PROJECT BENEFICIARY 2:

MUNICIPALITY OF DIMITROVGRAD

PROJECT:

APPLICATION OF INNOVATIVE TECHNIQUES FOR IMPROVING THE QUALITY OF DRINKING WATER IN URBAN AREAS - AQUA-LITY

DELIVERABLE 3.2.1

IDENTIFICATION OF ENVIRONMENTAL PRESSURE SPOTS IN DIMITROVGRAD, COMPLIANCE OF WATER SOURCES WITH EU REGULATION AND GEOREFERING OF THE POINTS

CONTRACTOR:

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1 DESCRIPTION OF THE EXISTING WATER SUPPLY INFRASTRUCTURE OF THE TOWN OF DIMITROVGRAD

Dimitrovgrad is a town in Haskovo Province, Bulgaria. It is along the Maritsa River in the Thrace region, close to the provincial capital, Haskovo. Dimitrovgrad had a population of 34 614 (2017) and is the administrative centre of Dimitrovgrad Municipality.1

In the separate territory of the town of Dimitrovgrad, the water supply, wastewater treatment and wastewater services are provided by "Water Supply and Sewerage" Ltd ("ViK" OOD). - Dimitrovgrad.

VIK OOD Dimitrovgrad is the WSS operator serving the Dimitrovgrad Municipality. The trade company has been founded in1992 and is registered under the Trade Act with 51% state (the managing ministry is the MRDPW) and 49% municipal ownership. The main business of the company includes operation, maintenance, construction, investment activities, WSS and construction services on the territory of Dimitrovgrad Municipality. The company executes its activity under the Water Supply and Sewerage Services Regulation Act.

Area of VIK OOD Dimitrovgrad, covers the Municipality of Dimitrovgrad and all the settlements in it, 27 total. The settlement network in the municipality consists of two cities – Dimitrovgrad and Merichleri and 25 villages spread evenly across its territory.

The total population in the territory of VIK OOD Dimitrovgrad is 53,500 inhabitants, spread over 27 settlements. The population tends to decrease as a result of combined negative birth rate and migratory balance. The area serviced by VIK OOD Dimitrovgrad includes all the 27 settlements, of which one counts over 10,000 inhabitants (Dimitrovgrad), all the others being below 2,000 inhabitants.

The subject of current document is Dimitrovgrad and Merichleri.

1.1 FACILITIES OF THE WATER SUPPLY NETWORK, LENGTH, AGE, DIAMETER AND MATERIAL OF PIPES

Maritsa river is the main source of surface water in the territory of VIK OOD Dimitrovgrad, but due to the quantity and quality of surface waters in the separate territory of dimitrovgrad, there are no surface water catchments for drinking water supply in the territory of the Water Operator.

VIK Ltd. Dimitrovgrad, operates around 100 different groundwater resources, which are more deeply laid and are "protected". These are pore waters in neogenic sediments and karst water in paleogenic sediments. Furthermore, treatment facilities for polluted water have been designed to reach indicators compliant with the requirements for drinking water supply. This is the grouping of water sources currently operated by the water company ensuring the drinking water supply of settlements in the municipality.

The available potential of groundwater resources is currently sufficient to cover all drinking, households' and other needs of the serviced settlements. Besides, a few water resources located on the territory of VIK OOD Dimitrovgrad are exploited and operated by WSSC Haskovo.

The water supply in the region is provided by independent water supply systems consisting of one or more water sources that supply water to one or more settlements. The total number of water supply systems on the territory of ViK OOD -Dimitrovgrad are 16, the size of each of them ranging from small ones supplying only one village to regional networks that connect many water sources with several settlements. The town of Dimitrovgrad is a main water supply unit of water system Dimitrovgrad. At present, the city of Dimitrovgrad is also supplied with the town of Merichleri and the village of Velikan.

The town of Dimitrovgrad uses only underground sources for drinking water supply.

The greater part of the water consumption is provided by "Krumska Terasa" wellfield includes 20 tube wells, which send water directly to DWTP. A major problem in the purification process is

the manganese pollution of all major water sources. The design capacity of the treatment plant is Q = 605 l/s, but only the first stage for Q = 375l/s it was built and put into operation in 1994.

The other water sources serving the Water system of Dimitrovgrad are:

- Chernogorovo wellfield - this is the latest zone, built in 1989. It consists of 9 tube wells, a 200 m3 reservoir and a pumping station that sends water to the urban pressure reservoir 8000 m3.

- Left Bank wellfield encompasses Mariino quarter, Vulkan quarter, Chernogorovo quarter and consists of 6 tube wells. Not currently operate and are destroyed. Serviced neighborhoods are supplied with water from WTP.

Each drilling field has the respective pumping stations.

The pressure reservoirs serve the needs of the towns of Dimitrovgrad, Merichleri and Velikan – "Goren Gaber 1" - 8 000 m^3, "Goren Gaber 2" -1660 m^3 and "Mariyno" - 4000 m^3.

The main feature of Dimitrovgrad's internal / distribution / water supply network is its scatteriness. This is due to the peculiarities of building the city - it consists of five relatively remote parts, each with its own water supply network.

1.1.1 Water sources

The water consumption of the town of Dimitrovgrad is provided by 36 underground water sources. All water sources have permission to be used.

1.1.1.1 Water abstraction areas for drinking and domestic water supply of the town of Dimitrovgrad

The town of Dimitrovgrad, the town of Merichleri and the village of Velikan are is supplied by three water abstraction areas:

- Krumska Terasa water abstraction area – it consists of 20 tube wells (TW), out of which 17 are shallow (up to 15.0 m) and use groundwater from the terrace of Maritsa River. They are divided into three groups: Ist group from TW №1 to TW №6; IInd group from TW №7 to TW №12 and IIIrd group from TW №13 to TW №17. There 3 deep tube wells,

which employ groundwater from the paleogenic karst aquifer. Their depth varies from 120.0 m to 135.0 m. The total absorbed capacity of the wells is 194-203 l / s, but the maximum Q = 150 l / s and the average for year Q = 90 l/s. At present, there are 8 drillings with pump characteristics Q =10 to 30 l/s, H = 50 m

- Chernogorovo water abstraction area – this is the latest zone, constructed in 1989. It consists of 9 tube wells, out of which 5 are operational and 3 (TW №7, 8 and 9, the so called "Pyrite") non-operational. They also built in the paleogenic karst aquifer. They are also found in the Paleogene karst aquifer.The characteristics of the pumps are Q =10 to 20 l /s, H =20 m
- "Left Bank water abstraction area encompasses Mariino quarter, Vulkan quarter, Chernokonevo quarter and consists of 6 tube wells and 2 shaft wells (SW).

All in offshore facilities, their local operational resources are described in Table 1.

Table 1 Water abstraction facilities, their local operational resources and water body code

№	Water Abstraction Facility	Operational resources, Qoper		Code of ground water body
		l / s	m3 / d	
B-14-B-5	Total for the town of Dimitrovgrad	115.27	9,959.33	
1.	Krumska Terasa water abstraction area	75.55	6,527.5	
1.1.	Branch 1 (TW(Tube well) №№1, 2, 3, 4, 5 and 6) - shallow	12.3	1,062.72	BG3G000000Q013
1.2.	Branch 2 (TW №№7, 8, 9, 10, 11 and 12) - shallow	12.3	1,062.72	
1.3.	Branch 3 (TW №№13, 14, 15, 16 and 17) - shallow	7.1	613.44	
1.4.	To Branch 1 (TK№№1a, 2a and 3a) - deep	46.84	4,046.98	Karst water in BG30000PgN026
2.	Chernogorovo water abstraction area	30.0	2,592.0	Karst water in BG30000PgN026
2.1.	Tube wells TW№№1, 2, 3 and 4	29.13	2,516.83	
2.2.	Tube wells TW №№5 and 6 (remote)	12.3	1,062.72	
2.3.	Tube wells TW №№7, 8 and 9 (pyrite)	-	-	
3.	Left Bank water abstraction area	9.72	840.0	

№	Water Abstraction Facility	Operational resources, Qoper		Code of ground water body
		l / s	m3 / d	
3.1.	Tube wells TW №№1,2,3,4,5 and 6	4.86	420.0	BG3G000000Q013
3.2.	Shaft wells SW№№7 and 8	4.86	420.0	

* Data from Regional Master Plan for Water and plumbing Dimitrovgrad

1.1.2 *Drinking water treatment plant*

Satisfying the needs for drinking water for Dimitrovgrad, Merichleri and Velikan is done by a drinking water treatment plant located some 3-4 km from the city near the village of Krum.

The quality of drinking water in the Municipality of Dimitrovgrad is problematic. The level of contamination of raw water from all major water sources exceeds the permissible standards. A serious problem for the internal water supply network of Dimitrovgrad Municipality is the manganese deposits in the pipes. To solve it, in 1993 a DWTP was built and put into operation for the city of Dimitrovgrad. Prior to the construction of the DWTP at the Krumska Terrasa Water Zone, all urban areas received water with high levels of manganese (0.7 to 2mg / l).

1.1.2.1 Characteristics of DWTP

The capacity of the established wastewater treatment plant is designed for the gross amount of water in the final stage Qdim = 605 l/sec. In 1994 only the first stage was built and put into operation for Qdim = 375 l/sec. A pumping station is working alongside the DWTP. Now the station cleans Qwork = 80 – 140 l/sec. It is designed to remove manganese.

1.1.2.2 Quality of raw water

The values of the water quality entering the DWTP. Results of the laboratory analysis presented are shown in the following table*:

Table 2 Laboratory analyses at the inlet of Dimitrovgrad DWTP

indicator	unit	value	Ordinance 9/2001
pH	-	7.0	6,5 - 9,5
Turbidity	mg / l	acceptable	acceptable
Oxidizability	mgO_2 / l	2.1	5
Ammonium ions	mg / l	0,039	0.5
Nitrites	mg / l	0,041	0.5
Nitrates	mg / l	43	50
Chlorides	mg / l	30	250
Manganese	µg / l	279	50
Hardness	mg eqv / l	7.2	12
Conductivity	µs / cm3	818	2000
Free residual chlorine	mg / l	0	0.3-0.4

* data form the Regional general plan of W&S Dimitrovgrad

1.1.2.3 Process

Wastewater treatment plant with aerator, sand filters and chlorination

Works in unreacted mode.

