



PROJECT BENEFICIARY 2:
MUNICIPALITY OF DIMITROVGRAD

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

DELIVERABLE 4.2.2
WATER QUALITY ENVIRONMENTAL GUIDE TO BE USED AS TRAINING MATERIAL FOR SEMINARS

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



Content

LIST OF ABBREVIATIONS USED.....	4
1 Introduction.....	5
2 LEGISLATIVE FRAMEWORK - OVERVIEW	7
2.1. NATIONAL LEGISLATION.....	7
2.1.1. WATERS ACT - general regulations.....	7
2.1.2. OTHER LAWS - special regulations.....	9
2.2. EU DIRECTIVES TRANSPOSED IN NATIONAL LEGISLATION.....	11
3. RESPONSIBLE INSTITUTIONS AND ORGANIZATIONS	14
3.1. MOEW.....	14
3.1.1. EEA.....	14
3.1.2. Basin Directorates for Water Management	14
3.1.3. RIEW	15
3.2. RHI.....	16
3.3. W&S OPERATOR.....	17
4. DETAILED REVIEW.....	19
4.1. ORDINANCE №1 FOR THE EXPLORATION, USE AND CONSERVATION OF THE UNDERGROUND WATER - DIRECTIVE 2006/118 / EC ON THE PROTECTION OF SUBSTITUTE WATERS FROM POLLUTION AND ENVIRONMENT.....	19
4.1.1. Scope of the Ordinance	19
4.1.2. Transposition.....	19
4.1.3. More important provisions in the context of the assignment.....	20
4.2. WATER MONITORING REGULATION 1 - Directive 2000/60 / EC establishing a framework for Community action in the field of water policy.....	22
4.3. ORDINANCE № 2 FOR THE PROTECTION OF WATER FROM POLLUTION with nitrates from agricultural sources - DIRECTIVE 91/676 / EEC ON THE PROTECTION OF WATER FROM POLLUTANTS FROM AGRICULTURAL SOURCES.....	23
4.4. Ordinance №3 FOR THE CONDITIONS OF STUDY DESIGN, VALIDATION AND OPERATION OF SPZ AROUND WATER SOURCES AND FACILITIES FOR DRINKING WATER SUPPLY AND THE SOURCES OF	



MINERAL WATERS USED FOR THERAPEUTIC, PROPHYLACTIC, DRINKING AND HYGIENE PURPOSES - DIRECTIVE 80/68 / EU ON THE PROTECTION OF SUBSTITUTE WATERS FROM POLLUTION CAUSED BY CERTAIN DANGEROUS SUBSTANCES.....24

4.4.1. Scope of the Ordinance 24

4.4.2. More important provisions in the context of the assignment..... 24

4.5. ORDINANCE No. 9 ON THE QUALITY OF DRINKING WATER– DIRECTIVE 98/83 / EC ON THE QUALITY OF WATERS INTENDED FOR HUMAN CONSUMPTION.....26

4.5.1. Scope of the Ordinance 26

4.5.2. Transposition.....27

4.5.3. More important provisions in the context of the assignment.....27

5. PROBLEMS WITH water quality IN DIMITROVGRAD AND METHODS FOR THEIR SOLUTION 1



LIST OF ABBREVIATIONS USED

W&SA – W&S association
BD – Basin Directorate
W&S – Water and sewerage
W&So – W&S operator
SG – State Gazette
SHC – State Health Control
AP – Additional provisions
EC – the European community
EU – European Union
WA – Water Act
HA – Health Act
LPAL – Law on the Protection of Agricultural Land
WMA – Waste Management Act
EEA – Executive Environment Agency
EWRC – Energy and Water Regulatory Commission
MH – Ministry of Health
MOEW – Ministry of Environment and Water
PSP – Public state property
TFP – Transitional and final provisions
QS – Quality Score
PMP – Public municipal property
WWTP – Waste water treatment plant
DWTP – Drinking water treatment plant
RMP – Regional Master Plan
WFD – Water Framework Directive
RHI – Regional Health Inspectorate
RIEW - Regional Inspectorates for Environment and Water
RPIS– Regional pre-investment survey
SPZ – Sanitary-protection zone

1 INTRODUCTION

This report is developed as part of the "Implementation of Innovative Techniques for Improving the Quality of Drinking Water in Urban Areas" - AQUA-LITY "and in particular Development 4 - "Environmental Quality Guide to Water used as training material for seminars".

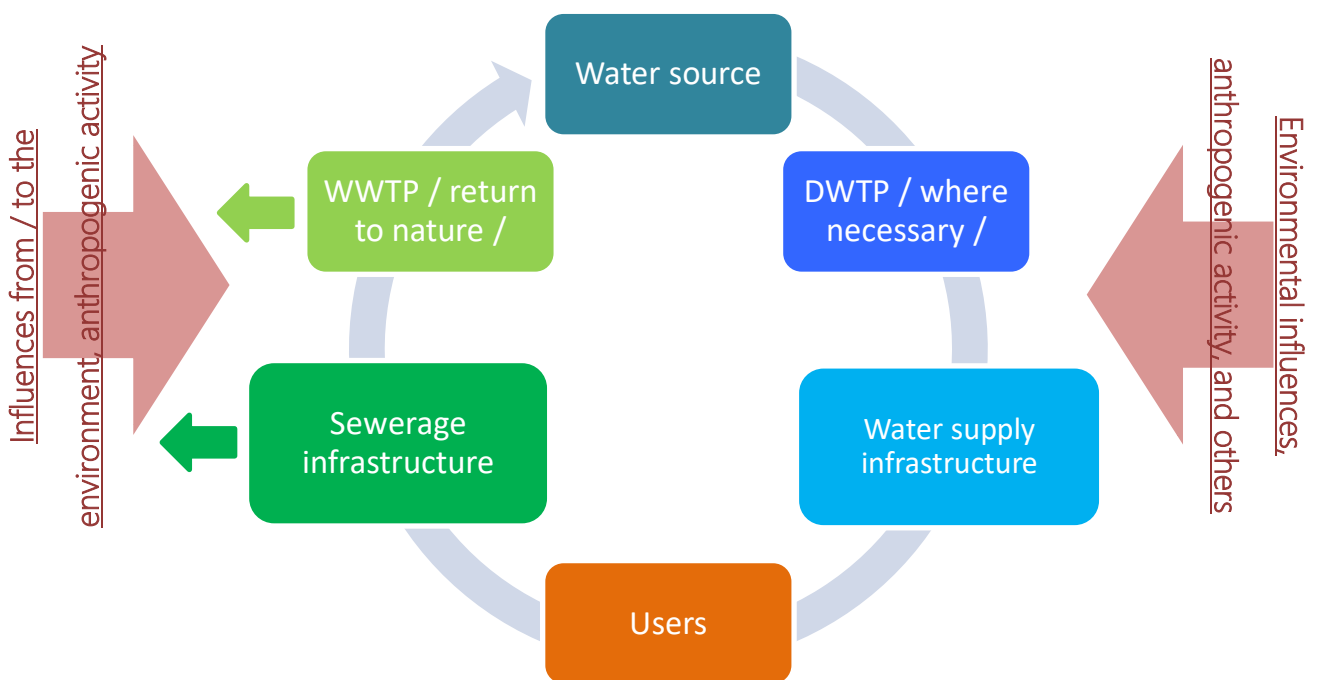
The ecological quality of water in natural ecosystems depends on many factors, but with the greatest impact today are those of anthropogenic origin. In addition to pollution from point sources (i.e. pollution originating from a specific source, e.g. discharge of industrial wastewater, settlement, etc.), potential diffuse sources of pollution (e.g. dissolved fertilizers and pesticides from agricultural activities). The more polluted the water, the more difficult, expensive or inefficient it is to purify it, and thus makes it unsuitable or dangerous to use it for drinking, household and / or other purposes without even mentioning the negative effect on the environment, flora and fauna.

