LIST OF APPENDICES

APPENDIX 1-1 PROJECTS CONDUCTED IN PESHTERA MUNICIPALITY

1. Project: "Modernisation of the Integrated Water Cycle of the town of Peshtera – Completion and rehabilitation of the existing water supply and sewerage network and construction of WWTP in the town of Peshtera"

- Project cost: BGN 27,661,359.07.
- Project completion date: November 2013.
- Project main objectives:
  - Meet the requirements of Directive 91/271/EEC concerning urban wastewater treatment in settlements with over 10,000 PE;
  - Provide environmentally sound collection, discharge and treatment of domestic waste water;
  - Increase the percentage of population using improved water supply and sewerage services in the project area;
  - Increase the scope of domestic wastewater treatment services on the territory of the town of Peshtera as a result of WWTP construction;
- Expected results:
  - Rehabilitated water supply network (including main branches) – 12,613 km;
  - Rehabilitated water supply service connections - 4,248 km;
  - Newly built sewerage network (incl. collectors) – 2,071 km;
  - Rehabilitated sewerage network (incl. collectors) – 11,258 km;
  - Newly built sewer service connections - 0,882 km (81 pcs);
  - Rehabilitated sewer service connections – 7,033 km (692 pcs);
  - Constructed pumping stations – 2 pcs;
  - Construction of domestic wastewater treatment plant for 25,000 PE
  - New temporary jobs: 75
  - Newly created permanent jobs: 3

2. Project: "Reconstruction and rehabilitation of the sewerage network in the village of Radilovo – Southern part, Peshtera Municipality"

- Project cost: BGN 1,919,277.16.
- Project completion date: December 2013.
- Project main objective: Improve the operational condition of the sewerage network by increasing wastewater collection, prevent flooding and inundation of properties by sizing appropriately the sewerage network.
- Expected results:
  - Sewerage network within the boundaries of the village – 14 km;
  - Intercepting collector, stormwater overflows;
  - Wastewater treatment facility before discharge – 1 piece;
  - Sewer connections – 700 pcs;
  - Drains, inspection manholes and jumper manholes;

3. Project: "Reconstruction and rehabilitation of water supply network in the village of Kapitan Dimitrievo and construction of WWTP in the village of Kapitan Dimitrievo, Peshtera Municipality, Pazardzhik District"

- Project cost: BGN 5,717,980.55.

- Project completion date: December 2013.
- Project main objectives:
  - Fully develop drinking water transmission mains and distribution networks, optimize water supply system, improve the quality of water supply service, establish hydraulic model of the internal water supply network and improve their operational condition in order to provide sufficient water resources to the population and companies.
  - Optimal use of water resources;
  - Reduce water losses to the minimum;
  - Turn water supply network into well operated zone;
  - Treatment of wastewater
- Expected results:
  - Delivery and installation of new PE pipes;
  - Construction of engineering building with treatment facilities;
  - Construction of building for drinking water disinfection;
  - Supply and installation of fittings and fixtures
  - Construction of water mains;
  - Construction of a and intercepting collector;
  - Construction of HVAC, air-conditioning and pipe network;

4. Project: “Reconstruction and rehabilitation of sewerage network in the village of Radilovo – Northern part and the village of Kapitan Dimitrievo”.

- Project cost: BGN 5,659,174.42.
- Project completion date: December 2013.
- Project main objective: Improve the access to high quality infrastructure for sewerage.
- Expected results:
  - Sewerage network within the boundaries of the villages of - Radilovo – 14 km, Kapitan Dimitrievo – 12 km;
  - Intercepting collector for both villages;
  - Stormwater overflows for both villages;
  - Wastewater treatment facilities before discharge for both villages;
  - Sewer service connections - the village of Radilovo – 700 pcs, the village of Kapitan Dimitrievo – 330pcs;
  - Drains, inspection manholes and jumper manholes;

5. Project: “Reconstruction and rehabilitation of the water supply network in the village of Radilovo, Peshtera Municipality“

- Project cost: BGN 5,866,417.80.
- Project completion date: December 2013.
- Project main objective: improve the access to high quality water supply services and water infrastructure.
- Expected results:
  - Reducing water losses in the internal water supply network, optimizing water supply system by establishing hydraulic model of the network, improving the quality of water delivery service by supplying and installing new high density PE pipes; fixtures and shafts, embankments and compaction

Overall rehabilitation and reconstruction of the water supply system in the village of Radilovo.

APPENDIX 1-2 REGULATORY FRAMEWORK IN BULGARIA

The Water Act (WA): The WA (SG 67/27.07.1999; last proposal for amendment April 2012) is the main legal act in Bulgaria that sets out the relations in the management of water as a nation-wide natural resource. The Act regulates the state policy related to the activities for operation, construction, reconstruction and modernization of water systems and facilities. According to the WA, water in the country is managed at the national and basin levels. Pursuant to the law, waters within the territory of the country are managed at the national and basin district levels. It includes: surface waters, ground waters including mineral waters, inner marine waters and territorial sea, as well as the waters of Danube, Rezovska and Timok Rivers, within the state border of the Republic of Bulgaria. In all cases stipulated by law, waters and water bodies within the territory of the country are public state property, municipal property or private property. The use of waters and water bodies includes water abstraction and use of the water body with permit or not, depending on whether the law requires the issuance of an individual administrative act as a prerequisite for exercising the right to use or abstraction, or such right occurs by virtue of another legal fact.

The WA determines the permission arrangement for water use and water-taking from water bodies in the cases where concessions are provided under the provisions of the Law on Concessions for Extraction of Mineral Water - exclusively owned by the state. The WA also determines the land easements, related to the water bodies, the requirements for the preservation of water and water bodies, the protection from the damaging effect of water, the water management, the financial organization and the economic regulation in the water management and the administrative and citizen responsibility.

The Water Act is supported by the following ordinances for its implementation:

- Ordinance № 1 from 10.10.2007 for specific requirements for the study and use of groundwater, including mineral waters and their protection against pollution (prom. SG. 87/30.10.2007)
- Ordinance № 2 from 13.09.2007 on the order and manner for finding, restricting and preventing nitrate pollution of waters from agricultural sources and the rights and obligations of the competent authorities in this field (prom. SG. 27/11.03.2008)
- Ordinance N°2 from March 2005 for “Design, construction and exploitation of water supply systems”
- Ordinance № 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 sanitation needs (promulgated SG. 88/2000)
- Ordinance № 4 from 20.10.2000 on requirements for quality of fresh waters – fish habitats, and the requirements for quality of coastal waters and marine waters jutted into the land, ensuring the normal existence and reproduction of crustaceous and mollusc species (promulgated SG. 88/2000)
- Ordinance № 5 from 23.04.2007 on requirements for monitoring and classification of bathing waters quality, the management of bathing waters quality, the provision of information to the public in relation to bathing waters quality and the terms and conditions for establishing new bathing areas (promulgated SG. 44/ 5.06.2007)

- Ordinance № 6 from 09.11.2000 on the standards for admissible contents of dangerous and harmful substances in the waste water discharged in the water bodies (promulgated SG. 97/ 28.11.2000)
- Ordinance № 7 from 8.08.1986 on the indicators and standards for determining the quality of flowing surface water (promulgated SG. 96/12/12/1986)
- Ordinance № 7 from 14.11.2000 on the terms and conditions for discharging industrial waste waters to the sewage systems and the standards for admissible contents of toxic, harmful and hazardous substances for the environment concentrated in such waste waters prior their discharge (promulgated SG. 98/ 1.12.2000)
- Ordinance № 8 from 25.01.2001 on the indicators and standards for the quality of coastal marine waters (promulgated SG. 10/2.02.2001)
- Ordinance № 9 from 16.03.2001 on the quality of water intended for human consumption. The ordinance aims to protect individual health against adverse effects of drinking water pollution, and it regulates the requirements for quality and safety of water. (promulgated SG. 30/28.03.2001)
- Ordinance № 10 from 3.07.2001 on issuing permits for waste water discharge into water bodies and setting individual emission limit values for point sources of pollution (promulgated SG. 66/27 July 2001)
- Ordinance № 12 from 18.06.2002 on the quality requirements for fresh surface waters, which after appropriate processing, are used or are perspective for obtaining waters for drinking and household purposes, their classification and measurement conditions, sampling and analysis of indicators, for drinking purposes (promulgated SG. 63/ 06/28/2002)
- Ordinance № 13 from 2.04.2007 on terms and conditions for characterization of surface water bodies (promulgated SG. 37/8.05.2007)
- Ordinance № 13 from 29.01.2004 on the procedures for carrying out the technical operation of dams and associated facilities (promulgated SG. 17/2.03.2004)

New Draft Water Law

In April 2012 a *Draft Law on amendment and supplements to the Water Act* has been prepared.