The elements of the treatment plant are as follows:

- Along the waterline
- Water meter shaft inlet
- Conical aerator
- Sand filters - Filters are filled with perlite and quartz sand. At present, there is no need for further manganese removal, by adding potassium permanganate to the sand as manganese is 0 µg / l at the outlet and within the range of 200-250 µg / l at the inlet. Therefore, currently the filters purify water adequately and fulfill their intended use.

- Clean water tank
- Chlorination station
- Water meter outlet - A measuring device is installed in the water meter chamber, which allows the measurement of drinking water supplied to the consumers with qualitative indicators meeting the requirements of Regulation 9/2001 under the Water Act.

- Along the sludge path

The water from the flushed filters is taken off to precipitators, after which the decanted water is discharged into the Dobrich river and the separated sludge is taken to a depot.

At present, the sludge produced in DWTP Dimitrovgrad is transported to Dimitrovgrad depot.

The water from the flushed filters is taken off to precipitators where a sediment consisting mainly of manganese is separated, the water above the sediments is released into the Dobrich river.

1.1.2.4 Quality of the filtered water

Table 3 Laboratory analyses at the outlet of Dimitrovgrad DWTP

indicator	unit	value	Regulation 9/2001
pH	-	7.4	6,5 - 9,5
turbidity	mg / l	acceptable	acceptable
Mn	mgO_2 / l	1.9	5
ammonium ions	mg / l	0.0	0.5
nitrites	mg / l	0.0	0.5
nitrates	mg / l	44	50
chlorides	mg / l	31	250
manganese	µg / l	0	50
hardness	mg eqv / l	7.3	12
conductance	µs / cm3	809	2000

residual chlorine	mg / l	0.4	0.3-0.4

* the data is taken from protocols at input and output of DWTP Dimitrovgrad on 24.10.2018.

*Data from W&S Dimitrovgrad

1.1.3 *Treatment of drinking water to other water supply systems*

After establishing the high content of heavy metal - arsenic in the water supply network of the town of Merichleri and the village of Velikan, the supply of purified water from the DWTP through the RT Mariyno was put into operation and commissioned.

For other urban areas the water is treated with chlorination in the reservoirs of the pumping stations or in the pressure tanks.

1.1.4 *External incoming water conduits*

The incoming water conduits are one of the most important facilities in the water supply networks and their smooth operation depends on the continuity of the water supply in the urban areas. Although the main pipelines of Dimitrovgrad were built between 1951 and 1989, their operating condition is satisfactory. A major drawback is the lack of a monitoring system to ensure a rapid response to the occurrence of an accident along the pipelines.

1.1.4.1 Transportable water mains from the water supply system of the city of Dimitrovgrad

The list of transmissions mains is presented in the following tables.

Table 4 Transmission mains of Dimitrovgrad water supply group from Krumska Terasa borefield

location	material	Diameter [mm]	Length [km]	Year of construction
From Well 1to Well 17	Asbestos cement	250	9.662	1983. 2011. 1983.
Crossing under railway line and road	HDPE	2h450 350		

I and II Branch – External Network	eternit	400		
PS of Right branch – External Network	cast iron	400	1,000	1951.
II Branch	Asbestos cement	400	2,080	1983.
III Branch - Chamber	steel	300	1,394	1988.
Chamber- DWTP	Asbestos cement	500		
Total for the Group			14.136	

* data form the Regional general plan of W&S Dimitrovgrad

Table 5 Transmission mains of water supply group with water source - Chenogororovo borefield

location	material	Diameter [mm]	Length [km]	Year of construction
PS- Distribution chamber	cast iron	400	7.325	1983.
Distribution chamber - Chernogorovo	Asbestos cement	200		
	Asbestos cement	250		
Distribution chamber - Reservoir	cast iron	400		
Total for the Group			7.325	

* data form the Regional general plan of W&S Dimitrovgrad

1.1.5 *Pressure tanks serving Dimitrovgrad, Merichlleri and the village ov Velikan*

1.1.5.1 PT Goren Gaber 1 – V=8000 м^3 city water basin

It is located in the southern part of Dimitrovgrad. The tank is a two-chamber rectangle. It is supplied with water from the DWTP and from PP Chernogorovo. It was built 1980-1985.

It is the main water source for Dimitrovgrad and Merichleri.

1.1.5.2 PT Goren Gaber 2 V=1660 м^3

It's located next to PT Goren Gaber 1.

It is supplied with water from the DWTP and from PPChernogorovo. It was built in 1956. It supplieis water to new and reveloping area of Gabera.

1.1.5.3 PT Mariyno V=4000 м^3

It is located to the north of Mariovo. The tank is a two-chamber ractangle. It is fed with purified water from DWTP through PT Upper Gaber 1. It was built in 1980-1985. It supplies residential areas Marino, Vulkan, Chernokonevo, as well as the town of Meierchleri and the village of Velikan.

1.1.6 *Pumping stations in the water supply system of the city of Dimitrovgrad*

1.1.6.1 PS Krumska terasa

PS Krumka Terrace are 20 tubular wells with a total flow of 272 m^3/h, located along the right bank of the Maritsa River. Using two 426 MT pulse pumps, the produced water enters the DWTP. There are currently 8 drillings with pump characteristics Q = 10 up to 30 l/s, H = 50 m.

1.1.6.2 PS chernogorovo

It has three pusher pumps, the stations send the water obtained from three groups of a total of 9 wells (currently 5 drillings are operating) located in the Maritsa River valley in the 200 m3 reservoir of Chernogorovo PS. From the collecting water pond the water is sent to the water basin via 3pcs. pumps with debit Q=30-80l/s and H=70m.

1.1.6.3 PS Merichleri – new

It has 3-pump pumps at a flow rate of 6 l / s and a pressure of 120 meters.

1.1.6.4 PS station with hydrophore system

For the districts Vulkan, Chernokonevo, Merichleri and Velikan the water passes through a hydrofor, in which 3 pumps operate with debit Q = 20l/s, H=70m.

1.1.6.5 PS liav briag

PS Liav Briag has 6 tubular wells and 2 shaft wells with a total flow of 35 m^3/h located along the left bank of the Maritsa River. It's not working right now.

W&S Dimitrovgrad relies heavily on the exploitation of drilling field Krumka Terasa for water supply to Dimitrovgrad. The wells in Chernogorovo also supply water to the city. The liav Briag system (opposite the Krumka Terrace) is not functioning. A connection has been made from the Goren Gaber Reservoir to the Mariyno reservoir, so that purified water from the DWTP can be supplied to the Marienho, Vulkan and Cherno Konevo residential areas. There is also a link from PS Mariyno to Merichleri, a new one, to supply the city of Merichleri.

1.1.7 *Distribution network*

The total length of the distribution network in the city of Dimitrovgrad is 121 km, providing almost 100% coverage of the population's needs for water supply.

The main feature of Dimitrovgrad's internal /distribution/ water supply network is its scatterness. This is due to the peculiarities of the the city's layout - it consists of five relatively remote parts, each with its own water supply network. Some of the pipelines are in very poor condition, have high leakage rates, so the amount of non-profit water revenue (NPR) is relatively high.

The internal water supply network of Dimitrovgrad is divided in:

- City center area – supplied by a pressure pipeline (PP) "Desen briag" and pumping station "Chernogorovo", as well as directly from a pressure pipeline form DWTP.
- Northen city area and residential areas "Iztok"1 and "Iztok" 2 / - They are supplied by the a pressure pipeline "Desen Briag" and pumping station "Chernogorovo"
- Residential area "Mariyno", Vulkan and Chernokonevo – supplied by pressure pipeline "Mariyno"
- Town Merichleri and the village ov Velikan – supplied by pressure station "Merichleri" – a new one which uses the water form pressure tank " Mariyno"

The connection between the two parts of the grid (central and northern) is interrupted by a stopckock DN225, in Mariyno after crossing the bridge over the Maritsa River (2 x DN225 PEHD - via the bridge). There is a hydrophore installation that sends water to PT Mariyno.

Distributive water supply networks of individual urban areas and neighborhoods are constructed as looped pipelines.

The total length of the urban distribution network is 121 km, of which:

- 58 030 m / 47,96% /- Ethernet pipes
- 55 015 m / 45.47 % /- PEHD pipes
- 5 295 m / 4,38 % / - cast iron pipes
- 2 630 m / 2,17% / - steel pipes

- Downtown area / Central City area

This is the oldest and largest part of Dimitrovgrad where the city center, large administrative and public buildings, restaurants, shops, hospitals, etc. are located.

To the east of the Central City area is the largest industrial area of Dimitrovgrad. The length of the water supply network is 74 536 m. It is mainly made of eternit pipes and has a number of cast iron and steel pipes and some replaced PEHD pipes.

- Residential area Iztok

It is located on the left bank of the Maritsa River, northeast of the Central City area. It consists of two parts - Iztok I and Iztok II, which have PEHD pies. The water inlet to Iztok I and II is 50% replaced with PEHD. To the south of the residential area there is an industrial zone.The length of the water supply network is 9,450 m PEHD and 1,000 m of eternet pipes.

- Residential area Mariyno Vulakn

It is located on the left bank, to the northwest of the Central City District. On the East-southeast of it there is a small industrial area. The network length is 16 474 m PEHD and 2000 m cast iron pipes. The pipeline was replaced in 2010 with PEHD.

A connection was made from PT Goren Gaber to PT Mariyno, where purified water from the Krum DWTP is fed.

- Residential area Chernokonevo

It is located on the left bank of the Maritsa River, west of the villages Vulcan and Mariovo. It is about 5 km away on the northwest of the Central City area. It has the character of a village. No industrial area. Distribution network length - 20 238 m PEHD and 2 000 m eternet pipes. In 2010 the network in Chernokonevo was replaced with PEHD pipes.