By its nature, water is an exhaustible resource, and as a result of the observed trends of deterioration of the quality of natural waters, in the last decades, the introduction of increasingly rigorous measures for preserving the ecological status of waters has begun. At EU level, the most important document in the sector is led by the Water Framework Directive. This directive was adopted in 2000 (number 2000/60 / EU) and its aim is to ensure the integrity and consistency of water policies in the community. At national level a normative act is the Water Act, which has the task of arranging in detail all the most important groups of legal relations related to the protection and use of the waters in the Republic of Bulgaria. As a member state of the EU, Bulgaria has in many respects unified the existing legislation in the water sector with that at the European level.

This document deals with and/or refers to legislative acts that have a direct and/or indirect significance for the quality of drinking water based on the principle that quality is the result of observing and following a set of rules and norms for conservation the quantitative and qualitative status of natural waters, their purification, storage and delivery to consumers.

W&S can be considered as a connected system consisting of two subsystems - water supply and sewerage. Each subsystem, for its part, consists of a group of elements, according to the specific conditions, location and application. At the level of the water supply system the following relationship can be derived: the environmental status of the environment and in particular the water (underground and surface) as well as the quality of the water supply and sewerage services and in particular the supply of drinking water to the population of the required quality depend on the following factors:

- quality of the resources used (water quality at the water source);
- quality, technical condition and efficiency of the infrastructure (water and sewerage, including purification facilities);
- reliability of operation;
- Control of pollution (point and diffuse sources);
- and others.



CONCLUSION

Determining the quality of drinking water are the water quality in the water sources, the efficiency of the purification facilities (where available) and, last but not least, the technical and operational status of the water supply and sewerage infrastructure.

2 LEGISLATIVE FRAMEWORK - OVERVIEW



- *The Act is a statutory instrument which governs primarily or on the basis of the Constitution, public relations which are subject to permanent regulation, according to the subject or subjects in one or several institutes of law or their subdivisions. In order to settle other relations on this matter, the law may provide for the issuance of a by-law. - Art. 3 para. 1 and 2, Law on Legislative Acts*
- *The Ordinance is a normative act, which is issued for the implementation of separate regulations or subdivisions of a higher-level legal act. - Art. 7 para. 2, Law on Legislative Acts*

2.1. NATIONAL LEGISLATION

2.1.1. WATERS ACT - general regulations

2.1.1.1 Function of WA



- *According to Art. 1. This law regulates the ownership and management of the waters on the territory of the Republic of Bulgaria as a nation-wide indivisible natural resource and the ownership of the water-saving systems and facilities."*

The Water Act is a fundamental normative act for the water sector, which has the task of arranging in detail all the most important groups of legal relations related to the protection and use of the waters in the Republic of Bulgaria. In 2009, the EN underwent a major amendment, which marked the beginning of the so-called Reform in the water supply sector. This reform regulates and divides the ownership of W&S infrastructure in the public sector (PSP and PMP), changes the management principle (W&SA) and defines rules for infrastructure development planning at the regional level (RMP, RPIS).

According to the WA, in general, the main body of management at the national level is the Minister of Environment and Water and at the basin level are the directors of the basin directorates. In more detail, the management structure in the water sector is as follows: the Minister of Environment and Waters, the Supreme Water Advisory Council, the Executive

Environment Agency, the directors of the four basin directorates, the basin councils, the regional inspectorates for the environment and the waters and the directors of the national parks with their functions under the WA for the territories of these parks. The EEA is a national authority, and RIEWs and National Parks Directors are regional authorities but different from the basin level. These institutions are closely specialized bodies in the management of water from the system of the MoEW. The law assigns them separate and autonomous powers in this area.

2.1.1.2 Structure of the Water Act

The WA consists of a basic part, additional provisions, transitional and final provisions (to different laws), and annexes. The last amendment to the WA is dated 26.03.2019, promulgated in State Gazette no. 25.

According to Art. 135, para. 1 in order to maintain the quantity and the necessary water quality at present a total of 16 regulations have been issued. This document only lists some of these regulations. Some of them are directly related to the quality of water for drinking purposes, others are indirect, by treating the rules and conditions for water abstraction, conservation, use and control of water quality in nature. This document does not list the regulations regulating waste water treatment and management rules.

Ordinances for implementation of WA (the list is not full):

- 1) ORDINANCE №1 of 10.10.2007 for exploration, use and protection of groundwater (Amended and supplemented, SG No. 102 / 23.12.2016, effective 23.12.2016);
- 2) ORDINANCE № 1 of 11.04.2011 for water monitoring (Amended and supplementary SG No. 20 of 15.03.2016, effective 15.03.2016);
- 3) ORDINANCE №2 of 13.09.2007 for the protection of waters from pollution with nitrates from agricultural sources (Amended, SG No. 97 of 9.12.2011);
- 4) ORDINANCE №3 of 16.10.2000 on the conditions and procedure for investigation, design, validation and operation of the sanitary-protection zones around the water sources and the facilities for drinking water supply and around the water sources of mineral waters used for healing, prophylactic, drinking and hygiene needs (promulgated SG No. 88/2000);
- 5) ORDINANCE No. 9 of 16.03.2001 on the quality of water intended for drinking and household purposes (Amended and supplemented SG No. 6 of 16.01.2018);

This is the most important regulation that regulates the requirements for the quality of drinking water. In general, applying the rules of the other regulations to the WA (including those not set out in this document) aims at protecting water in nature from pollution, measures to improve the condition, good practices, including maintenance of a database, which are important and are monitored not only at national level, but also at community level.

In cases where the water in the drinking water sources does not meet the adopted normative standards, it is necessary to apply purification methods in order to comply with Ordinance No. 9. In many cases, the removal of certain chemical compounds, metals and/or biological contamination in raw water is very complicated, expensive and energy-intensive. The better the qualities of water in water bodies and objects, the easier it is to use them.

6) [ORDINANCE № 12 of 18.06.2002 on the quality requirements for surface water intended for drinking and domestic water supply \(Amended, SG No. 15 / 21.02.2012, in force as of 21.02.2012\)](#)

The water sources used for drinking and domestic water supply in Dimitrovgrad are underground. In this respect, the implementation of Ordinance No 12 has no direct bearing on the quality of the city's drinking water. It is mentioned in the context of the regulatory framework in this direction.

2.1.2. OTHER LAWS - special regulations

The specific regulatory framework mentioned here includes laws and regulations (the list is not full) that affect the water sector in a different way. Their provisions and their application may have a direct and/or indirect impact on the environmental status of water bodies and sites, the quality of the infrastructure and, respectively, the quality of water used for drinking, household and other purposes. Of particular importance in the context of the subject are the following documents:

2.1.2.1. Health Act and its implementing legislation

The provisions of the Health Act harmonize with some of the principles and basic provisions of the Health Act and form a complex regime of combining the powers of the health authorities with those of the environmental and water authorities. This has been transferred to the secondary legislation, which is in the joint competence of the two ministers. These are:

- ❑ ORDINANCE № 3 of 16.10.2000 on the conditions and procedure for investigation, design, validation and operation of the sanitary protection zones around the water sources and the facilities for drinking water supply and around the water sources of mineral waters used for healing, prophylactic, drinking and hygienic needs (promulgated in State Gazette, issue 88 of 2000);
- ❑ ORDINANCE № 9 of 16.03.2001 on the quality of water intended for drinking and household purposes (Amended and supplemented SG No. 102 of 12.12.2014.);
- ❑ ORDINANCE № 12 of 18.06.2002 on the quality requirements for surface water intended for drinking and household water supply (Amended, SG No. 15 of 21.02.2012, in force as of 21.02.2012);

Pursuant to WA and HA, the competent authority in the Republic of Bulgaria in the field of drinking water, bathing water and mineral waters, intended for drinking or used for preventive, curative and hygienic purposes, incl. and for bottled mineral waters is the Ministry of Health and its regional structures - regional health inspections (RHI).