Amending and supplementing the Water Act proved to be necessary to regulate basic public relationships relevant to water systems and facilities and to reform the water supply and sewerage sector.

The purpose of the *Draft Law on amendment and supplement of the Water Act* is:

- to propose necessary legislation changes and to determine clear rules concerning the property of water infrastructure,
- to strengthen the responsibility of the State to provide the population with an access to drinking water,
- to increase the effectiveness of the WSSC by economies of scale for providing water supply and sewerage services to the population at socially affordable prices.

The main aims of reforming the water supply and sewerage sector by the proposed amendments and supplements to the Water Act are:

- to improve the quality and stability of water supply and sewerage services for consumers in the long term
- to regulate public relations related to construction planning, management and operation of water supply and sewerage systems and facilities
- to optimize WSSC operations
- to enhance water supply and sewerage services quality and effectiveness, in accordance with European practices
- to protect public interest by clear regulation of water supply and sewerage services as activities of public interest
- to facilitate the realization of projects for construction, rehabilitation and/or modernization of water supply and sewerage networks and facilities using state's investments as assets – state property.

Draft National strategy on management and development of the water sector

The National strategy on management and development of the water sector in Republic of Bulgaria was elaborated according to the requirements of art.151 of the Water Act.

The defined objectives of the above mentioned draft National Strategy are as follows:

The **long-term strategic objective** of the country in the water sector is to reach a sustainable use of water resources that meets present and future needs of the population, the ecosystems and the economic activities of the country.

- **Objective 1**: Guaranteed provision of water to the population and business, resilient to climate change (in particular during periods of droughts)

1.1. Ensuring continuous water delivery through rehabilitation of the existing and construction of new dams and reservoirs, rehabilitation of water supply networks and restoration of water bodies.

1.2. Reducing the overall water consumption through investments in water resource infrastructure and measures to improve the efficiency of water resources use.

- **Objective 2:** Preservation and improvement of surface and groundwater condition

2.1. Eliminating the discharge of untreated wastewater in artificial and natural receiving water bodies as well as in the Black Sea through building, reconstruction and renewal of wastewater disposal and treatment systems.

2.2. Strengthening the institutional system for surface and ground water monitoring and control.

2.3. Adopting an integrated water resources management approach, turning River basin management plans into a major planning document,

- **Objective 3:** Enhance the efficiency in the integrated management of water as an economic resource

3.1. Establishment of an institutional framework, which is to ensure the transfer of responsibility for decision making with regard to the water sector development at the national, regional and local levels, from business entities to public authorities – state, municipalities.

3.2. Funds from the population and businesses, EU funds and the required national co-financing should ensure self-financing in the water sector, following the “polluter - consumer pays” principle.

3.3. Increasing the capacity of all participants in the water sector management.

- **Objective 4: Mitigate the risk of flood damages**

4.1. Identifying risk zones.

4.2. Implementing measures included in flood protection plans.

The horizon/outlook of the national strategy document is 2035. It includes clear determination of property and responsibilities of the institutions for water facilities in the country. The financial needs for amortized water infrastructure and construction of new ones amount to BGN 13-43 billions, depending on service quality to be achieved.

In addition to the above mentioned legal documents, the following documents are relevant and described below:

Environmental Protection Act (EPA).

The Environment Protection Act (SG91/25.09.2002) is the basic act concerning all environmental components – air, water, soils, ground, landscape, natural sites, biodiversity and their interrelation. The Act contains provisions for the access to environmental information, development of National environmental protection strategy and municipal environmental protection programs; performance of environmental assessment of plans and programs and the environmental impact assessment for investment projects; prevention and limitation of industrial pollution (issue of permits for the construction of new and operation of existing enterprises and/or facilities and integrated permits), National environmental monitoring system, control on environmental components; administrative measures and the administrative and civil responsibility. The national environmental monitoring system, developed according to the procedures of the law, includes the national networks for monitoring of all environmental components.

The main sub-law acts of the Environmental Protection Act relevant to the water management are as follows:

- Ordinance for the terms and conditions for carrying out Environmental Impact Assessment (EIA), adopted with Council of Ministers’ Decree № 59 of 2003 by virtue of article 101, paragraph 1 of EPA, and article 31 of the Biodiversity Act. The Ordinance defines the requirements to assess the impact on environment and to their consistency, as follows: Informing the competent authorities and affected population, evaluation of necessity for EIA, carrying out consultations, defining the scope, contents and form of the report for EIA, assessment of EIA report quality, organization of public discussions on EIA report, decision making for EIA, control on meeting the requirements of the EIA decision and further certification of EIA decision that is no longer legally effective.
- The requirements for environmental assessments of plans and programs are defined by the Ordinance for the terms and conditions for carrying out environmental assessment of plans and programs adopted with Council of Ministers’ Decree № 139 of 2004 by virtue of article 90 of EPA.

State policy for protection of the environment

The state policy for protection of the environment is implemented by the Minister of Environment and Water. Competent authorities pursuant to the law are as follows: Minister of Environment and Water, Executive Director of Executive Environment Agency, directors of Regional Inspectorates of Environment and Water (RIEW), directors of basin directorates, directors of national park directorates, mayors of municipalities, and in towns with regional division – mayors of regions and district governors. The Minister of Environment and Water, together with the authorities competent in the relevant sector policies (transportation, energy, construction, agriculture, tourism, industry, education, etc.) develops the policy and strategy for protection of the environment in the Republic of Bulgaria, governs, through Executive Environment Agency, the National System for Monitoring of Environment, controls the condition of environment within the territory of the country, coordinates the surveillance authorities of other executive power bodies in relation to the environment, issues orders, permits, instructions and approves methodologies, prepares and submits to the European Commission reports and any other documents whatsoever, relevant to the environment, required by the European legislation, and carries out other activities relevant to protection and management of environment in compliance with special laws.

The *Executive Environment Agency* at the Minister of Environment and Water manages the National System for Monitoring of Environment. The Regional Inspectorates of Environment and Water, national parks directorates and basin directorates ensure the implementation of state policy for environment protection at regional level. The mayors of municipalities inform the population about the condition of environment pursuant to the legal requirements, develop and control, together with other authorities, plans for elimination of consequences from emergency and volley pollutions within the territory of the municipality, organize waste management within the territory of municipality, control the construction, maintenance and appropriate exploitation of waste water treatment plants in urban territories, organize and control cleanliness, maintenance, protection and expansion of green systems in settlements and in the adjacent territories, as well as the protection of biodiversity, landscape and natural and cultural heritage therein, exercise their power under the special laws in the field of environment, etc. District governors ensure the implementation of state policy for environment protection within the territory of the district, coordinate the work of executive power bodies and their administrations within the territory of the district in relation to the implementation of state environment protection policy, and coordinate the activities for implementation of environment protection policy among the municipalities within the district. The Ministry of Environment and Water controls the environment components and the factors affecting them. At national level such control is implemented by the Minister of Environment and Water, or by any persons, authorized by him, and at regional level – by the RIEW directors, the basin directorates' directors, the national park's directors, the district governors and by the mayors of municipalities, or officials authorized thereby.