Between Chernokonevo and Marino there are water supply pipes of about 3 km made of eternite and cast iron.

1.1 EXISTING SYSTEM FOR MONITORING

Constant monitoring /CM/ in the separate points as per an approved schedule which is updated each year as well as periodical monitoring /PM/ are implemented. At present complete water monitoring in the service territory is not performed also due to the insufficient capacity of the WSS company laboratories.

1.2 REGISTERED PROBLEMS ASSOCIATED WITH THE OPERATION OF THE WATER SUPPLY NETWORK OF DIMITROVGRAD REGARDING THE PROVISION OF THE SERVICE.

1.2.1 *Problems related to the quantity of the supplied water*

At present, the existing water sources fully satisfy the needs of Dimitrovgrad. There are no registered problems with the quantity of water supplied, except for the cases of accidents on the water supply network.

1.2.2 *Problems related to the quantity of the supplied water*

At present there are problems with the water pollution in the territory of Dimitrovgrad. Abnormally high concentration of manganese has been detected due to previous operation of mining industries (no longer operating) in the following settlements: Dimitrovgrad, Krum – new PS, Skobelevo and Stalevo – with concentration within 0.2 – 0.3 mg/l, only Stalevo is with concentration about 1 mg/l. Manganese appears in the end of 70-s due to contamination of nourishing source – Maritsa river and occurred hydrogeochemical processes in the rivers' terraces.

Thanks to the system for continuous monitoring of input and output DWTP problems with the quality of drinking water supplied to Dimitrovgrad not monitored.

Dimitrovgrad water supply distribution network has no points for permanent or temporary, stationary or remote monitoring of the drinking water quality.

The challenge to ViK Dimitrowgrad is introducing monitoring of drinking water quality in reservoirs and key points in the network.

1.2.3 *Problems related to the pressure of the supplied water*

The water required for the water supply of the town is stored in 3 pressure reservoirs located at an altitude between 140 m and 170 m above sea level. The altitude of the terrain varies between 100 m and 125 m.There are currently no problems with the water supply.

1.2.4 *Problems related to the continuity of the water supply*

As a result of the obsolete infrastructureq there are frequent accidents on the network. The lack of an effective system for remote monitoring of key operational features on the network makes it impossible for taking preventive measures to be quickly remedied hidden leaks, which subsequently grew into accidents. At the present moment the main activity of the teams of ViK Dimitrovgrad is to remove already occurred accidents on the network, which inevitably leads to longer interruptions in the water supply and inconveniences to end users.

The conclusion that can be done is that the water supply of Dimitrovgrad is firmly secured regarding the quantity of the supplied water with the required pressure. The main problems are related to the lack of continuous monitoring on the network of the quantitative and qualitative indicators of the water. This is a prerequisite not only to failure to implement effective quality control of the water in the distribution network, but also for the lack of information to determine the actual hydraulic trends in the network, leading to frequent accidents and interruption of the water supply.

2 COMPLIANCE ANALYSIS WITH THE WATER FRAMEWORK DIRECTIVE (WFD)

2.1 ANALYZED THE LEGISLATIVE ACTS CONCERNING THE ASSIGNED TASKS:

In preparing this analysis were used mainly normative acts regulating relations in the water sector in Bulgaria, as well as sources of international and European law in this area. Normative acts have been considered and are listed in their hierarchical order according to the type of legislative act - the constitution, codes, laws, ordinances, regulations, tariffs, instructions, orders, methodologies, etc.

Also mentioned are the main sources of international and European law - international conventions, treaties, regulations, directives, decisions, etc., Which are essential for the regulatory framework for the water sector in Bulgaria.

2.1.1 The analyzed normative acts are:

- Directive 2000/60 / EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy ("the Water Framework Directive")
- Floods Directive 2007/60 EU
- Directive 2000/60 / EC of 23 October 2000 establishing a framework for Community action in the field of water policy - the Water Framework Directive (WFD)
- Directive 98/83 / EC of 3 November 1998 on the quality of water intended for human consumption introduces requirements for water for drinking purposes, the location and frequency of monitoring and methods of laboratory testing of quality indicators of drinking water obligations reporting and informing consumers
- Plan for the conservation of water resources in Europe of November 11, 2012

- Convention on the Protection and Use of Transboundary Watercourses and International Lakes ("the Convention").
- Agreement between the Government of the Republic of Bulgaria and the Government of the Hellenic Republic to use the waters of the river. Mesta (ratified by a law passed by the 37th National Assembly on 03.28.1996, the re-adopted on 04.25.1996, the prom. SG, issue 37 of 1996)
- Agreement between the Republic of Bulgaria and the Kingdom of Greece on cooperation in the use of the waters of rivers which flow through the territories of both countries (ratified by Decree № 397 of the Presidium of the National Assembly on 07.30.1964, the prom. SG, br.87 1964)
- Water Act ("WA")
- Ordinance № 1 of 11.04.2011 on water monitoring
- Ordinance № 9 of 16.03.2001 on the quality of water intended for drinking purposes. The Ordinance aims to protect
- Ordinance № H-4 from 09.14.2012 on the characterization of surface waters.
- Ordinance № 12 of 18.06.2002 on the quality requirements for surface water intended for drinking water supply

2.2 ANALYSIS METHODOLOGY

The methodology that was used in in this analysis, It based on pre-defined methodological approach and structure in conducting the analysis.

The methodological approach includes a review and analysis of all operating general and special legislation which regulates legal relations in the water sector in all its branches, branches, sub-systems and other major components. The approach considers the development of the legal framework so far, which has shaped this part of the legal system into a system of

interconnected groups of law, subject to certain aims and objects of legal regulation, united by systematic features of a complex structure and framework of legal, administrative and other acts related to all management activities, use, water conservation, and construction and operation of WS systems.

The methodical approach requires the study of history, stages and trends of the legal framework for the water sector as part of the legal system in force in the country and comparative overview and analysis of the group regulations, the subject of analysis, both within the conditional divisional system and to the norms of other sectors and areas of existing legislation. The comparative analysis implies the definition and the assessment of sectoral legislation to the relevant branches of law and general legal theory, as well as consideration of the assessment and classification of each of the examined legislation with the basics of the legal system.

Next, the methodological approach should set structure analysis, which is largely independent of the existing structure, hierarchy and relationships of specific regulations governing the water sector, with the aim of this structure to allow a thorough analysis of the characteristics of "complexity and orderliness" of the legislation, and to facilitate identification of problems and shortcomings in the design and development of this sector legislation.

The structure of the analysis required for the study of the legislation in the system of the water sector to be clearly identified objects of legal regulation and the main components of the current legal framework for the sector. The structure includes a comprehensive study of the state and administrative environment, the system of authorities and the distribution of powers between them, the use of certain means of regulation, the method of treatment of legal problems and tasks of activities, that characterize the water sector as a structural element of the

economy and the organization of state and society, assessment of legal institutions and legal mechanisms and to assess their progress.

An essential characteristic of the methodological approach of the analysis of the system of legal norms at all levels to seek and to make continuous comparison of the legal framework existing real public relations and sustainable practices in their field of activities in the water sector in terms of finding effective solutions available rulemaking lasting and substantial problems in the organization of the sector. The chosen approach involves the evaluation and comparison of the objectives set out in the regulations, with the possible interim or final results of the application of legal norms.

2.3 EUROPEAN LEGISLATION AND TRANSPOSITION OF DIRECTIVES IN THE FIELD OF WATER REGULATION

European law includes 20 directives and some more decisions and guidance of the European Commission to implement the legislation. The main document of the European legislation - The EU Water Framework Directive 2000/60/EC, was implemented for the most of its part in 2006 by amending the Water Act. In 2010, Directive 2007/60/EC on the assessment and management of flood risks, was also implemented by amending the Water Act. Other secondary EU directives are also transposed – by new state directives in the areas for which they apply.

Important directives are:

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy:

- introduces a new legislative approach to managing and protecting water, based not on national or political boundaries but on natural geographical and hydrological formations

- river basin (basin water management)

The directive aims at establishing a framework for the protection of water (surface, ground, coastal or international). Through it the EU countries are required to prevent further deterioration and to improve the quality of aquatic ecosystems. The main objective is to achieve "good ecological status" by the year of 2015.

Good ecological status means "status of surface water body in which the value of its biological quality indicators show low levels of distortion resulting from human activities, and they deviate slightly from the status of a surface water body in the undisturbed conditions."

The Framework Directive deals with the three main elements of the aquatic ecosystem:

- Water quality - worsened by anthropogenic pollution, chemicals (fertilizers and pesticides), urban or industrial waste water, damage to rivers from water power plants, etc;
- Amount of water (hydrologic regime - volume and flow) – Worsened by drought, sewers, reservoirs, change and destruction of natural riverbeds for any human needs such as agriculture, industry, transport, electricity, mining, etc;
- Aquatic Habitats (morphology of rivers, lakes and seashores) - aggravated by intensive agriculture, soil erosion and construction of infrastructure.

2.4 DETAILED REVIEW OF LEGISLATION WITH DIRECT IMPACT ON WATER CONSERVATION, WATER QUALITY, WATER MANAGEMENT AND THE REQUIREMENT FOR WATER SOURCES FOR DRINKING WATER SUPPLY

2.4.1 *Water conservation*

Principles governing the conservation and protection of water, understood as an element of the environment and natural resource find their place in the Water Act - especially in Chapter Eight "Water conservation and water bodies". In this part of the act are concentrated most of the provisions transposing the basics of the Water Framework Directive. The forms and requirements for water protection are mostly those law measures for achievement of good chemical status of the water and water bodies; the quality of surface and groundwater; ecosystems and areas of protection; mode priority and priority hazardous substances; pollution prevention and disability; protection of groundwater through the set thresholds of contamination; determination of water bodies and areas of protection; emission standards and emission limitations; sewerage systems and wastewater discharge. In order to protect the water resource areas for water protection are being identified as special objects for water protection from depletion, pollution and damage. These include water bodies containing mineral waters, areas of water protection and sanitary zones around water intake facilities for drinking water supply and around water abstraction facilities for mineral water used for treatment, prevention, drinking purposes, bottling, hygienic goals, sports and recreation. Areas for water protection are defined in the development plans for river basin management and are subject of water monitoring in each basin management under Ordinance № 1 of 11.04.2011 on water monitoring.