2.1.2.2. Law on Territory Planning (LTP)

The LTP is essential for the development of the water sector in the design and construction of water supply and sewerage infrastructure. This is in particular Chapter Four "Networks and Facilities of the Technical Infrastructure" and the set of Ordinances applicable to the provision of plumbing services:

- ❑ ORDINANCE №2 of 22.03.2005 for the design, construction and operation of water supply systems;
- ❑ ORDINANCE № ПД-02-20-8 of 17.05.2013 for design, construction and operation of sewerage systems (Amended and supplemented, SG No. 99/30 November 2018);

Compliance with the legal framework in this area, in particular the design, construction and operation, aims at ensuring a minimum level of quality of the infrastructure subject to the assignment and hence of the activity for which it is intended. When it comes to drinking water, it is of prime importance that water abstraction facilities, raw water purification installations (removing and/or reducing the concentration of pollutants to levels that are safe for health, decontamination) are properly scheduling, drinking water storage facilities , dead zones) and water supply networks (min. speed, water tightness).

2.1.2.3. Waste Management Act (WMA) /and LPAL/

Waste Management Act and, in particular, compliance with the Ordinance regulating the utilization of sludge from urban WWTPs in agriculture may have a preventive effect on the protection of groundwater from contamination by nitrates, heavy metals and other substances.

- ▣ [REGULATION on the Procedure and Method of Utilization of Sludges from the Treatment of Wastewater by Their Use in Agriculture \(promulgated SG No. 63 of 12.08.2016\)](#)

2.1.2.4. Environmental Protection Act and its implementing regulations

2.1.2.5. Regulation of the Water Supply and Sewerage Services Act and the implementing regulations for its implementation

2.2. EU DIRECTIVES TRANSPOSED IN NATIONAL LEGISLATION

There is a well-established practice for the transposition of the EU water directives under national water sector legislation and some accompanying laws and regulations from other related sectors.

The main document of the European legislation - the European Parliament's Water Framework Directive 2000/60 / EC was transposed in its main part in 2006 by amending the WA. Accordingly, in 2010 the same law transposed the EU Floods Directive 2007/60. The other daughter water directives have been transposed at the level of secondary legislation - regulations, in the relevant areas to which they refer.

The EU directives and the relevant national legislation transposing them are given in the following table (the list is not exhaustive):

EU DIRECTIVES	National legislation
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	Water Act
	Ordinance No. N-4 of 14.09.2012 on characterization of surface water
	Ordinance No. 1 of 11.04.2011 on water monitoring

<u>EU DIRECTIVES</u>	<u>National legislation</u>
	Ordinance No. 1 of 10.10.2007 on exploration, use and protection of underground water
COUNCIL DIRECTIVE 98/83 / EC of 3 November 1998 on the quality of water intended for human consumption	Ordinance No. 9 of 16.03.2001 on the quality of water intended for drinking and household purposes
COUNCIL DIRECTIVE 2013/51 / Euratom of 22.10.2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption	Ordinance No. 9 of 16.03.2001 on the quality of water intended for drinking and household purposes
DIRECTIVE 2006/118 / EC of the European Parliament and of the Council of 12.12.2006 on the protection of groundwater against pollution and deterioration	Ordinance No. 1 of 10.10.2007 on exploration, use and protection of groundwater
COUNCIL DIRECTIVE 91/676 / EU of 12.12.1991 on the protection of waters against pollution caused by nitrates from agricultural sources	Ordinance No. 2 of 13.09.2007 on the protection of waters against pollution by nitrates from agricultural sources
DIRECTIVE 75/440 / EU of 16 June 1975 on the quality required of surface water intended for the abstraction of drinking water in the Member States *	Ordinance No. 12 on the quality requirements for surface water intended for drinking and domestic water supply
DIRECTIVE 79/869 / EU of 9 October 1979 on measuring methods and sampling frequencies and analysis of surface water intended for the abstraction of drinking water *	Ordinance No. 12 on the quality requirements for surface water intended for drinking and domestic water supply
COUNCIL DIRECTIVE 80/68 / EU of 17.12.1979 on the conservation of wild birds	Ordinance No. 2 of 13.09.2007 on the protection of waters against pollution by nitrates from agricultural sources

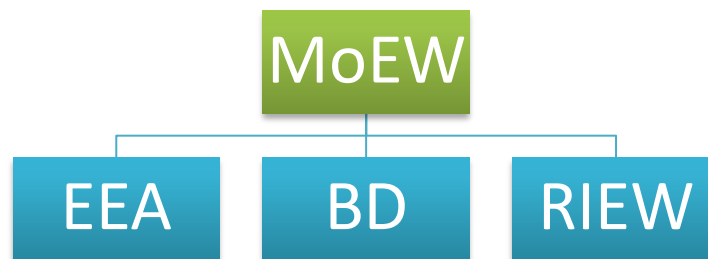
<u>EU DIRECTIVES</u>	<u>National legislation</u>
groundwater from pollution caused by certain dangerous substances (date of termination 21.12.2013) **	Ordinance No. 3 of 16.10.2000 on the conditions and procedure for investigation, design, validation and operation of the sanitary-protection zones around the water sources and the facilities for drinking water supply and around the water sources of mineral waters used for healing, prophylactic, drinking and hygiene needs
	Ordinance № 2 of 08.06.2011 for the issuance of permits for discharge of waste waters into water bodies and determination of the individual emission limitations of point sources of pollution

* These directives are no longer in force (date of termination 21.12.2007), their regulations are divided into other directives, mainly in the WFD.

** Directive no longer in force, successor in this direction is Directive 2006/118 / EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.

3. RESPONSIBLE INSTITUTIONS AND ORGANIZATIONS

3.1. MOEW



3.1.1. EEA

The Executive Environment Agency is an administration to the Minister of Environment and Water for conducting, coordinating and informing activities regarding the control and protection of the environment in Bulgaria. The Agency maintains and manages National System for Environmental Monitoring (NSEM) and national and regional information databases on environmental components, including on the state of water resources.

Environmental status assessments and data reporting at national level are carried out by the EEA; regional assessments - by RIEW, assessments and reports on the status of water resources at basin level - from 4 Basin Directorates.

3.1.2. Basin Directorates for Water Management

Four river basin districts - Danube, Black Sea, East Aegean and West Aegean - have been identified in Bulgaria, with four basin departments being established. These are administrations that assist the BD directors in exercising their powers, provide their technical activity and perform administrative services to citizens and legal entities. Their activity is coordinated and controlled by the MoEW.

The activities in the scope of the powers and duties of the BD are many, as part of them in the context of the development (the list is not exhaustive):

- ❑ Licensing under the Water Act - these are permits for water abstraction and/or waste water discharge, which define the parameters of the activity and rules for own monitoring (indicators, frequency, etc.);
- ❑ Planning, assigning and participating in the monitoring of WA waters, summarizing and analyzing the data, including:
 - quantitative monitoring of surface and groundwater;
 - the chemical and ecological status of the waters;
 - waste water.
- ❑ Defines the sanitary protection zones around the drinking and domestic water supply facilities;
- ❑ Control of the fulfillment of the conditions of the issued permits under the Water Act, with the exception of the permits for use of a water body for discharging waste water; this includes at least qualitative and quantitative control, SPZ control, self-monitoring, and so on.;
- ❑ Coordination of project documentation, acceptance of groundwater abstraction facilities, issuing of opinions on investment intentions for projects in the water supply and sewerage sector (within the scope of their powers).



The permits for water abstraction from groundwater and surface water shall be issued by the BD by area of management, by setting the minimum allowable quantities for use and by the program for carrying out its own monitoring on specified indicators and sampling frequency.

3.1.3. RIEW

Regional Inspectorates for Environment and Waters are administrative structures at the MoEW, ensuring the implementation of state policy on environmental protection at the regional level. They have control, information and control functions. In carrying out the regulatory functions, RIEWs develop or participate in the development of documents in the field of environmental protection and sustainable use of natural resources.