The establishment, functioning, technical facilities and information programming supply of the national automated system for environmental monitoring, and the methodical management of monitoring operations, excluding the national system for monitoring of noise in urban territories, are carried out by Executive Environment Agency. The assessments for the condition of the environment are carried out at national and regional level by the Executive Environment Agency and the Regional Inspectorate of Environment and Water, respectively.

The Regulation of Water Supply and Sewerage Services Act (RWSSSA)

The Regulation of Water Supply and Sewerage Services Act (RWSSSA) settles the regulation of prices, the accessibility and quality of water supply and sewerage services provided by the WSSC. The regulation of the water supply and sewerage services – quality, prices, control, etc., is done by the SEWRC. Several regulations have been issued setting provisions for the development of business plans of water supply and sewerage companies, the quality of water supply and sewerage, etc. In 2009, a change was introduced in the Act, according to which the SEWRC regulates the prices, at which WSSC and other companies supply water (from their own water installations or from ones, which have been granted to them for exploitation) to water supply systems of other water supply and sewerage operators.

Other relevant acts that concern the water sector include: the Spatial Planning Act, Waste Management Act, Biological Diversity Act and the respective sub-delegated legislation for their implementation.

APPENDIX 1-3 REGULATORY FRAMEWORK IN THE EUROPEAN COMMUNITY

The Water Framework Directive 2000/60/EC establishes a legal framework to protect and restore clean water across Europe and ensure its long-term, sustainable use. (Its official title is 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).

The directive establishes an innovative approach for water management based on river basins, the natural geographical and hydrological units and sets specific deadlines for Member States to protect aquatic ecosystems. The directive addresses inland surface waters, transitional waters, coastal waters and groundwater. It establishes several innovative principles for water management, including public participation in planning and the integration of economic approaches, including the recovery of the cost of water services.

The Directive has been transposed into the Water Act, Ordinance № 13/2007 on characteristics of surface waters, Ordinance №1/2007 on exploration, use and protection of groundwater and Order № RD-321/07.05.2007 of the Minister of Environment and Waters on establishing the priority substances in the field of water policy (issued as required in Art. 118, paragraph 1 and Art. 151, paragraph 2, item. 2 of the Water Act).

Directive 91/271/EEC on urban waste-water treatment has the objective to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of : domestic waste water, mixture of waste water, waste water from certain industrial sectors. The Directive lays down four main principles: planning, regulation, monitoring, information and reporting.

The Directive has been transposed into the Water Act, Ordinance № 6/2000 on the standards for admissible contents of dangerous and harmful substances in the waste water discharged in the water bodies, Ordinance № 7/2000 on the Terms and Procedure for Discharge of Industrial Waste Waters into Settlement Sewer Systems, Ordinance № 10/2001 on Issuing Permits for Waste Water Discharge into Water Bodies and Setting Individual Emission Limit Values for Point Sources of Pollution, Ordinance on the order and the way of sludge use from waste water treatment plant through its use in the agriculture (Council of Ministers Decree № 339/2004) and Order № RD-970/2003 of the Minister of Environment and Waters concerning determination of sensitive areas in water bodies (issued as provided for in Art. 12 of Ordinance № 6/2000).

Directive 75/440/EEC concerning **surface water used or intended for the abstraction of drinking water** after appropriate treatment and supplied by public distribution networks. The Directive sets the minimum quality requirements to be met by surface fresh water: Parameters defining the physical, chemical and microbiological characteristics; limit values and guide values for these parameters; the minimum frequency of sampling and analysis; common non-mandatory reference methods for measuring the parameters.

The Directive was amended by Directive 79/869/EEC concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water and Directive 91/692/EEC standardizing and rationalizing

reports on the implementation of certain Directives related to the environment. It has been transposed into Ordinance № 12/2002 on the Quality Requirements for Surface Water Intended for Drinking Water Abstraction and Household Supply.

Directive 2006/118/EC concerning the protection of groundwater from pollution and worsening was transposed by means of the Ordinance № 1 of 2007 on the exploration, use and protection of groundwater.

Directive 2006/7/EC concerning the quality of bathing water has been transposed into Ordinance № 5/2008 on the quality of bathing water.

Directive 1975/EC concerning the bathing waters quality is transposed into Ordinance №14 of 1987 on health resorts' resources, resorts sites and resorts, Ordinance № 8 of 2001 on the quality of coastal marine waters, Ordinance № 7 /8.08.1986 on the indicators and standards for determination of the surface waters quality, Ordinance № 11 on bathing waters quality.

Directive 98/83/EC concerning the quality of water intended for human consumption, has been transposed into Ordinance № 9/ 2001 on the quality of water intended for human consumption.

Directive 2006/44/EO on the quality of fresh waters needing protection or improvement in order to support fish life and Directive 2006/113/EO on the quality required of shellfish waters have been transposed into Ordinance № 4/2000 on the quality of waters supporting fish and shellfish organisms' life.

Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources has been transposed into Ordinance № 2/2007 on the Protection of Waters against Pollution Caused by Nitrates from Agricultural Sources.

Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances, amended by Directive 91/692/EEC and Directive 2006/118/EC on the protection of groundwater against pollution and deterioration has been transposed into the Water Act and Ordinance № 1/2007 on Exploration, Use and Protection of Groundwater, Ordinance № 2 of 2007 on protection of waters against pollution caused by nitrates from agricultural sources, Ordinance № 3 of 2000 for the terms and conditions for exploration, design, approval and exploitation of sanitary security areas around water sources and drinking water supply facilities, and around mineral water sources used for therapeutic, prophylaxis, drinking and hygiene purposes, Ordinance № 10 of 2001 on issuing permits for waste water discharge into water bodies and setting individual emission limit values for point sources of pollution.

Directive 2006/11/EC on water pollution caused by certain dangerous substances discharged into the aquatic environment of the Community and seven daughter Directives have been transposed into Ordinance № 6/2000 on the Limit Values for Admissible Contents of Dangerous and Harmful Substances in the Waste Water Discharged in the Water Bodies and Ordinance №7/2000 on the Terms and Procedure for Discharge of Industrial Waste Waters into Sewer Systems, Ordinance № 8 of 2001 on the quality of coastal marine waters, Ordinance № 10 of 2001 on issuing permits for waste water discharge into water bodies and setting individual emission limit values for point sources of pollution.

Directive 85/337/EEC on Environmental Impact Assessment, amended by Directive 97/11/EC, amended by Directive 2003/35/EC concerning the public participation in the preparation of certain plans and programmes with impact on the environment, has been transposed into the Environmental Protection Act and the Ordinance on the terms and conditions for performance of environmental impact assessments (№ 59/2003).

Directive 2004/35/EO on environmental liability with regard to the prevention and remedying of environmental damages has been transposed into the Law on liability for prevention and elimination of environmental damages.

Directive 90/313/EEC repealed by Directive 2003/4/EC on public access to environmental information has been transposed into the Environmental Protection Act and the Law on Access to Public Information and the Law on the liability for elimination and prevention of environmental damages.

Directive 2001/42/EC on environmental impact assessment of certain plans and programmes has been transposed into the Environmental Protection Act and the Ordinance of the terms and conditions of performance of environmental assessment of plans and programmes (№ 139/2004).