The system is supplemented by regulations that import requirements on quality indicators of water used for various activities – Ordinance No 1/10.10.2007 on the study, use and protection of groundwater, Ordinance No. 6 of 09/11/2000 on the emission values of admissible content of

harmful and dangerous substances in waste waters discharged in water bodies, Ordinance No. 18 of 27/05/2009 on the quality of waters used for irrigation for agricultural products, etc.

The bulk of the regulations provided for in Ar. 135 of the Water Act are mainly directed at the protection of water quality and water bodies as part of the environment. Besides water quality, the law covers, though not quite in detail, issues related to protection of water quantity and water resources through the provision of required minimum flow in the rivers, anticipating norms for water consumption.

In this part of the Water Act are the basic requirements for construction and operation of sewerage systems and requirements for waste water discharge. Later, in Chapter Ten "Water Management" of the WA, issues of water conservation and measures related to water quality are set as part of the mandatory content of the River Basin Management Plans (RBMP) through mechanisms for setting goals for environmental conservation, characteristics of the basin areas, programs of measures for RBMP, monitoring programs of water and the principles and rules for construction of the National System for Water Monitoring and water bodies.

Without being a separate sector, but with certain qualities of separate and clearly distinct subsystem in the legal framework of the water sector, the specialized legislation dedicated to quality of drinking water, bathing water and the forms of special use of the mineral waters should be viewed independently. The monitoring and control of them is a joint task of both the environmental authorities and the health care system authorities.

2.4.2 *Water quality*

The questions about the health aspects of the use of water are regulated on different legislative levels. All three acts – the Water Act, the Health Act and the Environmental Protection, treat water as a vital component of the environment, whose condition and quality is a criterion for

proper water use, welfare and one of the most important factors for the health of the population.

Health aspects of water use are mostly represented in the legal framework governing the protection and control of water quality for drinking purposes, the mineral water intended for drinking or preventive, curative and sanitary and water quality, water for bathing, as these are the main features of the health authorities in the field of water, which in many cases are interwoven and combined with the functions of the environmental authorities, especially in the field of water protection and water bodies.

The basis for state policy on protection and use of water is in the EPA, Section II "Protection and use of water and water bodies." The first priority of this policy is determined to achieve good status for all waters - underground and surface, to ensure the necessary quantity and quality of water for drinking and household needs for present and future generations and favorable condition and development of ecosystems and wetlands. There are general guidelines for protection of surface and groundwater in the process of their use. Listed are the activities of management and use of water and their relation to other certain activities and public health functions in relation to the monitoring and control of water quality for drinking water supply, water for bathing and the use of mineral water for drinking, treatment and other needs and also, the requirements to the activities associated with the regime and the treatment of wastewater. The power of the Minister of Health in the aforementioned areas are expressly settled, including his/her power about the use of mineral water - from bottling it for drinking to its use for hygienic purposes and sports and recreation.

This part of the legal framework contains these regulations that define as objects of public state property innermost belt of the sanitary protection zones of water sources and facilities for drinking water supply - public state property, and sources of mineral waters. Also, the texts

about the joint competence of the Minister of Health and the Minister of Environment concerning the determination of the priority hazardous substances in order of protection the waters, should also be mentioned. There are also forms of protection of water for drinking purposes and the relationship of these texts from the WA with some of the regulations on water and the areas of water protection, incl. the sanitary zones around water intake facilities. Under Article 135 of WA, the Health Minister, together with the Minister of Environment and other ministers have the obligation and competence to issue nine regulations relating to various aspects of the protection of surface and groundwater and water bodies and quality control water for drinking purposes and bathing water. One of the most important regulation acts is Ordinance No 3 from 16.10.2000 on the terms and conditions for research, design, approval and operation of sanitary protective zones around water sources and facilities for drinking water, and sources of mineral waters used for therapeutic, prophylactic, drinking and sewerage, issued jointly by the Minister of Health, Minister of Environment and the Minister of Regional Devolopment.

Outside of the above competences, the other competences of the health authorities in the field of water are directed to the groups of powers that regulate the implementation of the regulations, a separate group of supervisory powers, including powers in administrative penal part of WA. In coordination with the WA, there are developed principles and specific groups of legal norms for that part of the organization and directions of activities of the health authorities, which is in direct connection with their tasks in the field of water quality. These provisions were developed in the section on the state health control, where the tasks of the health authorities are subordinate to the principal concepts and requirements to the sites of public and factors of the living environment. There are the basic texts, dedicated to providing a healthy living environment, where water for drinking purposes, bathing water and mineral water have been identified as a major factor of the living environment.

Ensuring healthy living environment is one of the main directions of the activities of the Health Act, related to the protection of public health, including through maintaining a national system for analysis, evaluation and control of various pollutants factors of the living environment. In this direction are involved complex health requirements for sites with public designation, products, goods and activities of importance to human health, and the whole system of the state health control, powers and resources available to them in the Health Act. In the part of the law concerning the legal regime of resorts and resort activities, the topic "water" in the direction of the mineral water resort is affected as resource and object of protection, including by copublishing regulations by the Ministers of Health and Environment. In the AP, as objects of public importance are defined certain water sources and mineral water sources, water supplies and facilities for drinking water and swimming pools, beaches and bathing sites, and as factors of the living environment - water intended for drinking and household needs; water intended for bathing and mineral water intended for drinking or for use for prophylactic, therapeutic or hygienic purposes.

Implementation of the requirements of legislation for drinking water is entrusted mainly to the two entities - the water supply organizations, structures, operating the activities of water supply for drinking purposes, and the regional structures of the Ministry of Health, in their capacity as competent supervisory body. The activity of the regional structures in the field of drinking water includes few several directions:

- Monitoring / sampling and laboratory analysis / of the quality of drinking water;
- Control / inspections and audits / of the sanitary and hygienic condition of facilities and equipment for central drinking water supply – water sources, water intake structures, sanitary zones, water treatment plants for drinking water, chlorination and other plants to disinfect water tanks, etc;

- Taking administrative penalty and other measures when there are discrepancies in the quality of drinking water and violations of the hygienic regulations about the water supply;
- Research and analysis of the problems with drinking water, preparation of projects and programs for solving them.

Another significant part of the secondary legislation are the provisions on health requirements for water sources, basic health requirements for water intake and water supply facilities, Foreign aqueducts and water networks, the requirements for purification and disinfection of drinking water in the central water supply system, health conditions in the work of chlorination stations, requirements for sewerage systems and public health requirements for local water sources and mineral waters.

2.4.3 *Water management and water sectoru*

Water management is one of the most important aspects of government. From the perspective of state government each of its aspects can be characterized as a kind of legally regulated activity for managing and conducting the state policy to a range of public relations, united in selected sign. Prosecution of State and other legally regulated powers by the authorized state authorities at national and regional level, according to the scope and depth of specific legal regulation, is intended at guiding and regulating the relations between individuals in the sphere of public life.. As part of the analysis on legal definitions and terminology is examined how the legislature has defined the subject of legal regulation and management of the objects in the initial text of the law.

In WA legislature has used the opportunity to further define the object of government, and said the main existing sectoral trends in the activities of water use and water bodies. On this basis the

legal framework contains several complex and specific mechanisms of process management in the water sector, as follows:

2.4.3.1 Management by organization and distribution of the sectoral competence of state authorities.

The distribution of responsibility for various aspects of government policy in respect of the groups water supply systems and installations, the law has used a sectoral approach and has referred the activities of water supply and sewerage, hydropower and irrigation and drainage and protection from the harmful effects of water, connected them to sectoral competence of the ministers. This mechanism is complemented by the mechanism of control through a common, collaborative and sectoral competence of administrative Authorities for the adoption and implementation of relevant regulations at the regulatory level– rules, regulations, orders, instructions,also other complex mechanisms by sector principle - hydropower, water supply, irrigation, etc., up to eight directions in the legislation including the mechanism of management of water operators companies in the form of equity participation of the state and municipalities. Subspecies and a special mechanism is the order management systems of water supply and sewerage and water supply operators governed by a WA Association for Water, where the mechanism of management of reconciling power of two ministers, regional governors and representatives of local government in the face of municipal councils and mayors of municipalities.

2.4.3.2 Management by the ownership regime.

Certain objects are the types of management and ownership of them - outstanding state, public, state, private state, municipal public, private municipal, private property of individuals and legal entities. Additional aspects of the legal regime of the ownership developed by institutes of ownership, acquisition and restriction of property rights, land and other

easements.Arranged various objects of property rights – water, water bodies aquaculture systems and installations, and in applications of WA are also some special objects with different legal regime.

2.4.3.3 Management by legal regime of water use and the water sites.

This is one of the essential mechanisms of governance that determine the types of water use and the water sites as a general and individual consideration and free of charge, with permits and free Are separate subsystems and various forms of exploitation by assigning different sites and different uses - water abstraction, use of bodies of water discharge and others. The development of this mechanism continues through management by administrative authorization for human use which are covered in detail the possible licensing arrangements for water abstraction and use of water bodies. Regime of integrated permits under the Environmental Protection Act.

2.4.3.4 An independent mechanism represents The management by legal regime of special objects and special usage rights in the use of mineral waters.

The specifics of this mechanism stems from the exclusive state ownership of certain group water sources and mineral waters in them, which are Annex № 2 to Water act, and it is repeatedly reflected in the amended set of legal norms devoted to the concession of mineral water bottling and other needs, and the legal framework developed special procedures for these concessions, which is the special legislation against the general order and mechanism under the Law on Concessions.

