bidder Company authorized to performed noise levels measurements sub-contracted by the Contractor – Bidder	
Drinking water quality	Before the distribution staring from Water purification plant The water sample should be analysed by the Authorized, accredited laboratory (Institute for Public Health) for sampling and examination of water quality	Laboratory equipment for physical-chemical and microbiological water quality analysis	Continuously according to the national regulations Rulebook for safety of drinking water (Official Gazette of RM No.46/08)	To ensure the distribution of high quality drinking water to the population minimizing the health risks of waterborne diseases			Director of CSE "Rosoman"	
Regular maintenance of the water supply network and water reservoirs (the old and newly constructed one)	Along the water supply network and water reservoirs	Review of the Preventive Plan and proposed measures for prevention of spills, water losses and cracks	On annual basis /6 months after the diagnostic of the “hot spots” along the water supply network	To prevent or minimize the risks to human health as a result of water borne diseases				Mayor /Director of CSE “Rosoman”

5.

TECHNICAL SOLUTION

5.1 Description

The implementation of this project will ultimately lead towards improvement of the water delivery services in the local communities of Rosoman, Manastirec and Ribarci in the municipality of Rosoman, i.e. provide an adequate access to water for the population. At the same time, this approach will contribute to the settlement Palikura to be included in the water supply network.

The current water supply is from wells' system placed closely on the right side of the River Crna (largest right tributary of the river Vardar) upstream from the bridge. The two wells are with a capacity of 2x15 = 30l/sec.

The water from the wells is pumped and through pressure pipe is led to the reservoir in the local community of Ribarci, which has a capacity of 150m^3. From there onwards, the water from the reservoir flows through gravity through existing water supply pipeline and is being led to the consumers of the local communities Rosoman, Manastirec and Ribarci. The problems that the local communities face with the current solution are the following:

- Water from the wells is not safe according to the analysis of relevant institutions in the country and can only be used for other sanitary needs. Namely, from the tests performed by the Institute for Public Health of the Republic of Macedonia at certain times during the year, nitrites, manganese (Mn) and even arsenic (As) appear in the water known to have high averse environmental and health effects.

- The wells' system is highly inefficient due to the high electricity costs. Namely, the pumps have to work non-stop that results in high electricity consumption.

- The current reservoir area is considered ineffective for its purpose as it is small to answer the needs of the population of the local communities of Rosoman, Manastirec and Ribarci and thus, it is necessary to increase.

- Due to the low capacity of the reservoir and lack of water, the pressure in the pipes is low and the water does not come to the households in this local communities.

Therefore, in order to provide adequate solution to the above mentioned problems, the municipality Rosoman decided to initiate a preparation of basic design and other supporting technical documentation for construction of new water reservoir with an increased capacity of 250m^3.

As elaborated earlier already, the new reservoir will be placed right next to the old reservoir. The municipality foresees to replace the current system of using the water from the existing wells' system due to the unsanitary water with using water entirely from the water spring 'Lukar' and River 'Bunarska', which are the main water springs supplying the water system in the neighbouring Municipality Kavadarci. Water supply for the new reservoir in municipality Rosoman will start from the existing filtering station in Kavadarci where the water from 'Lukar' and river 'Bunarska' will be prepared as potable water. The route (Rosomanska line) from the filtering station in Kavadarci to Rosoman is 12.3km long. Starting from Kavadarci to Rosoman the pipelines are with Ø200mm made from PVC. At the elevation of 263m above the sea level there is a water pressure break chamber. After this chamber the pipelines to Rosoman are made from Ø125mm from PVC. For connecting the water supply pipeline with the new reservoir, the existing connection of the old reservoir as it is nearest to the new one will be used. This means that both the current and the new water reservoir will be filled with potable water from 'Lukar' and River 'Bunarska' ensuring capacity of 400m^3. Municipality Rosoman has signed a legal mutual agreement with municipality Kavadarci, whereby the municipality Kavadarci has to ensure the quality and quantity of water (30l/s) for the municipality Rosoman.

Taking into consideration that this kind of Projects involves standard specific maintenance, the assumption is that their standard technical life is 30 years after which some major rehabilitation might be needed. This means that the implementation of this Project will be a long term solution to the potable water problems that the residents in the local community of Rosoman are facing at present.