Directive 80/777/EC on rapprochement of member states legislations concerning exploitation and selling of natural mineral waters and **Directive 2003/40/EC** on making list, concentration limits and requirements for show-cards about the natural mineral waters components and conditions for the use of ozone treated air on natural mineral and sources waters are transposed with Ordinance for requirements to mineral, sources and dinning waters intended for drinking water purposes.

Directive 2008/56/EC on EC action framework creation for the maritime environment policy (Framework Directive for maritime strategy) is transposed with Ordinance of environment protection in maritime waters/2010.

Directive 2007/60/EC on evaluation and management of flood' risk is transposed with the Water Act and Regulations on activity, work organization and structure of basin directorates.

Directive 92/43/EEC on protection of natural habitations and wild flora and fauna is transposed with the Biological diversity Law, Ordinance №11/2009 for conditions and order to applying measure 214 "Agro ecological payments of the Program for development of rural areas 2007-2013, Ordinance №23/2010 on conditions and order to give a grant for measure 2.5 Fishing in internal water basins.

Directive 2009/90/EC on determination according Directive 2000/60 of technical specifications for chemical analysis and monitoring of water's status – the transposing act will be presented in the Action plan of Ministers Council **Directive 2008/105/EC** on determination of standards for the environment's quality in water policy is transposed with Ordinance on environment quality standards for substances and other polluters and Regulation on activity, work organization and structure of basin directorates /2011.

Directive 86/278/EEC on environment protection and especially of earth after using sludge from waste water treatment in agriculture is transposed in the Law of wastes management.

APPENDIX 3-1 LOCAL OPERATION RESOURCES OF THE WATER ABSTRACTION FACILITIES IN PESHTERA MUNICIPALITY

Table: Local operation resources of the water abstraction facilities in Peshtera Municipality

№	Water Abstraction Facility	Operational Resources, Qoper		Water source /code of GWB/
		l/s	m3/d	
I	The town of Peshtera, total	99.15	8566.56	
1	Kievo SC	18.90	1632.96	BG3G0000PgN020
2	Kievo Kale SC	3.30	285.12	
3	Siniyat Kainak SC	18.10	1563.84	
4	Chepinski Vriz SC	2.10	181.44	
5	Studenata Voda SC	4.80	4147.20	
6	Cheshme Bashi SC	2.40	207.36	
7	Dalbochitsa 1 SC	3.00	259.20	BG3G00000Pt047
8	Dalbochitsa 2 SC	3.00	259.20	
9	Novomahlenski SC	18.10	1563.84	
	∑ from springs	73.70	6367.68	
10	Tube well TW1	6.20	535.68	BG3G00000Pt047
11	Tube well TW2	6.10	537.04	
12	Tube well TW3	3.77	325.73	BG3G0000PgN020
13	Tube well TW4	9.38	810.43	
	∑ from wells	25.45	2198.88	
II	The village of Radilovo, total	6.52	563.33	BG3G0000PgN020
1	Malinovi Livadi SC	0.63	54.43	
2	Chatal Uluk SC	0.73	63.08	
3	Borov Chuchur 1 SC	0.32	27.65	
4	Borov Chuchur 2 SC	0.25	21.60	
5	Demishki Dol SC	4.28	369.79	
6	Kapinov Dol SC	0.31	26.78	
III	The village of Kapitan Dimitrievo, total	1.60	138.24	BG3G0000PgN020
1	Osmanagovitsa SC	1.60	138.24	
IV	St. Constantine Holiday Resort, total	1.20	103.68	BG3G00000Pt047
1	Kukusheva Cheshma SC	1.20	103.68	
	Overall	108.47	9371.81	
	Incl. : from GWB BG3G00000Pt047	37.60	3248.64	
	from GWB BG3G0000PgN020	70.87	6123.17	

APPENDIX 3-2 GROUNDWATER QUALITY

Table: Groundwater Quality

Parameters	Unit	Parametric value according to Ordinance № 9/2001 /Directive 98/86/EC/	Groundwater body "Fissure waters – West Rodopi Complex under code BG3G00000Pt047"			Groundwater body "Fissure waters – Peshtera-Dospat under code BG3G0000PgN020"			
			The town of Peshtera		St. Constantine Holiday Resort "	The town of Peshtera		The village of Radilovo	The village of Kapitan Dimitrievo
			from	to		from	to		
A. Microbiological parameters									
Escherichia coli (e-coli)	KOE/ml	0/100							0/100
Coliforms	KOE/ml	0/100							0/100
B. Chemical parameters									
Arsenic	µg/l	10			2,00			2,00	2,00
Cadmium	µg/l	5,0			0,000			0,0000	0,000
Chrome	µg/l	50	0,000		0,000	0,000		0,000	0,000
Copper	mg/l	2,0			0,290			0,0284	0,290
Zinc	mg/l	5,0			0,70			0,12	0,70
Cyanides	µg/l	50							
Fluorides	mg/l	1,5			0,10			0,00	0,10
Lead	µg/l	10			9,60			0,00	9,60
Nitrates	mg/l	50	2,0	4,0	7,00	1,0	3,5	1,0	7,00
Nitrites	mg/l	0,50	0,00		<0,02	0,00	signs	0,00	<0,02
C. Indicative parameters									
Electrical conductivity	µS cm-1	2 000			115				
Ammonium ion	mg/l	0,50	0,00		0,00				
Active reaction	pH	≥6,5 и ≤ 9,5	7,35	7,50	6,70				
Iron	mg/l	200	signs	<0,02	<20				
Calcium	mg/l	150	46,09	50,10	16,3				
Magnesium	mg/l	80	0,00	10,94	7,3				
Manganese	µg/l	50	0,00	следи	0,00				
Oxidisability	mg/l O2	5,0	0,40	1,04	0,96	1,04	0,48	0,88	
Sulphates	mg/l	250	21,81	55,60	30,04	6,17	21,4	20,58	
Phosphates	mg/l	0,5	0,08	0,15	0,06	0,02	0,08	0,00	

Parameters	Unit	Parametric value according to Ordinance № 9/2001 /Directive 98/86/EC/	Groundwater body "Fissure waters – West Rodopi Complex under code BG3G00000Pt047"			Groundwater body "Fissure waters – Peshtera-Dospat under code BG3G0000PgN020"			
			The town of Peshtera		St. Constantine Holiday Resort "	The town of Peshtera		The village of Radilovo	The village of Kapitan Dimitrievo
			from	to		from	to		
Chlorides	mg/l	250	7,09	10,65	8,86	0,35	5,32	5,32	<250
Sodium	mg/l	200			5,50			14,83	
Total hardness	mg∑qv/l	12	3,2		1,40	6,17	21,4	0,45	
I. Radiological indicators									
Total β - radioactivity	mBq/l	2000	<100		26	<100		<100	
Uranium	mg/l	0.06	0,0011	0,0020		0,0020			
II. Others									
Hydrocarbonate	mg/l	-	161,70	195,26	39,66	3,64	30,51	30,51	
Dry residue	mg/l	-	204,0	223,7	125,0	71,0	120,0	67,0	

APPENDIX 3-3 EXTERNAL WATER SUPPLY SYSTEM OF THE TOWN OF PESHTERA

Water sources of Water Supply System of the town of Peshtera

Table: Water supply group with 4 catch systems, feeding PR V=600m3 – main characteristics of the water sources

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Studenata Voda	2.50	4.80	9.00	717.00	716.30
Kievo Kale	3.00	3.15	4.50	820.00	819.30
Kievo	16.00	18.90	25.00	832.00	831.30
Cheshme Bashi	0.50	2.40	6.00	848.50	847.75
Total water quantity	22.00	29.25	44.50		