2.4.3.5 Management of water use and water bodies via complex rules and requirements for water protection.

This mechanism is more complex and includes a number of rules relating to the conservation and regime of protection zones of water and sanitary protected areas, permissible emissions of the wastewater, the condition and protection of water and water bodies, as are provided a set of administrative and substantive law obligations and consequences. In this part we can treat and a special device mechanism of Managing of water quality for drinking purposes and bathing water, which includes in itself and special powers of health authorities.

2.4.3.6 Managing of water use through tariff policy.

This is the mechanism of management through the introduction of various taxes that the state collects from water users for the implementation of the licensing regime under water.

2.4.3.7 General-purpose management by complexes of power to the main government.

This mechanism includes expressly provided for in Chapter X "Water Management" of WA complexes of specific powers in water management and water sector of the Council of Ministers, Minister of Environment and Water Basin directors, ExEA, RIEW and others, who ensure through the powers and public administration duties apply other mechanisms of management of the sector. In this group are included the special powers of the Minister of Health and subordinate structures in the area of water conservation and water quality for drinking purposes and bathing with total focus on protecting human health.

2.4.3.8 Management by economic regulators.

This mechanism has a complex character and covers financing rules and applying of other economic mechanisms and regulators of the processes in the water sector, including through price regulation of water services. The mechanism is not settled only in one act and is scattered in different directions and acts of the legal framework of the water sector. As a subset of this mechanism of management in the sector " Water Supply and Sewerage" can be mentioned the new mechanism of management the activities and investments in Water Supply and Sewerage through the 25-year-old regional master plans for Water Supply and Sewerage and master plans of Water Supply and Sewerage for agglomerations with over 10 000 PE and 5-year investment programs to them. According to WA it will be crucial for the implementation of other subspecies complex mechanism for management of the WSS operators - - 5-year business plans, prices and quality of water supply services incorporating all the important aspects of the activity of each WSS operator according to the "Act to regulate the water supply and sewerage services" and regulations. Those plans and investment programs relating to certain conditionality to economic regulators because they should contain to a large extent technical, operational and construction part.

2.4.3.9 Management through administrative control and administrative penalties.

This mechanism includes a set of powers and responsibilities of different authorities to exercise administrative control over the observance and implementation of the legal framework and powers to impose on the persons and offenders coercive measures, fines and other administrative penalties provided mainly in the Water Act . This group includes the opportunities for financial penalties, and bringing civil claims for damages, which to some extent can be assigned and to the mechanism of management by economic regulators.

2.4.3.10 Management through priority regimes.

The special regime of the rules of conduct, specific requirements and special effects, set out in the section of WA, dedicated to the protection from the harmful effects of water, is a basis for the formation of this way of managing of a certain circle of relationships between public authorities, the owners and users of hydraulic structures and water bodies and all other institutions and individuals who may be a subject or be affected by the harmful effects of water, in an independent mechanism of management through the introduction of specific priority regime. These norms have extraordinary nature and regime of priority implementation in a certain cases, which limits or modify the rights and forms for the implementation of the other management tools.

2.4.3.11 Management through regimen schedules of complex dam lakes.

This is a specific and concrete mechanism consisting in the powers of the Minister of Environment and Water to fix monthly regimen schedules for abstraction of complex and important dams included in Annex № 1 to WA and to determine the procedure and manner the use of water of these dams, including the procedures for emergency release of water from them.

2.4.3.12 Managing through The river basin management plans (RBMP) and The plans for risk management of irrigation (PRMI).

The mechanism of management by RBMP is completely new for our legislation and is in very initial stage of implementation. Because of the particular importance of this mechanism and its complexity the analysis of this part of the legal framework and content of the RBMP are considered together in this section of the analysis.

The first plans for river basin management in Bulgaria have been approved by the Minister of Environment and Water in March 2010.

So far this mechanism is the most comprehensive, detailed and comprehensive tool for managing processes in the water sector and can generally includes in itself full and partial implementation of all the other mechanisms of management of water use. The main focus of the RBMP is to protect water and the environment regardless of the distribution of administrative and managerial competence between the various structures of state and local authorities, forms of ownership and the structure and management of water operators. However to achieve these goals, RBMP in its preparation and accompanying analysis, as well as their components must pass and should be coordinated with those essential for the organization of water sector issues.

In the beginning it should be noted that each of the main elements of RBMP, namely the analysis and characterization of the river basin management, the register of areas of water protection, the identification of bodies of water for drinking, monitoring systems and programs of measures, all of them have a double purpose in the new legal framework established by Directive 2000/60 / EU policy framework in the water sector, respectively fully transposed into our Water Act.

On the one hand, they are regulated as independent elements of the legal framework for water policy and in the most part they should have been specified and implemented before the entry of the first RBMP into force. In this sense, they are designed to prepare the development of the first RBMP. For each of these elements the Directive, respectively the Law are provides specific requirements and in most of the cases and individual Applications as well as for different periods of development or implementation.

At the same time the legal framework linking these terms in a particular cycle, which is oriented to the basic deadlines and cyclicality of action of the RBMP , so that to keep in the time the preceding role of these elements. The review or update of any of these items, with the exception of environmental objectives and partly of the programs of measures to achieve them, which grow together with , keep development with one or two steps in front of the update of the RBMP. In this sense RBMP are not only one act administrative action or documents with a specified by law content, and RBMP are a mechanism in the development of compulsory set trends for continuous self-renewal and change. On the other hand, the law treats each of the elements as an integral part of RBMP without any of which it could not work and achieve its goals and objectives of the Framework Directive, it to be the complex legal, administrative, programming and simultaneously working tool for policy implementation in the field of water.

2.4.3.12.1 *Content of the river basin management plans*

In the Water Act has two texts dedicated to the content of the RBMP. The first is in the provision of Article 149, which in four points requires during the development of river basin management plans to set the goals for environmental protection, waters intended for drinking water supply; areas for water protection and programs of measures. Subparagraph 2 of this article requires in the development of RBMPs to be performed characterization of area of basin management. This is a general text in the law and the second one, the one of the Article 157 already provides detailed regulation of the content of the RBMPs.

In fact, Article 157 of WA literally recreates part "A" of Annex VII to Directive 2000/60 / EU, as stated in 12 points the required content of the RBMPs for each region with basin management in Bulgaria, namely:

p.1 requires a general description of the characteristics of the region with basin management in accordance with Section IV of WA, including and the relevant maps.

p.2 prescribes as the next element of the RBMPs the brief review of significant pressures and impact from human activity on the status of surface and groundwater, including estimates of pollution, the amount of water abstractions and other impacts of human activity.

p.3 - p.5 are devoted to the maps of protected areas, maps of monitoring networks and maps with the results of the monitoring of surface water and groundwater areas and water protection.

p.6 of Art. 157 WA indicates one of the most essential elements of RBMPs - The list of goals for environmental protection for surface and groundwater and areas of water protection, accompanied by relevant information, including the four forms of possible extensions, deviation or transformations in setting of environmental goals which the Framework Directive allowed as exceptions. In our Water Act these are the texts of chl.chl.156в - 156е.

p.7 of the same Article requires as content of the RBMP brief overview of the economic analysis of abstraction.

p.8 of Article 157 of WA is with the largest content, because in 11 sub points, from "а" to "л" defined the lists of different types of measures which should accompany the main brief overview of the programs of measures for achieving the objectives of environmental protection.

p.9 prescribes as register content of all other similar programs and plans in the scope of region, which relate to the sub-basins, sectors, issues and types of water, including a description of their content.

p.10 of Article 157 of WA is a key because regulates the interaction of the responsible, competent government administration with the public in the process of coordination of RBMPs by requiring a list of measures for discussion with the public, the achieved results in the implementation and the related changes to the plan. Outside the text of Art. 157 there is one more provision in this regard and the text of Art.168v, which states that the pleadings to the

public via the documents for the project of RBMPs are an integral part of the documentation to the RBMPs.

point 11 of Article 157 required in RBMPs to be indicate the name and address of the competent authority for water management. The text of Annex VII in conjunction with Annex I to the Water Framework Directive is more detailed, because prescribe unless the address and name of the authority for water management, but to indicate and the normative grounds, its place in the system of controls, the nature of its jurisdiction, and some other data.

The last point 12 of Article 157 required RBMPs indicate the contact persons and procedures for obtaining the documentation and the information under Section VII and those associated with the programs of measures and monitoring data under Section VIII of the Water Act.

2.4.3.12.2 *Content of the RBMP in update.*

In Article 159 The Water Act reproduces the contents of part "B" of Annex VII of the Framework Directive, and in Four Points gives the necessary additional content of the RBMP, except as provided in Article 157, which each RBMPs should have in his update. All four points are related to the performance evaluation of the initial RBMPs and any deviations from its provisions. This group includes:

- A list of all modifications or updates for the previous period, including a review of the circumstances under chl.156 в- 156e of WA;

- Estimate the degree of fulfillment of environmental goals and explain the reasons for not fulfilling the goals;

- List of not taken measures from the previous plan with an explanation of the reasons;

- A list of additional measures from Article 156o of WA

These texts are indicate as an illustration of special self-control mechanism, which is enshrined in the structure of the RBMPs and related with the mechanisms and the obligation of each member state in the EU for periodic reporting to the European Commission about the progress in the implementation of European directives on waters and the RBMPs, apparently is intended to ensure the effective result from implementation of this complex mechanism about water management. The mechanism is arranged so that all cases about delay or failure to targets on the status of water and water bodies are included in the RBMPs and its timetable for implementation, until they have been achieved or until measures of the programs are not fulfilled.

In terms of governance mechanisms most essential part of RBMPs are the programs of measures for achieving the objectives of protection of water and environment and the extent of obligation to those programs for all entities in the water sector and their responsibility for their implementation. Since this issue has not been resolved so far nor from the Water Act nor from any other act of this magnitude, nor in themselves RBMPs, then this matter is referred to the relevant section of the analysis, which considered the problems of the legal framework of the water sector.