The control functions of the Regional Inspectorate of Environment and Waters consist in the implementation of preventive, ongoing and ex-post control over the implementation of normative acts regulating the quality of the environmental components and the factors that affect it. The control activities under the water component are to protect water from pollution, prevent contamination of the water intake with waste waters, control over compliance with the conditions of the issued discharge permits and other.

3.2. RHI



Regional Health Inspections are administrative structures to the Ministry of Health and implement state health policy on the territory of the districts in the country. Pursuant to the WA and HA and the regulations for their implementation, as well as other normative acts, the Ministry of Health, respectively. RHIs carry out state health control of drinking water, water sources and water supply facilities and facilities, sanitary-security zones and other.

RHI activities in the field of drinking water include the following main directions:

- Monitoring (sampling and laboratory analysis) of quality:
 - Drinking water at the "final consumer";
 - raw water from water sources for drinking and domestic water supply;
 - Water at different stages of processing and delivery to the "final consumer";
 - water from self-supplying water;
 - water from "public local water sources".
- RHIs have the obligation to carry out at least 50% of the full amount of research to be carried out by the water supply companies.

- ❑ Inspection of the sanitary and hygienic status of the facilities for central drinking and water supply - water sources, water supply facilities, SPZs, DWTP, chlorination and other water disinfection stations, reservoirs, independent water supply facilities, etc. ; coordination of project documentation for SPZ of water sources for drinking and household purposes and project documentation of water supply facilities and networks, participation in reception committees for such sites.
- ❑ Take administrative and penal actions and other measures in case of inconsistencies in the quality of the drinking water and sanitary and hygienic requirements to the water sources,



RHI - Haskovo is the regional structure, which covers the territory of Dimitrovgrad Municipality. The inspection has an accredited laboratory where microbiological and chemical monitoring is carried out, including the possibility of sampling of individuals and organizations.

3.3. W&S OPERATOR

Responsible for the fulfillment of the requirements of the legislation for achieving the necessary quality of the drinking water, including the monitoring of its full volume, are the water supply organizations - the water supply and sewerage operators, in their capacity of structures conducting water supply for the population for drinking and household purposes objectives.



- *Water supply organizations are required to take all necessary measures to ensure that the population is supplied with safe and clean drinking water. - Art. 3, para. 1, Ordinance №9*
- *Water supply organizations take all necessary steps to avoid secondary deterioration of the quality of drinking water in the repair of water supply systems, regular water supply and commissioning of new water sources. - Art. 3, para. 3, Ordinance №9*
- *In order to protect water for drinking and household purposes from pollution around the drinking water sources and the facilities for drinking and domestic water supply, it is obligatory to create SOD according to Ordinance № 3 - art. 3, para. 4, Ordinance №9*

Apart from implementing and abiding by the Water Act and its regulations concerning the quality of the water intended for household drinking purposes, W&S operators draw up a business plan

for implementation of its activities, which includes monitoring programs and improvement of drinking water quality in order to reach the required levels of the following quality indicators:

- ❑ **QS2a - Drinking water quality in large water supply areas** - this is an indicator expressed as a percentage of the number of analyzes meeting the applicable standards and the total number of analyzes in large areas;
- ❑ **QS2b - Quality of Drinking Water in Small Water Supply Areas** - this is an indicator which is expressed as a percentage of the number of analyzes meeting the applicable standards and the total number of analyzes in small areas;
- ❑ **QS2c - Monitoring of drinking water quality** is an indicator expressed as a percentage of all monitored water supply areas and the total number of areas in the area served by the WSS operator.

Quality levels are defined and therefore their implementation is monitored by the EWRC, requiring detailed information from operators on the number of analyzes by type (for indicators of indicative importance, microbiological, physico-chemical and radiological) made for all water supply areas. The verification of the submitted data from the W&S companies is done by providing a register of laboratory tests and a written statement from the RHI.

In the event of failure to comply with any of the quality indicators, the EWRC may recommend that additional investments be made in the respective direction to improve the technical condition of the infrastructure and the level of services provided. The activity of the operators is monitored annually by submitting annual reports, including the quality indicators and the implementation of the investment program.

4. DETAILED REVIEW

4.1. ORDINANCE №1 FOR THE EXPLORATION, USE AND CONSERVATION OF THE UNDERGROUND WATER - DIRECTIVE 2006/118 / EC ON THE PROTECTION OF SUBSTITUTE WATERS FROM POLLUTION AND ENVIRONMENT

4.1.1. *Scope of the Ordinance*

This ordinance regulates the specific requirements for the exploration and use of underground, including mineral waters, and their protection against pollution and deterioration. The purpose of the Ordinance is to ensure:

- 1) the protection of groundwater as a valuable natural resource and a main source of water for drinking and domestic water supply;
- 2) the termination or limitation of the introduction of pollutants into groundwater;
- 3) that it prevents deterioration of the chemical status of all groundwater bodies;
- 4) achievement and maintenance of good quantitative and good chemical status of the groundwater bodies on the territory of the Republic of Bulgaria;
- 5) collecting data and information on the assessment of the status of groundwater bodies and the risk of their deterioration as a result of human activity.

The Ordinance is very comprehensive and significant in volume. It consists of the following sections: general situations, exploration, resources, ground water eradication, construction, and acceptance, and / or removal, control of good status, permit registers, AP, TFP and annexes.

4.1.2. *Transposition*

According to § 3a. This Ordinance introduces the requirements of Art. 17, Annex II, point 2, Annex V, paragraphs 2.1 and 2.3 of Directive 2000/60 / EC establishing a framework for Community action in the field of water policy, Directive 2006/118 / EC on the conservation of natural habitats and of wild fauna and flora groundwater pollution and deterioration and Directive 2014/80 / EC amending Annex II to Directive 2006/118 / EC.

Those parts of the WFD are precisely those concerned with the protection of groundwater:

- Article 17 - Strategies for protection and control of groundwater pollution;
- Annex II - Groundwater;
- Annex V - 2.1. Quantitative status of groundwater; 2.3. Groundwater chemical status

4.1.3. *More important provisions in the context of the assignment*

- Art.2, (3) The groundwater body condition is quantitative and chemical and is assessed as:
 1. good - when the conditions for good quantitative status under Art. 42, para. 2 and the conditions for good chemical status under Art. 72;
 2. poor - in all other cases where one or more of the conditions under item 1 are not met.
- Art. 2, (5) The condition of groundwater bodies shall be assessed on the data of the completed ones:
 1. programs for water monitoring, approved by the Minister of Environment and Water by the order of art. 169, para. 2 of the Water Act;
 2. self - monitoring programs run by:
 - a) the holders of permits for water abstraction and/or use of underground water body issued by the order of the Water Act;
- Art. 43 The protection of the groundwater quantitative status and the prevention of its deterioration involves the implementation of measures for the protection of groundwater:
 7. Determination of obligations for water abstraction permit holders for own groundwater monitoring and requirements for the monitoring program;
- Art. Article 61. (1) The protection of groundwater against pollution and deterioration shall be carried out by:
 5. Determination of obligations for the holders of permits for conducting own groundwater monitoring and requirements for the monitoring program, according to the requirements of the Water Monitoring Ordinance under Art. 135, para. 1, item 14 of the Water Act and the guides from the general strategy for implementation of the

Water Framework Directive, using the methodology for planning the networks and the programs for groundwater monitoring, published on the website of the Ministry of Environment and Waters.