Table: Water supply group with water source – Novomahlenski catch system, feeding PR V=600m3 – main characteristics of the water sources

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Novomahlenski	12.00	18.10	30.00	555.00	553.65

Table: Water supply group with 3 catch systems, feeding PR V=180m3 of Chepinski Vriz -old– main characteristics of the water sources

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Dalbochitsa 1	2.50	3.00	4.00	856.00	855.00
Dalbochitsa 2	2.50	3.00	4.00	834.00	833.40
Chepinski Vriz	1.00	2.10	4.00	541.00	540.40
Total water quantity	6.00	8.10	12.00		

Table: Water supply group with water source – Siniya Kainak catch system, feeding PR V=1250 m3 of Chepinski Vriz –new – main characteristics of the water source

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Siniya Kainak	12.00	18.10	30.00	451.00	449.20

Table: Water supply group with water sources - 4 tube wells in the terrace of Novomahlenska River, feeding PR V=500 m3 – main characteristics of the water sources

Name of Water Source	Flow [l/s]	Depth	Ground elevation	Elevation of Static water level	Lower water table elevation
Tube well 1 (TW1)	6.2	60	478.70	475.75	462.40
Tube well 2 (TW2)	6.1	90	463.79	463.79	451.30
Tube well 3 (TW3)	2.5	15	457.27	453.72	450.45

Name of Water Source	Flow [l/s]	Depth	Ground elevation	Elevation of Static water level	Lower water table elevation
Tube well 4 (TW4)	4.5	15	454.35	450.60	446.60
Total water quantity	19.3				

Table: Water supply group with water source – open river intake, feeding PR V=1000 m3 – main characteristics of the water source

Name of Water Source	Flows		Ground elevation
	Qmin l/s	Qmax. l/s	
Open river intake	8.00	27.00	835.00

Reservoirs of main water supply system in Town of Peshtera

Table: Reservoirs of main water supply system in Town of Peshtera

Name	Location	Total Volume Vo [m³]	Volume regulation Vreg. [m³]	Fire Protection Volume Vf.p. [m³]	Characteristic elevations			
					Ground elevation	Inlet pipe elevation	Water level elevation I	Feeding pipe elevation
Pressure Reservoir V=600 м3 - south	Town of Peshtera	600	546	54	503.45	503.50	503.70	500.90
Pressure Reservoir V=180 m3 – Chepinski vriz – old	Town of Peshtera	180	180	-	517.20	517.50	517.30	515.20
Pressure Reservoir V=500 m3	Town of Peshtera	500	446	54	469.05	470.25	470.00	467.90
Pressure Reservoir V=1250 m3 – Chepinski vriz – new	Town of Peshtera	1142	1142	108	503.50	503.70	503.50	499.50
Pressure Reservoir V=1000 m3	Town of Peshtera	1000	892	108	535.00	535.40	535.20	532.00
Total for Town of Peshtera		3422	3206	324				

Pumping stations of Peshtera water supply system

Table: Pumping stations of Peshtera water supply system

Name	Number of pumps	Type of pumps	Operating capacity of pumps [m³/h]	Suction tank [m³]
BPS 1 (bunker pumping station 1) at TW1	1	submersible “PLEUGER”	29	
BPS 2 (bunker pumping station 2) at TW 2	1	submersible “PLEUGER”	36	
BPS 3 (bunker pumping station 3) at TW 3	1	submersible “PLEUGER”	9	
BPS 4 (bunker pumping station 4) at TW 4	1	submersible “PLEUGER”	16	
Siniyat Kainak PS	3	Horizontal pumps	108	V=50m3

Name	Number of pumps	Type of pumps	Operating capacity of pumps [m³/h]	Suction tank [m³]
	(1 operating + 2 standby)			
Total by theory			198	
Total for normal operation			173	

Transmission Mains of the Water Supply System of the town of Peshtera

Table: Transmission Mains of Peshtera Water Supply System, with 4 catchment systems, feeding PR of V=600 m3

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
Most of the water mains from the catchment systems to PR V=600 m3	Asbestos cement	150	6.440	1965–1967	Obsolete pipes
Section from Studenata Voda catchment system to Collection Chamber	PE	160	0.420	2006	In good condition
Section from Kievo Kale „catchment system to water pipeline of ∅150	Asbestos cement	80	0.150	1967	Disconnected
From PRC (Pressure Release Chamber) to PR V=180 m3	Steel (Mannesmann)	90	3.180	1950	In comparatively good condition
From PRC to PR V=180 m3, in the area of the town of Peshtera	PE	140	0.820	2007	In good condition
Total for the group			11.010		

Table Transmission Mains of Peshtera Water Supply System, with water source, Novomahlenski catchment system, feeding PR of V=600 m3

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
From the catchment system to DWTP	Asbestos cement	300	2.300	1963–1964	Obsolete pipes. There are failures each year.
Almost the whole section from DWTP to PR V=600 m3	Asbestos cement	250	1.360	1963–1964	Obsolete pipes
From DWTP to PR V=600 м3, in the area of the town of Peshtera	PE	250	0.180	2009	In good condition
Total for the group			3.840		

Table: Transmission Mains of Peshtera Water Supply System, with 3 catchment systems, feeding PR of V=180m3 Chepinski Vriz, old

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
Most of the water pipelines from the connection of both Dalbochitsa catchment systems to PR V=180m3	Asbestos cement	100	5.780	1965	Obsolete pipes
From Dalbochitsa 1 catchment system and Dalbochitsa 2 catchment system to water pipeline of ∅100	Asbestos cement	80	0.430	1965	Obsolete pipes
Section from Chepinski Vriz catchment system to PR V=180 m3	Steel	50	0.480	1967	Old corroded pipes
Total for the group			6.690		

Table: Transmission Mains of Peshtera Water Supply System, with water source, Siniya Kainak catchment system, feeding PR of V=1,250 m3 Chepinski Vriz, new

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
From Siniya Kainak catchment system to Suction Tank of PS	Asbestos cement	300	0.150	1969	Obsolete pipes
Pressure pipeline from PS to PR V=1,250 m3	Steel	273	0.700	1987	Failures may be expected due to the age of pipes
Total for the group			0.850		

Table: Transmission Mains of Peshtera Water Supply System, with water sources, 4 tube wells in the terrace of Novomahlenska River, feeding PR of V=500 m3

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
The whole section	Steel	159	1.300	1992	In comparatively good condition

Table: Transmission Mains of Peshtera Water Supply System, with water source, open river intake, feeding PR of V=1,000 m3

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
The whole section	PE	200	2.220	2008	The water main is entirely new and is in good condition. It is to be put into operation.

Table: Total for the transmission Mains of the Water Supply System of the town of Peshtera

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
	Asbestos cement		16.610		
	Steel		2.480		
	Steel (Mannesmann)		3.180		
	PE		3.640		
Total length of the external water pipelines			25.910		

APPENDIX 3-4 EXTERNAL WATER SUPPLY SYSTEM OF THE VILLAGES OF RADILOVO AND KAPITAN DIMITRIEVO

Water sources of External Water Supply System of the villages of Radilovo and Kapitan Dimitrievo

Water sources delivering water to the village of Radilovo

Table: Water supply system (group) with 6 catch systems, feeding PR V=120 m3 and PR V=300 m3 – high zone – main characteristics of the water sources.