Systems and mechanisms of managing the processes in the water sector would hardly be possible without the systems for Monitoring the status of water and water bodies and the rules and obligations for construction and maintenance of the National System for Water Monitoring which are provided in the Water Act and Ordinance № 1 of 11.04.2011 on Water monitoring. The data from the systems about water monitoring should provide the necessary basis for almost all management decisions and the implementation of mechanisms of management in every field of activity in the water sector, but the process and mechanisms of monitoring cannot be attributed to the mechanisms of control - they rather presupposed and serve them. However, as far as the legal framework provides obligations and guidelines for the specific

conduct of state authorities, institutions, water operators and water users related to the monitoring of water and water bodies and objects, it is also to some extent a mechanism for governance in the water.

In sectoral respect the management of activities and water development and / or hydraulic systems and equipment related to water use and water bodies, is largely complies with those laid down by WA and listed above basic mechanisms of management so that no legal or other grounds in the analysis to examine further any particular sectoral management tools.

2.4.4 *Requirements for water sources designed for drinking and domestic water supply*

By Ordinance № 3 of 16.10.2000 on the terms and conditions for research, designing, approval and operation of sanitary and protected areas around water sources and facilities for drinking and domestic water supply and around the sources of mineral waters used for healing, prophylactic, drinking and hygiene needs are determined terms and conditions for study, design, creation, approval and operation of sanitary protection zones (SPZ) around water sources and facilities for (1) drinking and domestic water supply from surface waters; (2) drinking and domestic water supply from groundwater; (3) mineral water used for therapeutic, prophylactic, drinking and hygiene needs.

The choice of water source is one of the most demanding tasks in the design of water supply systems.

It largely determined the character of the water system itself, and the facilities on it, and therefore the cost of construction and operation.

The water source must:

- to provide the required amount of water throughout the whole operational period;
- to have such power that not disturb the ecological system of the area after abstraction;
- to ensure continuity of the water supply;

- to ensure a certain quality of water, even with view of its eventual purification;
- to supply water with the lowest possible investment and operational costs;

Water sources are:

- surface water bodies or parts thereof;
- water intake facilities for underground, including and mineral waters.

Sanitary protection zones are areas around the water sources that surround a particular area, they benefited from special status and the activities that can be carried in them, are strictly regulated.

Sanitary protection zones are mandatory established for water sources for drinking and domestic needs, and around some other facilities of water supply system and the definition of SPZ is done through a project which is an integral part of the project of water supply system.

Sanitary protection zones provide:

- Physical security of the water supply and / or installation;
- Protection against entry of pollutants into the water sources;
- Ensure of the project quantity and quality of waters in water abstraction facilities for the duration of the permit for water use;
- Save the water sources in a state, allowing its use for drinking purposes by future generations.

Sanitary protection zones consist of:

- internal belt I - for security of the water source from a direct negative impact; belt I is an integral part of the water source and it only activities directly related to the operation;
- middle belt II - for protection of water sources from contamination with chemical, biological and others short- decomposing substances and activities leading to the deterioration of the water sources;

- external belt III - for protection of water sources from contamination with chemicals and others. slow-decomposing substances and activities leading to the deterioration of the water sources;

2.5 COMPLIANCE ASSESSMENT OF DIMITROVGRAD'S EXISTING WATER SUPPLY SYSTEM AND THE WATER FRAMEWORK DIRECTIVE

Based on the analysis of the legal framework, Dimitrovgrad's water supply network's current situation, in accordance with the Regional plan for Dimitrovgrad's "Water and sewage" Ltd and the data provided by the "Water and sewage" Ltd, a compliance assessment with the water framework directive 200/60/ EU of the urban places that the company serves was made.

Dimitrovgrad is the only city with a population of over 10 000 people that meets the requirements for quality and quantity of the water supplied to the customers.

The next largest city with a population of less than 2000 people is Merichleri. It has 100% connectivity to the water supply network and meets the requirements for quality and quantity of the water supplied to the customers

The rest smaller towns which are not a part of the current assessment meeting the requirements are: Brod, Voden, Dobrich, Kasnakovo, Krepost, Krum and Svetlina.

3 POLLUTION OF WATERSOURCES, DETERMINING THE AREAS WITH POTENTIAL RISK OF POLLUTION OF WATERSOURCES

The potential threats of water pollution on the territory of W&S Dimitrovgrad Ltd are one of the significant issues which have negative impact on the quality of surface and underground water.

Pollution of surface and underground water is mainly due to untreated waters discharged by the citizens and manufacturing enterprises.

Livestock farms and poultry farms contribute to soil and water pollution in the absence of effective control and management of waste waters and manure.

Transport companies also pollute the soil and water with oils and other petroleum products.

Agricultural land is fertilized without applying good practices.

The uncontrolled piling up of wastes, waist depos that do not meet the requirements and regulations contribute to the environmental pollution.

The pollution influences surface and underground waters in the outflow areas.

3.1 MAIN SOURCES OF POLLUTION

3.1.1 *Industry –a source of waste water pollution*

Leading industries for Dimitrovgrad Municipality are: the chemical, coal and energy industries. Typical of the municipal economy is the predominant importance of large industrial enterprises providing employment and income for the majority of the population of the municipality. The leading companies in the municipality are "Neohim" Ltd, currently with the most modern plant for of ammonia production, nitric acid and ammonium nitrate; "Vulkan" Ltd, producing cement and asbestos coatings, and "Climatech" Ltd, producing air conditioning air-purifying and heating

equipment. The „Maritsa 3"TPP is also located in the municipality. Small and medium-sized companies predominate in the textile, knitwear and food industry sectors.

Companies with foreign participation are in the industry sector, trade and service industry. Dimitrovgrad is one of the first cities among all other municipalities in volume of foreign investments. In the agricultural field vegetables, fruit crops and cereal crops are the most common for growing in the municipality. Of great importance for the development of the municipality is Dimitrovgrad's marketplace for industrial products, which is one of the biggest markets on the Balkan Peninsula.

On Dimitrovgrad's territory located on the right bank are the following larger industrial companies:

- "Neohim" Ltd – nitrogen fertilizers,
- "Maritsa 3" TPP,
- Railway station and locomotive depot,
- "Atlas" Ltd. – car seller.

As well as other small companies – mainly auto services and carwashes

Most of them use water from the urban pipeline, mainly for household and hygiene needs of workers. Some of them use the water for manufacturing purposes, but in very small amounts and this does not require equipment for equalization of runoff to the urban sewerage.

"Neohim" Ltd. And "Maritsa 3" TPP do not use the urban sewage system. They have local Water Treatment Systems and after that the water flows into the river.

There are no large companies for production of food and drinks.

- *Electricity production* – "Maritsa East 3" TPP - The plant consists of 4 condensing monoblocks: boiler-turbo-generator-transformer, with a total capacity of 840 MW. The average annual output is 4 billion 310 million kilowatt-hours of electricity. The annual usability of the installed capacities is nearly 22,000 hours. For the first time at Maritsa East 3 TPP, a scientifically based scheme for direct burning of low calorie lignite was applied. The plant produces approximately 9-10% of the total electricity for the country / Maritsa East complex is included with 33% in the total energy balance of Bulgaria.
- *Chemical industries* –it is represented by:

- "Polihim" Ltd. - production of small chemical products, including chemicals, reagents, pure substances, anti-overheads, tartaric acid, salts, etc.
- „Neohim" Ltd. Starts its manufacturing on 5th Nov 1951. Initially nitrogen and phosphorous fertilizers were produced. Subsequently, extensions, reconstructions and modernizations of production facilities were made;
- «Evro Fert» Ltd. – fertilizer production;
- «Interior» Ltd – production and marketing of alkyd paints and varnishes, latex and façade paints, adhesives, thinners;
- «Vulkan» Ltd. – production of cement.

Table 6 Pollution sources and quantities, discharged into the river water for the town of Dimitrovgrad

River Basin	Pollution Source	Volume of Wastewater discharged to receiving water [million m^3/year]	Pollution load discharged to receiving water [kg BOD/year]	Pollution load discharged to receiving water [PE]	Assessment (compliance with discharge permit for waste water, treatment level)
Maritsa River	Dimitrovgrad WWTP	3.285000	6 570	300	100 % treated
	Krumska Terasa DWTP	0.00280	84	4	Backwash water from the filters pass through sedimentation tanks, where sludge, mainly consisting of removed manganese and clarified water is discharged into Dobrichka River. The treatment plant is remote from the water sources and practically, it does not affect water quality.
	Domestic Solid Waste Landfill		No data	No data	There is no study on the quantity and quality of infiltrated water.
	Agriculture		No data	No data	No data

*The data is provided by The Regional Plan of W&S Dimitrovgrad Ltd.

Georeference of the main water supply facilities and places with a potential risk of fouling of water sources.

4 MAINTENANCE (GEOFFERING) OF THE MAIN WATER SUPPLY FACILITIES AND PLACES OF POTENTIAL RISK OF WATER TREATMENT.

4.1 MAIN WATER SUPPLY FACILITIES SERVING THE CITY OF DIMITROVGRAD

4.1.1 *PP "Krumska terasa"*

it consists of 20pcs. tubular wells that directly feed water into the DWTP.

- Location – It is located on the right bank of the Maritsa River, about 5 km. west of the city of Dimitrovgrad.
- Coordinates ≈ 40°03'47,00 N 25°32'23,80 E

4.1.2 *PP "Chernogorovo"*

It consists of 9 tubular wells.

- Location –It is located on the western side of the Dimitrovgrad – Chernogorovo road
- Coordinates 42° 2'27.16"N 25°38'28.83"E

4.1.3 *PP "Merichleri"*

- Location – It is located in the Chernokonevo district
- Coordinates 42° 07'18.56" N 25°52'52.93"E

4.1.4 *PT "Goren Gaber 1" V=8000 м³*

- Location – It is located in the Gabera area (Penyo Penev park),in the southern part of the city of Dimitrovgrad

- Coordinates 42° 2'40.80"N 25°35'35.86"E
- Altitude 166 м.