- Art. 72. (1) The groundwater body is in good chemical condition if the following conditions are met:
 1. changes in ground water conductivity do not indicate the attraction of salty or polluted water;
 2. the chemical composition of groundwater is such that the concentration of pollutants:
 - a) does not show the attraction of salty and polluted water;
 - б) does not exceed the concentrations defined as a groundwater quality standard in Annex 1 and as the pollution threshold;
- Art. 80. (1) Own monitoring of the groundwater chemical status shall be carried out:
 1. holders of permits for:
 - a) water abstraction;
 - (2) The own monitoring under para. 1, item 1, letter "a" includes:
 1. annual survey of the chemical composition of groundwater by:
 - a) pH, electroconductivity, dissolved oxygen concentration, ammonium, nitrate, nitrite, phosphate, chloride and sulphate, and
 - б) other indicators on which the water body is at risk of not achieving good groundwater chemical status;
- Art. 136. (1) Right to water abstraction from underground, incl. mineral water is provided through:
 1. issue of a permit for water abstraction under the terms of Chapter Four of the WA;
 - (2) Right to water abstraction under para. 1 is provided only within:
 2. the available resources of the groundwater body or part of it if the authorized groundwater abstraction does not pose a risk to the quantitative or chemical status of the body.

- Art. 137. (1) Permit for water abstraction from underground, incl. mineral water is required for all instances of water abstraction, including mineral waters, to ensure the total water use for drinking and watering by the citizens.
- Appendix 1 - Groundwater Quality Standards.

The chemical composition and physico-chemical properties of groundwater are determined by field measurements and laboratory tests of samples of them for all substances and indicators listed in Annex 1.

**IMPORTANT**

W&SA are the holders of permits for water abstraction from groundwater for the purpose of supplying water of the required quality to the population and under the conditions of these permits have the obligation to carry out their own monitoring of the water sources.

4.2. WATER MONITORING REGULATION 1 - DIRECTIVE 2000/60 / EC ESTABLISHING A FRAMEWORK FOR COMMUNITY ACTION IN THE FIELD OF WATER POLICY

This regulation regulates the monitoring of natural waters in all directions (underground, surface, precipitation), qualitative and quantitative analysis, defining the technical specifications for chemical analysis and monitoring of the water status and establishes minimum criteria for the methods of analysis applied by the accredited laboratories in monitoring the status of water. This normative act does not apply to monitoring carried out by the competent authorities of the Ministry of Health (RHI), in compliance with the provisions of Art. 189 of WA (drinking water monitoring), as well as for the monitoring of waters contaminated with radionuclides.

In accordance with § 2. This Ordinance introduces the requirements of Annex V, items 1.3, 2.2 and 2.4 of Directive 2000/60 / EC establishing a framework for Community action in the field of water policy, Directive 2009/90 / EC of 31 July 2009 laying down, pursuant to the WFD, technical specifications for chemical analysis and monitoring of water status and Commission Directive 2014/101 / EU of 30 October 2014 amending Directive 2000/60 / EC of the European Parliament and of the Council Of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of gender water policy (OJ L 311/32 of 31.10.2014).

4.3. ORDINANCE № 2 FOR THE PROTECTION OF WATER FROM POLLUTION WITH NITRATES FROM AGRICULTURAL SOURCES - DIRECTIVE 91/676 / EEC ON THE PROTECTION OF WATER FROM POLLUTANTS FROM AGRICULTURAL SOURCES

The Ordinance transposes the regulations adopted by the European Parliament on the protection of surface water and groundwater and the way of establishing, limiting and preventing their contamination with nitrates from agricultural sources. The document also regulates the rights and obligations of the competent authorities in this respect.

The competent authorities for the implementation of this Ordinance are the Minister of Environment and Water, the Minister of Agriculture and Food, the Minister of Health and the Directors of Basin Directorates or their authorized persons. The work of the three ministries and administrations to them is constantly interrelated.

Part of the duties of the Minister of Environment and Waters are:

- Determination of the waters that are contaminated and of the waters that are threatened by pollution, taking action (according to the ordinance);
- Determination as vulnerable zones of the areas in the country where water is polluted or can be contaminated with nitrates from agricultural sources and contributes to the pollution;
- organizing and managing monitoring of nitrate in water;
- submitting to the Minister of Health the received during the monitoring under the procedure of Art. 18 information on the content of nitrates in surface water and groundwater when they are intended for drinking water supply;

Similarly, the Minister of Health provides the Minister of Environment and Water with information about:

- Drinking water sources with an excess of nitrates;
- the control of the bodies of the DZC in the boundaries of the SPAs around the water sources and the facilities for drinking and household water supply, on the activity of persons - farmers.

This information is drawn up on the basis of the results of the monitoring carried out according to Ordinance No. 9 on the quality of water intended for drinking and household purposes.

**IMPORTANT**

Monitoring of nitrate content in drinking water is carried out by the Ministry of Health according to the requirements of Ordinance No. 9 on the quality of water intended for drinking and household purposes. - Art. 20, para. 2

4.4. ORDINANCE №3 FOR THE CONDITIONS OF STUDY DESIGN, VALIDATION AND OPERATION OF SPZ AROUND WATER SOURCES AND FACILITIES FOR DRINKING WATER SUPPLY AND THE SOURCES OF MINERAL WATERS USED FOR THERAPEUTIC, PROPHYLACTIC, DRINKING AND HYGIENE PURPOSES - DIRECTIVE 80/68 / EU ON THE PROTECTION OF SUBSTITUTE WATERS FROM POLLUTION CAUSED BY CERTAIN DANGEROUS SUBSTANCES

4.4.1. Scope of the Ordinance

According to Art. 1. (1) This Ordinance defines the terms and procedure for investigation, design, establishment, validation and operation of the sanitary protection zones (SPZ) around the water sources and the facilities for:

1. drinking-water provision from surface water;
2. drinking-water provision from groundwater;

The provisions of this Ordinance do not apply to individual and public local water sources unless the water is used for commercial or social purposes for drinking use.

The Ordinance sets out detailed rules and requirements for SPZs around abstraction facilities from different water bodies, detailed guidelines for exploration, design and establishment of SPZs, operation, security and control as well as administrative criminal liability.

4.4.2. More important provisions in the context of the assignment

□ Art. 3 (2) The sanitary protection zones shall ensure:

1. security guards at the water source and / or the facility;

2. protection against input of pollutants into water sources;
 3. ensuring the design quantity and quality of the water in the water abstraction facilities for the duration of the permit for water use;
 4. preserving the water source in a state that allows its use for drinking purposes by future generations.
- Art. 4 (1) Protective regimes shall be found and established in the SPZ to prohibit, restrict, observe, stop and control activities that destroy, damage or threaten to cause a negative change in the quality and /or quantity of water in the long term, directly or by harming the elements of the environment.
 - Art. 7. (1) The sanitary protection zones consist of three belts:
 1. Innermost zone I - strictly guarded directly around the water source and/or the human activities facility that can damage the water used;
 2. Middle belt II - to protect the water source from:
 - a) contamination with chemical, biological, rapidly degradable, readily degradable and highly sortable substances;
 - b) activities leading to a reduction of water source resources and/or design flow of the abstraction facility;
 - c) other activities leading to degradation of the quality of the extracted water and/or the state of the water source;
 3. Outside zone III - to protect the water source from:
 - a) contamination with chemical, slowly decaying, poorly degradable, poorly sorbable and unsorbable substances;
 - b) activities leading to a reduction of water source resources and/or design flow of the abstraction facility;
 - c) other activities leading to degradation of the quality of the extracted water and/or the state of the water source.
 - 10. (1) In zones II and III, the activities listed in Annexes 1 and 2 shall be prohibited, restricted or restricted as appropriate.

- (2) If during the water use it is established that any of the limited activities under Annexes 1 and 2 worsens the quantity and/or quality of the extracted water, this activity shall be prohibited by the authority under Art. 37, governed by SPZ.

Annex 2 to Art. 10, para. 1 gives a detailed list of prohibitions, limitations and restrictions in case of proven necessity in the sanitary protection zones - zones II and III around water sources for drinking and domestic water supply from groundwater.



„ Exploitation of SPZ " are the activities for marking of SPZ, maintenance of the marking, upgrading, landscaping, rehabilitation, consolidation and others in order to protect the water against pollution, as well as to protect the SPZ and to monitor the quantity and the quality of the water within the SPZ.