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Malinovi Livadi	0.15	0.63	4.00	760.00	759.70
Chatal Uluk	0.30	0.73	4.20	870.00	868.90
Borov Chuchur 1	0.20	0.32	2.50	953.00	952.45
Borov Chuchur 2	0.10	0.25	2.50	987.00	986.50
Demishki Dol	2.80	4.28	19.00	850.00	850.00
Kapinov Dol	0.20	0.31	1.50	1040.00	1038.15
Total water quantity	3.75	6.52	23.70		

Water sources delivering water to the village of Kapitan Dimitrievo

Table: Water supply system (group) with water source – Osmanagovitsa catch system, feeding PR V=120 m3 – main characteristics of the water sources

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Osmanagovitsa	1.20	1.60	2.40	332.00	331.75

Reservoirs of the water supply system in the villages of Radilovo and Kapitan Dimitrievo.

Name	Location	Total Volume Vo [m³]	Volume regulation Vreg. [m³]	Fire Protection Volume Vf.p. [m³]	Characteristic elevations			
					Ground elevation	Inlet pipe elevation	Water level elevation I	Feeding pipe elevation
Pressure Reservoir V=300 м3 – high zone	Village of Radilovo	300	246	54	475.00	475.20	475.00	472.80
Pressure Reservoir V=120 м3 – high zone	Village of Radilovo	120	120	-	475.00	475.20	475.00	473.00
Pressure Reservoir V=500 м3 - low zone	Village of Radilovo	500	446	54	443.50	443.70	443.50	441.00
Total Village of Radilovo		920	812	108				

Name	Location	Total Volume Vo [m³]	Volume regulation Vreg. [m³]	Fire Protection Volume Vf.p. [m³]	Characteristic elevations			
					Ground elevation	Inlet pipe elevation	Water level elevation I	Feeding pipe elevation
Pressure Reservoir V=120 м3	Village of Kapitan Dimitrievo	120	120	-	321.00	321.20	321.00	319.00
Pressure Reservoir V=300 м3	Village of Kapitan Dimitrievo	300	246	54	329.25	329.65	329.50	327.30
Total for Village of Kapitan Dimitrievo		420	366	54				

Pumping stations of the water supply system of the villages of Radilovo and Kapitan Dimitrievo

Name	Number of pumps	Type of pumps	Operating capacity of pumps [m³/h]	Suction tank [m³]
Kapitan Dimitrievo PS	4 (2 operating + 2 standby)	Horizontal pumps	18 m3/hour each	V=100m3

Transmission Mains of the Water Supply System of the villages of Radilovo and Kapitan Dimitrievo

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
Water mains from water supply group, feeding PR V=120 m3 and PR V=300 m3 of the village of Radilovo					
From the catchments Borov Chuchur 1, Borov chuchur 2, Chatal Uluk, Demishki Dol and Malinovi Livadi to Collection Chamber in Popovo Horo locality	asbestos cement	60-100	10.980	1955-1967	Obsolete pipes
Section from Kapinov Dol catchment system to water pipeline of ∅80	galvanized	2”	0.800	1967	Obsolete pipes
Section from Chatal Uluk catchment system to Collection chamber in Popovo Horo locality	asbestos cement	80	4.060	1959	Obsolete pipes
From Collection chamber in Popovo Horo locality to PR V=120 m3- and PR V=300 m3 of the village of Radilovo	steel	108	2.300	1955	Old corroded pipes
Total for the group			14.080		

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
Water mains from water supply group, feeding PR V=120 m3 of the village of Kapitan Dimitrievo					
The whole section	steel	100	0.420	1944	Old corroded pipes
Total for the group			0.420		
Water mains from water supply group, delivering water from the reservoirs of the town of Pazardzhik					
From the reservoirs of the town of Pazardzhik to ST V=100m3	steel	159	3.000	1991	In good condition
Pressure pipeline to PR V=500 m3 of the village of Radilovo	steel	219	6.300	2000	In good condition
Pressure pipeline to PR V=300m3 of the village of Kapitan Dimitrievo	steel	159	0.660	1991	In good condition
Total for the group			9.960		
Total for the external water pipelines of the villages of Radilovo and Kapitan Dimitrievo					
	asbestos cement		10.980		
	steel		12.680		
	steel (galvanized)		0.800		
Total length of the external water pipelines			24.460		

APPENDIX 3-5 EXTERNAL WATER SUPPLY SYSTEM OF ST. CONSTANTINE HOLIDAY RESORT

Water sources of External Water Supply System of St. Constantine Holiday Resort

Table: Water supply system (group) with water source – Kukusheva Cheshma catch system, feeding PR V=32 m3 - main characteristics of the water sources

Name of Water Source	Flows			Ground elevation	Feeding pipe elevation
	Qmin l/s	Qoper. l/s	Qmax. l/s		
Kukusheva Cheshma	0.90	1.60	2.20	1263.50	1263.25

Reservoirs of the water supply system of St. Constantine Holiday Resort

Table: Reservoirs of the water supply system of St. Constantine Holiday Resort

Name	Location	Total Volume Vo [m³]	Volume regulation Vreg. [m³]	Fire Protection Volume Vf.p. [m³]	Characteristic elevations			
					Ground elevation	Inlet pipe elevation	Water level elevation I	Feeding pipe elevation
PR V=32 m3	St. Constantine Holiday Resort	32	32	-				
PR V=25 m3	St. Constantine Holiday Resort	25	25	-	503.45	503.50	503.70	500.90
PR V=50 m3	St. Constantine Holiday Resort	50	50	-	503.45	503.50	503.70	500.90
Total for St. Constantine Holiday Resort		107	107	-				

Pumping Stations of the Water Supply System of St. Constantine Holiday Resort

Table: Pumping Stations of the Water Supply System of St. Constantine Holiday Resort

Name	Number of pumps	Type of pumps	Operating capacity of pumps [m³/h]	Suction tank [m³]
Kukusheva Cheshma PS	2 (1 operating + 1 standby)	horizontal	7	15
Chamber with pump I-st lift	1	vertical “Grundfos CR 16-120”	16.6	27
Chamber with pump II-nd lift	1	vertical “Grundfos CR 16-120”	16.6	27
Chamber with pump from window №2	1	Vertical submersible	18	Sucks directly from the tunnel
Total			23.6	

Transmission Mains of the Water Supply System of St. Constantine Holiday Resort

Table: Transmission Mains of the Water Supply System of St. Constantine Holiday Resort

Location	Material	Diameter [mm]	Length [km]	Year of construction	Observations
Water mains from water supply group with water source, Kukusheva Cheshma catchment system, feeding PR V=32 m3					
Section from Kukusheva Cheshma catchment system to ST V=15 m3	PE	75	0.050	2005	In good condition
Section from to PR V=32 m3	Steel	90	0.480	before 1960	In relatively good condition
Total for the group			0.530		
Water mains from water supply group, delivering water to the supply system of Batak Dam					
All sections	Steel	133	1.970	1999	In good condition
Total for the group			1.970		
Total for the external water pipelines of St. Constantine Holiday Resort					
	Steel		2.450		
	PE		0.050		
Total length of the external water pipelines			2.500		

APPENDIX 3-6 WATER DISTRIBUTION NETWORK OF THE TOWN OF PESHTERA

Table: Existing water distribution network of Town of Peshtera - pipelines distribution of Town of Peshtera by pipe material and diameters