4.1.5 *PT "Goren Gaber 2 V=1660 м³*

- Location – It is located in the Gabera area (Penyo Penev park),in the southern part of the city of Dimitrovgrad next to "Goren Gaber 1"
- Coordinates ≈ 42° 2'40.80"N 25°35'35.86"E
- Altitude 166 м.

4.1.6 *PT Mariyno V=4000 м³*

- Location – It is located north of Mariyno area
- Coordinates - 42° 4'43.45"N 25°34'10.34"E
- Altitude - 151 м.

4.2 AREAS WITH POTENTIAL RISK OF POLLUTION OF WATERSOURCES.

4.2.1 *Industrial companies*

- "Neohim" Ltd. – nitrogen fertilizers, - Located in the East Industrial Area with approximate coordinates 42° 2'58.37"N 25°37'5.38"E
- Maritsa 3 TPP - Located in the Eastern Industrial Area 42° 3'8.25"N 25°37'26.00"E
- railway station and locomotive depot, - It is located on the western side of Stara Zagora-Haskovo road with approximate coordinates - 42° 3'3.16"N 25°36'16.02"E

- "Atlas" Ltd - car service. It is located in the northern part of the town in residential complex "Drujba".
- „Vulkan"Ltd. – It is located in Vulkan district.

Chemical Industry - represented by the following companies:

- "Polihim" Ltd. - production of small chemical products, including chemicals, reagents, pure substances, anti-therm elements, tartaric acid, salts, etc.
- "Neochim" Ltd. - production of nitrogen and phosphorous fertilizers.
- "Evro Fert" Ltd. - production of artificial fertilizers;
- "Interior" Ltd. - production and trade of alkyd paints and lacquers, latex and façade paints, adhesives, thinners;

5 IS AN AUTOMATIC MONITORING SYSTEM NECESSARY? A NEEDS ASSESSMENT AND ANALYSIS

5.1 DETERMINING NETWORK "CONFLICT" POINTS THAT NEED ADDITIONAL AUTOMATIC QUALITY AND QUANTITY MONITORING AND AN EARLY WATER POLLUTION WARNING SYSTEM.

The main goal of the project is to improve the quality of drinking water and reduce health risks. This will be achieved by introducing an innovative early warning system for water pollution and a remediation system .

This will be achieved through the installation of telemetry stations with a water quantity readout, pressure sensor and sensors to monitor the quality of the sites allowing both the control of all the main water sources in the city and the information on the quality and quantity of the water supplied to the main areas of the distribution network.

The city of Dimitrovgrad is supplied with water mainly from two places – PT "Goren Gaber" and pumping station for water purification „Krum"

5.1.1 *Monitoring point 1 (MP 1)*

MP 1 is located in Gabare quarter over the ring road between Stara Zagora and Haskovo. The water is pumped into the municipal water tank with a volume of 8000 m3. After MP 1 there is a pressure regulator. The apparatus will be installed on the Eternit DN475 at the beginning of the water supply area.

Water from PT "Goren Gaber" supplies the central and east parts of the city, residential areas Marijno, Vulkan, Chernokonevo, the town of Merichleri and the village of Velikan. Approximately 80% of the water flow passes through the point.

5.1.2 *Monitoring point 2 (MP 2)*

MP 2 is located in a shaft with a water meter and an airspace on a DN200 Eternite pipeline. This is the pipeline that supplies the city directly from the DWTP pusher. The shaft of MP 2 is located in the southern part of the town, at the beginning of Vaptsarov Park. Through MP 2 flows about 10% of the water supplied from the DWTP pusher.

Installing MP 1 and MP 2 will assure the control of the quality and quantity of all the water supplied to the city.

5.1.3 *Monitoring point 3 (MP 3)*

MP 3 is located on a DN 200 pipeline connecting the central and northern part of the city. The shaft of MP 3 is located on the right bank of the Maritsa River just before the bridge. A shut-off valve is installed in the shaft. MP 3's water passed to the PT "Mariyno" and the residential areas in the northern part of the city.

By measuring the quality and quantity of water entering the city (MP 1 and MP 2) and the water passing through MP 3, an analysis of the water consumption in the central part of Dimitrovgrad can be made.

5.1.4 *Monitoring point 4 (MP 4)*

The equipment will be installed on a DN450 water pipe at the beginning of the water supply area, which covers Mariyno, Vulcan, Chernokonevo and Merichleri.

MP 4 is located in the Mariovo district of the water supply pipe from a 4000 m^3 water reservoir in a shaft with a pressure regulator.

For operational reasons, at present the Mariyno residential area is supplied by the PT "Goren Gaber 1" network and the monitoring of the quality and quantity of the water supplied to the neighborhood is carried out by the MP 3.

5.1.5 *Monitoring point 5 (MP 5)*

MP 5 is located in the hydrophore pumping station "Merichleri" - a new one located in Chernokonevo.The town of Merichleri and the village of Vulkan are supplied with drinking water form the DWTP. The equipment will be installed on a PE water pipe DN140 at the beginning of a water supply pipe for the town of Merichleri.

The commissioning of the five permanent monitoring points will provide data on the basic hydraulic parameters of the whole distribution network of Dimitrovgrad as well as the water supplied to the town of Merichleri and the village of Velikan. The information gathered will provide an opportunity to analyze the trends in the areas with regard to water consumption, water quality and pressure change and the implementation of adequate measures to combat physical losses, clogged leaks and contamination of drinking water with manganese. Suggested points for additional monitoring are in close proximity to the RT from which they are supplied. In this way, installing sensors and remote controllers for water quality will in practice provide reliable monitoring of 2 of the 3 RTs that feed the city. To summarize, the recommended points for remote monitoring and management will contribute to the development of the water supply system of Dimitrovgrad and Merichleri in two directions. First of all, the exploitation of the network will be greatly facilitated thanks to the continuous monitoring of key hydraulic indicators and decision-making on the basis of real trends in the change in observed parameters. In addition, it will increase the control and reliability of the water supply at the final

stage of the water supply system - the city's distribution network. Last but not least, it will improve the quality of drinking water and reduce health risks.

5.2 TECHNICAL REQUIREMENTS FOR INSTALLING TELEMETRIC STATIONS

In many of the points identified for the development of the remote monitoring and management system, the existing infrastructure is beneficial and will greatly facilitate the upgrade process. In most places with recommended real-time monitoring, there is no power supply and connection to the grid should be considered. For the points in the distribution network, existing shafts have been selected, which need to be upgraded.

Measure	Equipment required	Installation requirements
Installing a water quantity meter, pressure sensor, and water quality monitoring sensors in an existing shaft with a pressure regulator at the beginning of the water supply area. (MP1)	1. Ultrasonic flow meter 2. Pressure gauge 3. Sensors for measuring pH, ORP, temperature, residual chlorine and dissolved oxygen. 4. Terminal station for collecting, processing and sending information	1. Straight section for installing the flow sensor's sensors 2. Sleeve for water supply for the samplers 3. Power supply 4. Ventilation and drainage of shafts
Installation of a water quantity meter, pressure sensor and water quality monitoring sensors in an existing shaft with a water meter on the DN200 E pipeline	1. Ultrasonic flowmeter 2. Pressure gauge 3. Sensors for measuring pH, ORP, temperature, residual chlorine and dissolved oxygen. 4. Terminal station for collecting,	1. Straight section for installing the flow sensor's sensors 2. Sleeve for water supply for the samplers 3. Power supply 4. Ventilation and drainage of

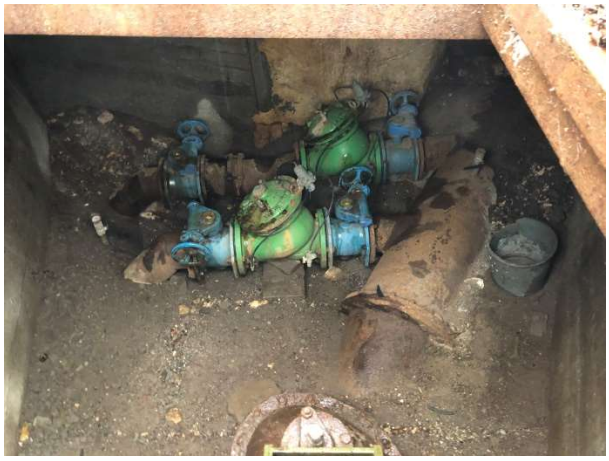
coming from the pipeline of the DWTP (MP2)	processing and sending information	shafts
Installation of water quantity meter, pressure sensor and sensors for water quality monitoring in an existing shaft with a shut-off valve before the bridge over the Maritsa River. (MP3)	1. Ultrasonic flowmeter 2. Pressure gauge 3. Sensors for measuring pH, ORP, temperature, residual chlorine and dissolved oxygen. 4. Terminal station for collecting, processing and sending information	1. Straight section for installing the flow sensor sensors 2. Sleeve for water supply for the samplers 3. Power supply 4. Ventilation and drainage of shafts
Installation of a water quantity meter, pressure sensor and water quality monitoring sensors in an existing shaft with a pressure regulator on the Mariyno PP pipe line. (MP4)	1. Ultrasonic Flow Meter 2. Pressure gauge 3. Sensors for measuring pH, ORP, temperature, residual chlorine and dissolved oxygen. 4. Terminal station for collecting, processing and sending information	1. Straight section for installing the flow sensor's sensors 2. Sleeve for water supply for the samplers 3. Power supply 4. Ventilation and drainage of shafts
Installing a water quantity meter, pressure sensor and water quality monitoring sensors in the Merichleri PP – a new one (MP5)	1. Ultrasonic flowmeter 2. Pressure gauge 3. Sensors for measuring pH, ORP, temperature, residual chlorine and dissolved oxygen. 4. Terminal station for collecting,	1. Straight section for installing the flow sensor's sensors 2. Sleeve for water supply for the samplers 3. Power supply 4. Ventilation and drainage of