4.5. ORDINANCE NO. 9 ON THE QUALITY OF DRINKING WATER– DIRECTIVE 98/83 / EC ON THE QUALITY OF WATERS INTENDED FOR HUMAN CONSUMPTION

4.5.1. Scope of the Ordinance

This Ordinance:

- 1) sets the water quality requirements for drinking and household purposes.
- 2) aims to protect human health from the adverse effects of drinking water contamination by regulating quality and safety requirements.

The normative act introduces general provisions and obligations for both water supply organizations and the SHC, regulates the limit content and concentration of the monitored indicators and the order for monitoring, control and reporting, sets minimum requirements for materials and reagents, the procedure for elimination of discrepancies, limitation of use and mode of use in case of deviations from drinking water quality requirements.



- Pursuant to the Ordinance, drinking water is safe and clean when it contains no micro-organisms, parasites, chemical, radioactive and other substances in numbers or concentrations that pose a potential danger to human health; meets the minimum requirements set out in Annex 1, Tables A and B; and the requirements of Art. 5-10 and Art. 13. - Art. 3, para. 2, items 1, 2 and 3

4.5.2. *Transposition*

Ordinance 9 introduces the requirements in addition to Directive 98/83/EC and Directive 2013/51/EURATOM on the definition of the requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption, including Directive (EU) 2015/1787 amending Annex II and Annex III to Directive 98/83/EC. - § 1 of the Additional Provisions.

The requirements of Directive 2013/51/EURATOM concerning the radiological performance of drinking water have been transposed into the basic structure of the Ordinance and the acceptable content of radioactive and other substances is given in Annex 1, Table D - Radiological Indicators (D.1 and D .2.).

Amendments to Annex II - Control and Annex III - Specifications for Parameter Testing to Directive 98/83 / EC have been transposed in Annex 2 - Monitoring and Annex No. 3 - Methods of Analysis.

4.5.3. *More important provisions in the context of the assignment*

4.5.3.1. Quality requirements for drinking water

- Art. 5. (1) The drinking water shall correspond to the values of the indices set out in Annex 1, Tables A, B, C, D 1 and D 2.
 - (2) The values of the indicators in Annex 1, tables C, D 1 and D 2, serve for the purposes of monitoring and fulfillment of the obligations under Art. 10.
- Art. 6. (1) The values of the parameters under Annex 1 shall be observed in the following places:
 1. for water supplied through the water supply network - at start point and from the tap to the user;

In addition, water and sewerage operators have the rights and obligations to inform consumers of inconsistencies, to propose risk mitigation measures, to use an appropriate treatment method and water purification technologies before distribution to the water supply network, to provide information and advice to affected consumers about all other the additional actions they need to take in order to adjust the deviations to the end user.

4.5.3.2. Annex 1

□ Table A.1 Microbiological Indicators

For water within the meaning of Art. 6, para. 1, items 1, 2 and 4.

<u>Indicator *</u>	<u>Value number 1 KOE/ml</u>
E. coli	0/100
Enterococci	0/100

* For reference, Regulation No. 9 has explanations for the indicators.

□ Table B Chemicals

<u>Indicator*</u>	<u>Maximum value</u>	<u>Unit</u>
Acrylamide	0,10	µg/l
Antimon	5,0	µg/l
Arsene	10	µg/l
Benzen	1,0	µg/l
Benzene (s) pyrene	0,010	µg/l
Bohr	1,0	mg/l
Bromati	10	µg/l
Vinyl chloride	0,50	µg/l
1,2-Dichloroethane	3,0	µg/l
Epichlorohydrin	0,10	µg/l
Mercury	1,0	µg/l
Cadmium	5,0	µg/l
Copper	2,0	mg/l
Nickel	20	µg/l
Nitrates	50	mg/l
Nitrite	0,50	mg/l
Lead	10	µg/l
Pesticides	0,10	µg/l
Pesticides (total)	0,50	µg/l
Polycyclic aromatic hydrocarbons	0,10	µg/l
Selene	10	µg/l
Tetrachloroate and Trichlorethane	10	µg/l
Trihalomethanes (total)	100	µg/l

<u>Indicator*</u>	<u>Maximum value</u>	<u>Unit</u>
Natural uranium	0,03	mg/l
Fluorides	1,5	mg/l
Chrom	50	µg/l
Cyanide	50	µg/l

*For reference, Ordinance No. 9 has annotations on the indicators.

□ Table C Indicative Indicators

<u>Indicator*</u>	<u>Maximum value</u>	<u>Unit</u>
Active reaction	>6,5 и <9,5	pH units
Aluminum	200	µg/l
Ammonium ion	0,50	mg/l
Taste	Acceptable for users and without significant fluctuations compared to the usual indicator	
Electrical conductivity	2000	µS cm ⁻¹ (at 20°C)
Iron	200	µg/l
Calcium	150	mg/l
Magnesium	80	mg/l
Mangan	50	µg/l
Odor	Acceptable for users and without significant fluctuations compared to the usual indicator	
Turbidity	Acceptable for users and without significant fluctuations compared to the usual indicator	
Sodium	200	mg/l
Total Organic Carbon	No significant fluctuations in the normal value of the indicator	
Total hardness	12	mg (Sum) qv/l
Residual free chlorine	0,3-0,4	mg/l
Permanganate oxidisability	5,0	mg O ₂ /l
Sulfates	0,5	mg/l

<u>Indicator*</u>	<u>Maximum value</u>	<u>Unit</u>
Phosphates	250	mg/l
Chloride	Acceptable for users and without significant fluctuations compared to the usual indicator	
Color	4,0	mg/l
Zinc	0/100	KOE/ml
Clostridium perfringens (including spores)	0/100	KOE/ml
Number of colonies (microbial number) at 22 ° C	No significant fluctuations in the normal value of the indicator for the respective water	

*For reference, Ordinance No. 9 has annotations on the indicators.



Chlorine is used to disinfect water from the water source before it is delivered to consumers. It is applied in a safe dose required for effective water disinfection, including a residual effect against secondary pollution in the water supply network.

The residual free chlorine indicator, which is determined at the first and all intermediate chlorination stations after a 30-minute contact with water, is monitored.

□ Table D Radiological indicators

<u>D.1. Parameter values for water intended for drinking and household purposes</u>		
<u>Indicator*</u>	<u>Parametric value</u>	<u>Unit</u>
Radon	100	Bq/l
Tritium	100	Bq/l
Indicative dose	0,10	mSv
<u>D.2. Control levels for total alpha and beta activity</u>		
<u>Indicator*</u>	<u>Control level</u>	<u>Unit</u>
Total alpha activity	0,1	Bq/l
Total beta activity	1,0	Bq/l

* For reference, Ordinance No. 9 has annotations on the indicators

4.5.3.3. Monitoring

- Art. 7. (1) The water supply organizations shall carry out or commission a monitoring of the indicators under Annex № 1, divided into Group A and Group B, according to Annex № 2, in order to check if the waters supplied to the consumers meet the requirements of the Ordinance, and in particular that they do not exceed the maximum and parametric values determined in accordance with the requirements of annex 1 and to monitor the efficiency of the treatment and disinfection.
 - (4) In cases where the disinfection is a stage of the preparation or distribution of drinking water, the effectiveness of the residual disinfectant and the microbiological parameters according to Annex 2, Table A is systematically checked. The drinking water treatment scheme applied must minimize the possibility of its contamination by disinfection by-products.
 - (5) The minimum frequency for sampling and testing of the Group A and Group B indicators shall be determined in accordance with Annex 2, Table B.1. For the radiological indicators of Annex 1, Table D.1 and D.2, the monitoring frequency shall be determined in accordance with the requirements of Annex 2a.
- Art. 8. The SHC shall check by means of control monitoring the compliance of the drinking water supplied to the consumers with the quality indicators set out in Annex 1 and a frequency determined in accordance with a developed control monitoring plan, up to 50% of the requirements set out in Annex 2, Table B.1.
- Art. 9. (1) In fulfillment of the obligations under Art. 7 and 8, water supply organizations are developing drinking water monitoring programs that coordinate with the Regional Health Inspection (RHI).
 - (2) Monitoring programs must meet the following conditions:
 1. to verify that the measures applied to control the risks to human health throughout the water supply system, from the water catchment, water abstraction, purification and storage to distribution, are effective and that water at the site of conformity determination under Art. 6, para. 1 is safe and clean;
 - (4) Програмите за мониторинг се състоят от следните елементи The monitoring programs consist of the following elements:

1. sampling and laboratory analysis of individual water samples or measurements documented through a continuous monitoring process;
2. data from the ongoing inspections of the water catchment area by the authorities, inspections of water abstraction facilities, purification, decontamination, storage, distribution and supply facilities and / or documentation inspections of the functionality and maintenance of the equipment.