5.2 Analysis, evaluation and potential amendments

Water supply of the new reservoir in Rosoman will starts from Kavadarci at the height elevation of 275 meters above the sea level. It will starts from the filtering station in Kavadarci where the water from "Lukar" and river "Bunarska" will be prepared as potable water. Pipelines are with Ø200mm made from PVC along the route of water supply system to the height elevation of 263 meters above the sea level. From here, the pipeline system goes to the reservoir and consists of Ø125mm pipes made from PVC. The route from Kavadarci to Rosoman is 12,300m long. The existing reservoir of 150m^3 is located at the height elevation of 195 meters above the sea level. For connecting the water supply pipeline with the new reservoir will be used the existing connection of the old reservoir due to the nearest to the new one. The main project goal is to solve the above mentioned problems with construction of a new reservoir with a capacity of 250m^3, with two wet chambers and a dry chamber. Main project activities will include: a) marking out the construction site and b) construction of the water reservoir and c) maintenance during the operational phase. The construction works are mainly focused on: civil works (mechanical excavation of the soil and alike), reinforced concrete works, insulation works, installation works and other works. All the construction elements are reinforced concrete class MB30 with additives for water tightness. Hydro-insulation is being envisaged around the entire reservoir surfaces.

The new reservoir of 250m^3 is designed with a circular (cylindrical) shape considered the best in static terms. It consists of two wet chambers (for water) and a dry chamber where all needed pipes, fittings and valves will be placed. When determining the dimensions of the wet chambers (diameter and height), special attention is paid to their optimum capacity which influences also optimal cost of the reservoir.

The construction of the reservoir consists of structural units as follows:

- Two wet circular (cylindrical) chambers with a diameter of D=6.50m and height of H=4.50m;
- Dry chamber between the two circular wet chambers where all the necessary equipment is planned to be placed.

The planned technical solution is presented on the picture below.

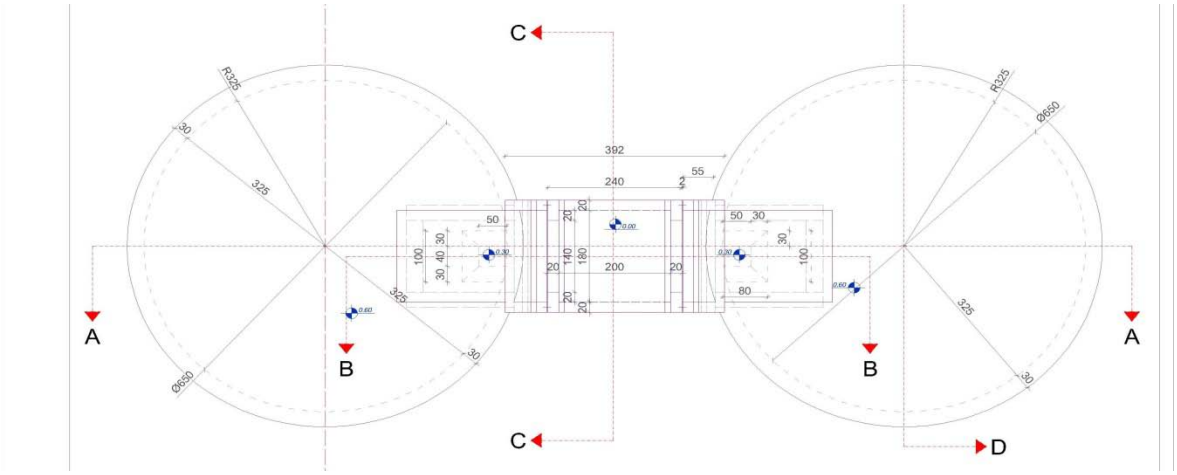

Figure 5 The planned technical solution
Source: Project's technical documentation

The circular wet chambers are planned to be constructed with a cylindrical reinforced concrete MB30 class walls with a thickness of t=30cm. The bottom slab is reinforced concrete with concrete class MB30 and thickness t=30cm. The roof construction of the wet chambers is envisaged as reinforced concrete slab MB30, with a thickness of t=20cm.

The construction of the dry chamber is separated from the wet chambers by a vertical dilatation and consists of vertical reinforced concrete (MB30) layers with thickness of t=30cm. All the hydro mechanical equipment will be stored in the dry chamber. The roof slab of the chambers is planned to be constructed of reinforced concrete (MB30 class) with thickness of t=12cm.

5.3 Conclusion

The implementation of this project will ultimately lead towards improvement of the water delivery services in the local communities of Rosoman, Manastirec and Ribarci i.e. provide potable water for the population. Namely, providing an adequate access to water to the population living in the local community of Rosoman, is considered mandatory and of an urgent priority for the Rosoman municipality.

The designed reservoir is able to provide the planned service. The project is in line with the existing positive regulation and standards in the country.

The technical documentation was also confirmed by the CSE “Rosoman”, which after the construction will operate and maintain reservoir and facilities. This implies that the project is technically feasible.