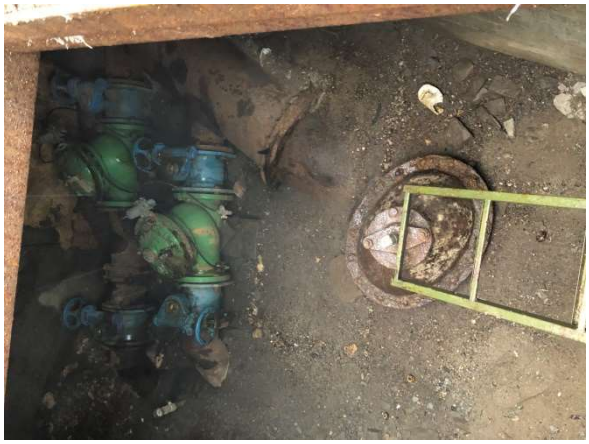
	processing and sending information	shafts

Interreg Greece-Bulgaria Aqua-lity European Regional Development Fund

Application of innovative techniques to improve the quality of drinking water in urban areas - AQUA-LITY

MP 1 – technical possibility

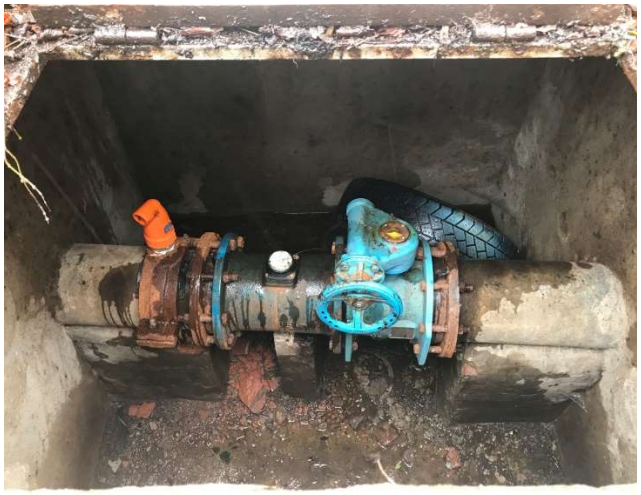


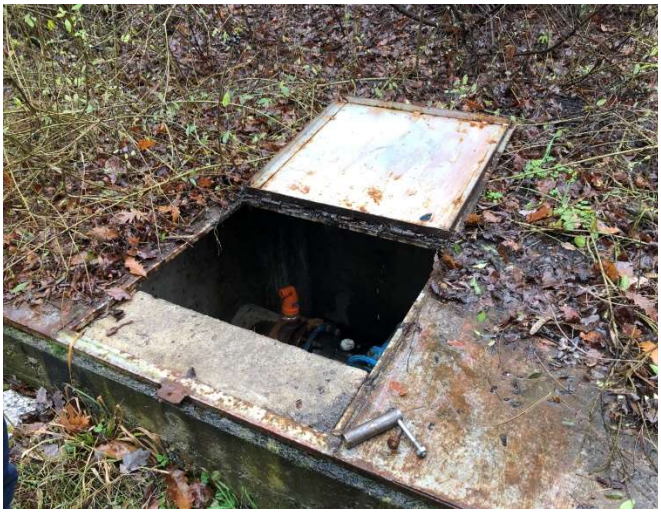


The existing shaft is suitable for installation of residual chlorine and dissolved oxygen sensors, pressure sensor and terminal station. It is necessary to provide electric power, drainage and ventilation of the shaft.

Due to the fact that the pipe is not completely visible, it will become clear whether there are enough straight sections in the shaft for the installation of sensors to measure the after it is excavated.

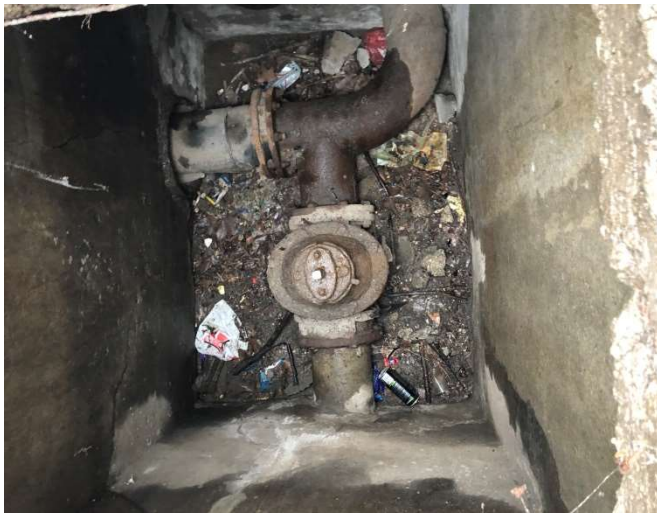
MP 2 – technical possibility

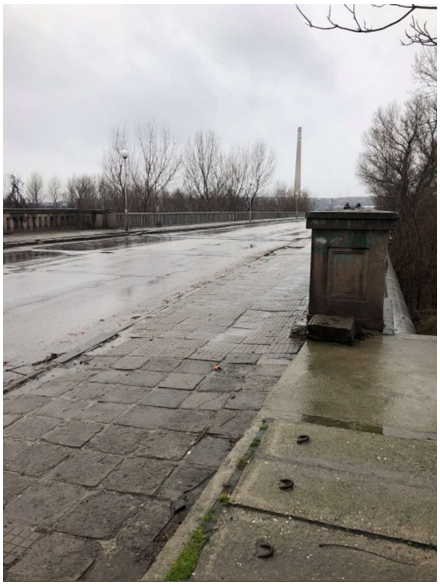




The existing shaft with straight sections is suitable for the installation of a quantity measurement sensor, residual chlorine and dissolved oxygen sensors, pressure sensor and terminal station. It is necessary to provide electric power, drainage and ventilation of the shaft.

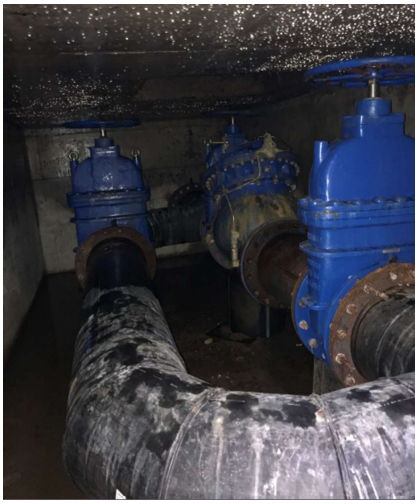
MP 3 – technical possibility





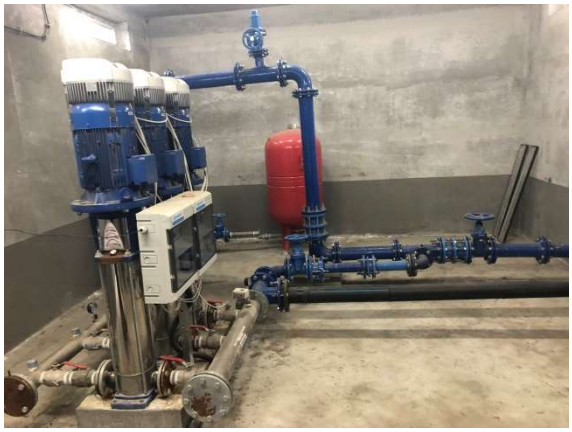
The existing shaft with straight sections is suitable for the installation of a quantity measurement sensor, residual chlorine and dissolved oxygen sensors, pressure sensor and terminal station. It is necessary to provide electric power, drainage and ventilation of the shaft.

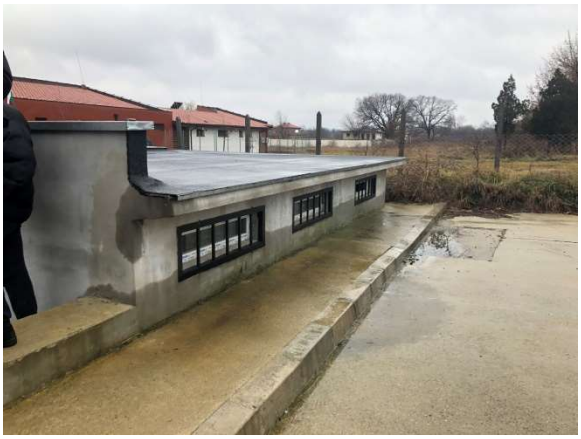
MP 4 – technical possibility



The existing shaft with straight sections is suitable for the installation of a quantity measurement sensor, residual chlorine and dissolved oxygen sensors, pressure sensor and terminal station. It is necessary to provide electric power, drainage and ventilation of the shaft..

MP 4 – technical possibility





The existing PP station is suitable for the installation of a quantity measurement sensor, residual chlorine and dissolved oxygen sensors, pressure sensor and terminal station.

5.3 FINAL CHOISE OF POINTS ON THE NETWORK FOR INSTALLATION OF AUTOMATIC MONITORING FACILITIES

Due to the urgent need to install a monitoring system for basic quantitative and qualitative indicators on Dimitrovgrad's water supply network, it is recommended that the planned pilot installation of five permanent monitoring points be carried out to the lowest level in the water supply system of the town. With minimal construction and investments the selected points for a remote monitoring system can be tailored to fit the required equipment.

With the introduction of the measurement points, continuous monitoring of the water quantities entering the areas covering almost the whole network of the city and data on the pressure change and water quality of the inlet zones will be ensured. In addition, reliable quality control of the drinking water coming from the city's water basins will be guaranteed in real time.

The pilot system will be a good basis for primal zoning of part of the city into large water supply areas with constant input monitoring. The system will provide good prerequisites for future upgrading to the rest of the network or splitting the five pilot areas into smaller ones for more efficient operation.

The direct effect of the installation will be to increase knowledge of basic hydraulic and quality indicators in the network, improve the quality of drinking water and reduce health risks, which will inevitably have a positive effect on the fight against water losses and frequent accidents and will give long-term solutions for system development. Online monitoring of the physical and chemical indicators of drinking water in the distribution network is an innovative approach for the water and sewerage sector in Bulgaria and it will not only ensure increased quality control for consumers in Dimitrovgrad, but also will support the promotion of such systems at national level.