4.5.3.4. Annex 2

□ **Table A Minimum Group "A" Analysis Indicators**

<u>Indicator</u>
Active reaction
Aluminum - Determined if used as a chemical for water purification
Ammonium ion - Determined if chloramine is used for disinfection
Taste
Electrical conductivity
Iron - determined if used as a water purifier
Odor
Turbidity
Nitrite - Determined if chloramine is used for disinfection
Residual free chlorine
Color
E. coli
Coliforms
Other indicators of Annex 1 for which it was found in the monitoring program and / or the risk assessment that it is important to be monitored as Group A indicators - by decision of the W&S and/or RHI
Other additional indicators for which the risk assessment is found to be relevant in accordance with Art. 9, para. 16 - by decision of the RHI

□ **Table B Minimum analysis indicators from group "A"**

The monitoring by Group B indicators covers all the indicators under Annex 1 except of the Group A indicators (given in Table A).

Minimum frequency for sampling and analysis for the purposes of monitoring the compliance of drinking water within the meaning of Art. 6, para. 1, points 1, 2 and 4.

<u>Volume of water distributed or extracted daily in the water supply in m3*</u>		<u>Group A indicator</u> <u>Number of samples per year *</u>	<u>Group B indicator</u> <u>Number of samples per year *</u>
	<10	2	Once every 2 years
>10	≤100	2	1
>100	≤1000	4	1
>1000	≤10 000	4 +3 for every 1000 m3 / day and for the corresponding remainder of the total volume	1 +1 for each 4500 m3 / day and for the corresponding remainder of the total volume
>10 000	≤100 000		3 +1 for every 10,000 m3 / day and for the corresponding remainder of the total volume
>100 000	≤100 000		12 +1 for every 25,000 m3 / day and for the corresponding remainder of the total volume

* For reference, Ordinance 9 has annotations.

In the remaining applications of the group, the rules and frequency of monitoring of the remaining indicators (2a - Monitoring of radioactive substances and 2b - Monitoring of the indicative dose and analytical performance) and the risk assessment in different hypotheses (2c - Evaluation of the risk).

4.5.3.5. Annex 3

This appendix lists the approved standardized methods for analyzing performance (for which there are) and standardized characteristics for minimum metrological quality of measurement and sample and pad processing.



IMPORTANT

Annex 1 sets out the quality indicators to be met by drinking water and Annex 2 sets out the minimum number of analyzes for each set of indicators according to the daily volumes of water supplied to the respective water supply area.

5. PROBLEMS WITH WATER QUALITY IN DIMITROVGRAD AND METHODS FOR THEIR SOLUTION

The main problem with water quality in Dimitrovgrad is the high concentration of manganese due to previously functioning mining industries, with concentrations predominantly in the range 0.2 - 0.3 mg / l, at the permitted concentration of 0.05 mg / l. Manganese emerged in the late 1970s, due to contamination of the feed source - the Maritsa River and hydrogeochemical processes occurring in the river terraces.

In order to deal with the main problem with the quality of raw water - the presence of manganese DWTP "Krum" was built. It is located about 3-4 km away from the town near the village of Krum and purifies the water from the Krumska terasa water catchment area. Prior to the construction of the facility, all urban neighborhoods received water with increased manganese content.

DWTP Krum is designed for gross water quantity at the final stage $Q_{op} = 605$ l/s, but in 1994 only the first stage for $Q_{op} = 375$ l/s was built and put into operation. Taking into account the needs of the city, the station is now cleaned with $Q = 150 \div 200$ l/s. The technology scheme is two-step without the use of reagents except for chlorination to decontaminate purified water. Manganese is removed on the principle of oxidation and filtration by means of sand filters filled with perlite and quartz sand. No further organization is required at present, by the addition of potassium permanganate or other reagent, since at the exit station the manganese indicator is in norms. It follows that the filters purify the water sufficiently and currently fulfill its purpose.

In addition to the constant monitoring of the DWTP outlet, the exploitation company has established a system for monitoring the water quality in the separate territory, observing the normative requirements. In addition, state control over water quality is carried out by the Regional Directorates of RIEW and RHI.

The monitoring of the quality of drinking water consists of sampling and laboratory analysis at different points of the water supply systems. This includes both raw water samples from drinking water supply sources and samples from the "final" water consumer, samples from different stages of purification, water samples from self-supplying water and water from "public local water sources" (public fountains with free access and more).

Institution responsible for monitoring	Location: River Basin / Code a system for monitoring / Location of measuring point	Frequency of monitoring	Observed parameters
1. <u>Water sources</u>			
W&S Ltd. Dimitrovgrad	All available water sources (catchments, river catchments, tubular wells)	Once per year	According to Ordinance No. 9 of 16.03.2001
2. <u>Distributive water supply network Dimitrovgrad</u>			
W&S Ltd. Dimitrovgrad	14 points from the distribution network (one per network area)	monthly	According to Ordinance No. 9 of 16.03.2001

A serious problem for the internal water supply network of the town of Dimitrovgrad, the town of Merichleri and the village of Velikan are the manganese deposits in the pipes. As a result of the

long-term supply of contaminated water, manganese hydroxide deposits have accumulated in the pipes, resulting in drastic changes in water velocity, and in addition they significantly reduce pipe cross-section, which is a potential problem for hydraulics of the network. In the districts of Mariyno, Vulkan, Chernokonevo water is supplied with the highest manganese content (up to 2, 0 ÷ 2, 5 mg/l) from the decommissioned water catchment area "Left Bank", respectively the described problems have the biggest negative effect there.