Material	Nominal Diameter [mm]	Length [km]	Share of the total length [%]	Year of construction
Asbestos cement	60	1.227	2.62	before 1970
	80	18.269	39.00	before 1970
	100	2.669	5.70	before 1985
	125	0.454	0.97	before 1985
	150	0.805	1.72	before 1985
	200	0.827	1.77	before 1985
	250	0.838	1.79	before 1985
	300	1.549	3.31	before 1985
Total Asbestos cement		26.638	56.87	
Cast Iron	60	2.094	4.47	before 1955
	90	0.453	0.97	before 1955
	125	0.681	1.45	before 1955
	150	0.257	0.55	before 1955
	200	0.131	0.28	before 1955
Total Cast Iron		3.616	7.72	
Steel	40	0.409	0.87	before 1990
	60	0.572	1.22	1990 - 1995
	80	0.728	1.55	1990 - 1995
	100	0.645	1.38	1990 - 1995
	133	1.000	2.13	1999
	200	0.169	0.36	1989
	250	1.685	3.60	1989
Total Steel		5.208	11.12	
PE	63	0.300	0.64	1998
	75	0.408	0.87	1998 - 2001
	90	1.703	3.64	after 2000
	110	1.479	3.16	after 2000
	125	0.556	1.19	after 2000
	140	0.196	0.42	after 2000
	160	4.124	8.80	after 2000
	200	0.780	1.67	after 2000
	250	0.361	0.77	after 2000

Material	Nominal Diameter [mm]	Length [km]	Share of the total length [%]	Year of construction
	315	0.871	1.86	after 2000
Total PE		10.778	23.01	
PVC	315	0.600	1.28	1994
Total PVC		0.600	1.28	
Total:		46.840	100	
Service connections	½" - 2 ½"	41		

APPENDIX 3-7 SLUDGE MANAGEMENT

Sludge Treatment:

There is an elaborated and approved Sludge Management Report for the sludge of the future wastewater treatment plant of the town of Peshtera. It envisages that the sludge will be disposed to the existing municipal waste landfill, and after its closure, to the regional municipal solid waste landfill for the area of Pazardzhik.

The sludge from the joint wastewater treatment plant of the villages of Radilovo and Kapitan Dimitrievo, which is still at design stage1, is planned to be disposed similarly to the sludge from Peshtera WWTP.

Both treatment plants located on the territory of Peshtera Municipality will be provided with the following sludge treatment facilities:

Gravity thickener for sludge thickening up to humidity of about 97 %

Aerobic stabilizer, combined with a thickener, operating in cyclic mode

Belt filter press for sludge dewatering up to humidity of about 75 %

Sludge Management Options:

Landfill: There is one existing landfill in Peshtera Municipality, which is located about 4 km outside the town of Peshtera, the waste landfill has been operated since 1980 without permit for performing activities involving waste under Art. 12 (1) of WMA and does not meet the requirements of the regulatory framework. Therefore, it has been decided to close the existing landfill in Peshtera as soon as a new Regional Municipal Landfill in Pazardzhik will be put into operation (date is unknown).

Agricultural use or reuse of sludge in the forest areas is a feasible option in Peshtera. The agricultural lands of Peshtera Municipality are 51,359 decares, of which 31,000 decares are arable areas. About 40% of the total municipal territory is occupied by forests.

Reuse of sludge for recultivation purposes has been assessed to be a feasible option for Peshtera (Stone Quarries might soon be available having total area of 300 decares are operated on the land owned by the village of Kapitan Dimitrievo and might).

The table below summarizes sludge treatment and management for Peshtera and Kapitan Dimitrievo WWTPs.

[1] Preliminary designs

Table: Sludge treatment and reuse/disposal in Peshtera and Kapitan Dimitrievo WWTP

Settlement/ WWTP	Commissioning Year	Capacity in PE	Sludge Treatment Technology	Type of Sludge Reuse / Disposal	Sludge Volume	
					to DS2/ a	Humidity [%]
Peshtera WWTP	After 2012 (construction on-going)	25,000	Aerobic stabilization and mechanical dewatering by belt filter press	Municipal Landfill Peshtera Planned Regional Landfill in Pazardzhik	302	75 %
Kapitan Dimitrievo WWTP	2012 (construction on-going)	2,870	Aerobic stabilization and mechanical dewatering by belt filter press		34	75 %

Proposed Sludge Management Options and Assessment of compliance:

Peshtera and Kapitan Dimitrievo WWTP: It is proposed that the sludge from both WWTPs will be disposed to the existing municipal waste landfill, and after its closure to the Regional Municipal Landfill for the area of Pazardzhik. The management of the sludge from WWTP in the area of Peshtera Municipality will be consistent with the requirements of the national legislation in this field and is not expected to create any insurmountable problems.

Industrial WWTP of BIOVET Peshtera: BIOVET (a pharmaceutical company) is discharging treated wastewater directly into the receiving water body of Stara Reka River by meeting all emission standards. The sludge from the treatment plant is dewatered and disposed in compliance with agreements made with the respective authorities. There is currently no data available on the quantity and quality parameters of the waste water and sludge from Biovet WWTP.

Sludge Quality

There is no information available on the sludge quality as the WWTPs in Peshtera and Kapitan Dimitrievo are not yet in operation. Based on the type of polluters connected to the wastewater network of Peshtera there is no reasons to expect that sludge is harmful, hazardous or requiring special disposal site. On the contrary, the Consultant is of the opinion that the produced sludge is suitable for reuse of agriculture, forestry or recultivation of abandoned terrains, etc. It is expected that hygienic risks will be limited as there are no sources of pathogenic helminths and other harmful substances.

[2] Dry substance

However, quality analysis of the produced sludge will have to confirm suitability of sludge reuse for agriculture as soon as the WWTPs will be operational.

Sand and Grease Disposal

All materials that will be removed from the screens at inlet of the new WWTPs will be disposed of in a controlled and approved manner. The same procedure is recommended for the sand extracted from the grit chamber. The following table gives an overview of the type of material, the corresponding volumes and the disposal route.

Table: Sand and Grease to be treated/disposed

Sludge Production	Daily volume (m^3)	Sludge Disposal Routes
Fine screens	1.7	Transported to municipal solid waste landfill
Grease	-	(No data)
Sand	1.37	After its flushing in the treatment plant, sand may be used in construction (except for concrete preparation)
Residues from sewer cleaning	-	(No data)
Sludge collected from septic tanks, treated in the WWTP	-	No septic tanks are envisaged after the construction of WWTP

APPENDIX 3-8 REQUIREMENTS WHICH SHOULD BE COVERED TO CONNECT INDUSTRIAL WASTEWATERS TO THE URBAN WASTEWATER SYSTEM

In order to connect industrial wastewaters to the urban wastewater system, consistency with the following requirements has to be ensured:

Wastewater should not contain large insoluble particles that may settle or come to the surface and clog and disturb the urban sewerage;

Wastewater should not cause corrosion of the pipe material and all system facilities;

Wastewater should not contain inflammable substances (petrol, oil, etc.), poisonous and gaseous admixtures that can form explosive materials in the sewerage network and facilities;

The temperature of industrial wastewater should not exceed the limit set out by the standard;

Wastewater should not contain bacterial pollutants, bacteria of Siberian ulcer, glanders and other pathogenic microorganisms;

Wastewater should not contain radioactive and other toxic substances above the permissible levels; before discharge of such water, harmful impurities must be removed

Wastewater should not contain suspended oils, tars, black oil or hardly soluble synthetic surface-active substances that are practically impossible to oxidize in the biological treatment facilities.

Active reaction pH should be from 6.5 to 8.5;

The total concentration of dissolved salts should be consistent with the standards

Biochemical oxygen demand (BOD5) and Chemical oxygen demand (COD) should comply with the standards laid down in the permit issued by the supervisory authorities.

The process waste water, which does not correspond to the above said conditions, are subject to pre-treatment

The largest industrial undertaking in the agglomeration is BIOVET Peshtera. It is provided with water from the urban system of the WSS Company for drinking–domestic purposes and from own water source for the process. Waste water is treated in a local treatment plant and separately discharged into the receiving water body. The treatment plant is located in Dabovik area and is intended to treat industrially polluted waste water from the process of Biovet AD. Water is transported from the main site to the treatment plant site through a trunk sewer lying in the bed of Stara Reka River. After mechanical treatment in screens, hydrosieve, grit chamber grit classifier and floatator, waste water is repumped to biological stages of first and second phase. Biological treatment is performed there by applying the method of “Activated sludge”

including amonification and nitrification. Surplus sludge is dewatered by a belt filter press and composted together with other organic waste.