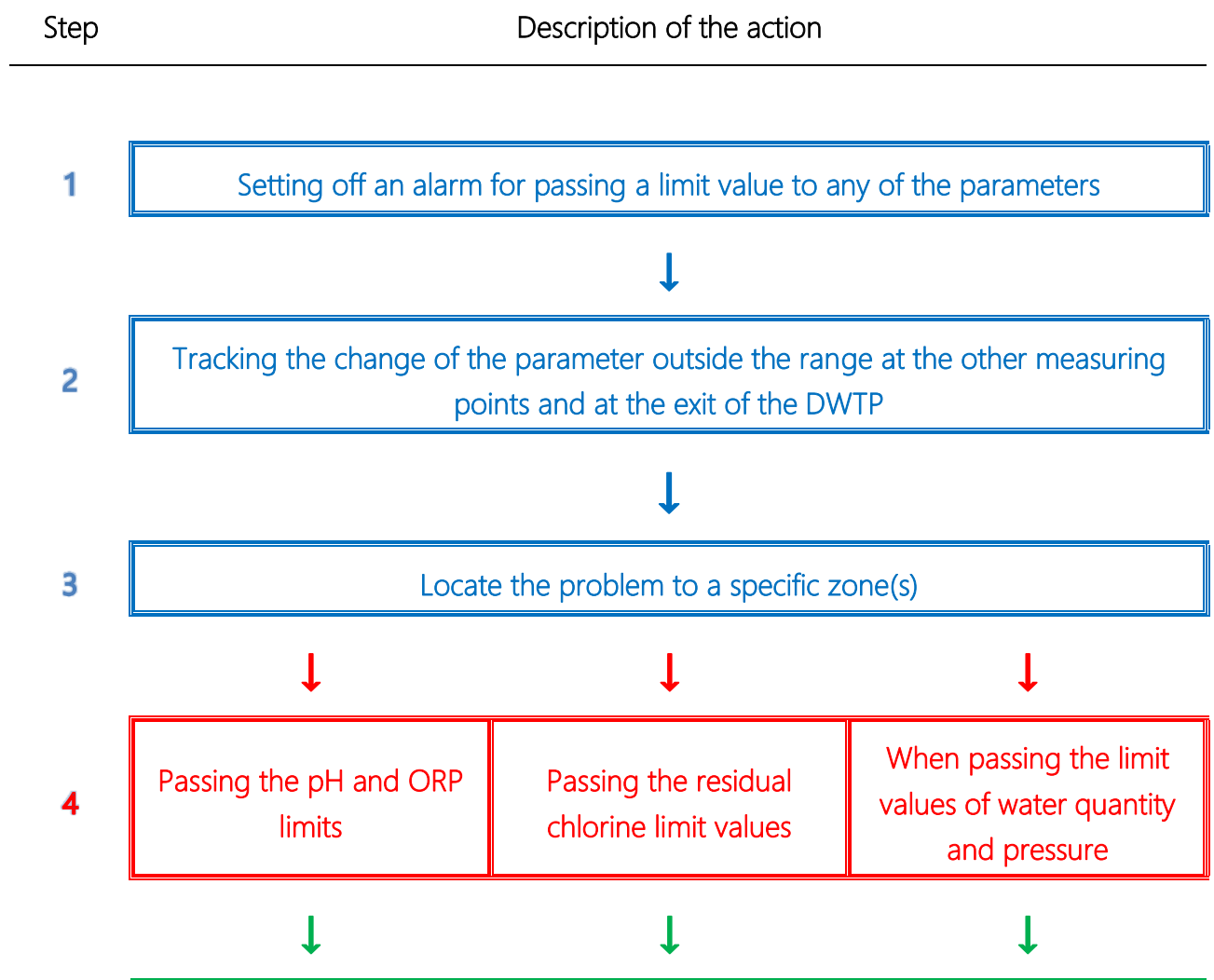
To ensure adequate quality control of the drinking water quality in the city's distribution network, it is foreseen to build a real-time monitoring system for basic chemical indicators at key points in the water supply network. The system will consist of 5 control points (CP) installed at pre-selected control points. Their layout is consistent with the characteristics of the entire water supply system so as to ensure the maximum coverage of the city and the cities that are supplied by the urban water supply network of Dimitrovgrad.

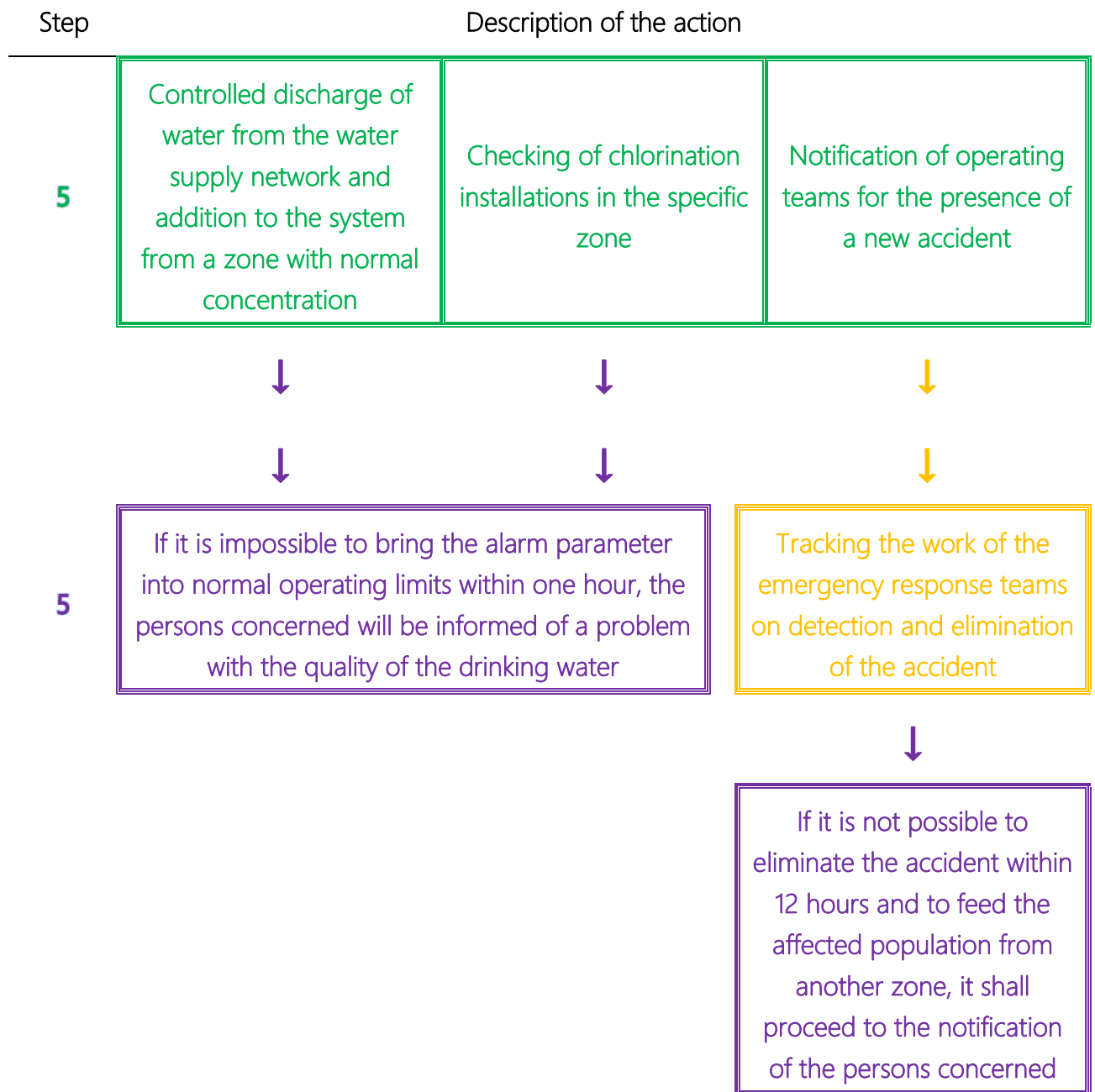
In order to ensure quality control of the risk of contamination of drinking water at the selected points of the water supply network it is foreseen to install a set of sensors, the information from which will be merged by telemetry stations and will be transmitted remotely to a central dispatch point. The newly-built system will enable the W&S operator to real-time monitor basic water chemical indicators that directly affect the quality of water intended for drinking and domestic water supply. It is envisaged that monitoring of pH, oxidation reduction potential (ORP) and residual chlorine will be monitored by sensor assembly, and the change in manganese concentration will be indirectly monitored by constantly controlling the change of the two other parameters observe - pH and ORP.

The collected information about the measured parameters will be processed and stored in a data control system - a local SCADA with an information processing interval of 5 minutes. In case of deviation of any of the monitored parameters the SCADA system will perform the following

actions - local signaling via a message on the screen and sending an e-mail to a predefined list of contacts.

Upon receiving a signal of exceeding the predefined boundary levels of some of the monitored parameters, the responsible officers on the part of the Operator have the task of analyzing the received information and starting the action plan in accordance with the following sequence of actions.





The main problems with the quality of the water intended for drinking in Dimitrovgrad are:

- *Increased concentration of manganese in water sources*
- *Manganese deposits on the inside of the pipes in the city's distribution network that fall into the water when changing its speed*





The measures taken to address current water quality problems for drinking and household purposes are:

- Purification of the water extracted from the water sources through the Krum DWTP*
- Implementation of water quality monitoring system implemented by the operator, RIEW and RHI*
- Establishment of a monitoring and early warning system for a drinking water quality problem in the city's distribution network*