According to the terms of the integrated permit, discharged waste water formed on the territory of the production site, is:

- Average daily wastewater quantity, Q aver.daily: 5,220 m3/day
- Maximum hourly water quantity, Q max.hourly: 320 m3/h
- The annual quantity of discharged waste water amounts to 2,080,000 m3/year
- Water composition should not exceed:

COD: 150 mg/l

BOD5: 30 mg/l

Suspended solids: 20 mg/l.

The actual composition of discharged waste water found in the monitoring point:

COD: 51 mg/l

BOD5: 15 mg/l

Suspended solids: 2 mg/l

APPENDIX 3-9 INDUSTRIAL ENTITIES

The main industrial entities, their wastewater flow and wastewater concentration as well as their installed treatment facilities are specified below:

Table: Existing industrial companies discharging waste water into the sewerage network for the year 2011

№	Enterprise	Subject of activity	Industrial+ domestic waters [m3/year]	BOD concentration [mg/l] [mg/l]	Pre-treatment facilities installed [yes/no]
1	Mehanika AD	Tobacco processing factory	379		Seasonal activity – None
2	VM Vassil Muletarov EOOD	leathers, adhesives	11,199		None
3	ET Nagi Trans Peshtera	Transport activity	434		Out of the settlement - None
4	Gribash OOD Peshtera	Production of boza	299		None
5	Herkal EOOD	Metal	2,857		Sludge and grease trap
6	Adi OOD	Shoe manufacture			None
7	ET Grigorov i Sin	Car wash	3,340		Sludge and grease trap
8	ET Atanas Palikarov	Car wash	940		Sludge and grease trap
9	Fresh Clean System EOOD	Laundry and detergents trade	720		None
10	As I Co OOD	Furniture production	307		None
11	TPKI Bratya Gorovi	Cloths	1,604		None
12	Chiko OOD	Brushes, wire, fibres, etc.	1,178		Out of the settlement - None
13	Gudex AD	Caps	199		None
14	ET Tatyana Kostadinova	Swimming pool	1,130		None
15	Vinprom Peshtera AD	Strong alcoholic drinks	128,280	400 for wine production. No data for the new programme	None

№	Enterprise	Subject of activity	Industrial+ domestic waters	BOD concentration [mg/l]	Pre-treatment facilities installed [yes/no]
			[m3/year]	[mg/l]	
16	Bratya Angelovi OOD	Breeding hens for eggs	6,988		Out of the settlement - None
17	ET Yanko Dzharov	Shoe manufacture	1,706		None
18	ET Shterio Tahov	Breeding hens for eggs	850		None
19	" Transervice OOD	Transport company	1,016		Sludge and grease trap
20	Daf trans EOOD	Transport company	777		Sludge and grease trap
Of which, the following companies are not connected to the sewerage					
	ET Nagi Trans Peshtera	Transport activity	434		Out of the settlement – none
	Chiko OOD	Brushes, wire, fibres, etc.	1,178		Out of the settlement – none
	Bratya Angelovi OOD	Breeding hens for eggs	6,988		Out of the settlement – none

Total industrial water quantities sold: 149,035 m3/year

Total industrial water quantities discharged into the sewerage: 0.9 x 149,035 = 134 131.5 m3/year = 367m3/day

The contracts signed between the Water operator and the individual customers do not specify the concentrations of the limit pollutions of waste water discharged by the individual enterprises into the urban sewerage. The water operator does not have an accredited laboratory for control of water entering the sewerage. We recommend that the water operator should renegotiate the conditions for wastewater connection to the sewerage, with the customers by obliging them to conduct monitoring of their waste water in the discharge point at least once per 3 months. The results of monitoring should be kept in special records.

In compliance with the requirements of Ordinance №7, due to the fact that the pollutions from the industry after local treatment are biodissoluble, we expect that the total pollution of industrial waste water connected to the urban sewerage as according to BOD5 will amount to 20% of the normal value for the settlement and the pollution adopted in the project for BOD5 ~ 568 mg/l or ~ 110 mg/l.

APPENDIX 4-1 DAILY AND HOURLY PEAK COEFFICIENT AND DOMESTIC CONSUMPTION

Daily peak coefficient for water supply systems is set as follows:

- 2 for settlements with population between 0 and 499 inhabitants;
- 1.8 for settlements with population between 500 and 1,999 inhabitants;
- 1.7 for settlements with population between 2,000 and 4,999 inhabitants;
- 1.6 for settlements with population between 5,000 and 9,999 inhabitants;
- 1.5 for settlements with population between 10,000 and 49,999 inhabitants;
- 1.4 for settlements with population between 50,000 and 99,999 inhabitants;
- 1.3 for settlements with population over 100,000 inhabitants.

Hourly peak coefficient for water supply systems are set as follows, assessed by averaging the values obtained by applying Tribut formula through the considered range:

- 4.2 for settlements with population between 0 and 499 inhabitants;
- 2.9 for settlements with population between 500 and 1,999 inhabitants;
- 2.5 for settlements with population between 2,000 and 4,999 inhabitants;
- 2.2 for settlements with population between 5,000 and 9,999 inhabitants;
- 2.0 for settlements with population between 10,000 and 49,999 inhabitants;
- 1.9 for settlements with population between 50,000 and 99,999 inhabitants;
- 1.8 for settlements with population over 100,000 inhabitants.

Tribut formula, which was used, is the following:

$$K\_P = K\_inf + \lambda/\sqrt{n} \times \sqrt{(K\_inf \times (D/(c \times d) - 2\ [\![\times K]\!]\ \_inf))} + t/n$$

Where:

- Kp is the hourly peak coefficient
- Kinf = 1.8
- λ= 1.5
- t = 34.5
- n is the number of customers connected to the water supply network
- D is the specific flow for one customer. Usually the value is equal to 43.200 l/day
- c is the unit consumption per capita
- d is the mean number of persons per household. The value chosen is 2.1, according to 2011 census provided by the National Statistical Institute.

APPENDIX 4-2 COMPARISON OF COMBINED AND SEPARATE SEWERAGE SYSTEMS

Combined sewer systems

Combined sewer systems tend to be larger than separate systems, because the stormwater runoff has to be transported.

During heavy rainfalls, the hydraulic limit of the network capacity is reached. Furthermore, the wastewater treatment facilities are not able to cope with extreme variations of flows and loads.

Therefore, overflows have to be integrated in the drainage system discharging the part of wastewater/stormwater, which exceeds the hydraulic capacity of the sewer network.

Advantages	Disadvantages
- Only one pipe to be laid into the trench	- Discharge of wastewater into recipient during heavy rainfalls (overflows)
- Flushing of all pipes during rainfall	- Sedimentation problems due to low flow velocity (big dimension / low flow)
- Illegal or wrong connections (wastewater/stormwater) not possible	- High investment costs for stormwater overflows and “mixed”-water treatment facilities
- Discharge and treatment of stormwater from contaminated surface areas or road sections with traffic volume	- Insufficient wastewater concentration at WWTP (biological treatment) caused by infiltration
- Lower operation costs for network maintenance	- Higher treatment and operation costs for wastewater treatment in case of long rainfall events

Separate systems

Separate systems consist of a dual pipe system, which is often laid in parallel. Underneath the road surface, the larger stormwater pipe is placed above the smaller sewer pipe. By adopting this strategy, in case of leakages, no wastewater seeps into the stormwater pipe and thus into the receiving water body.

Different drainage systems can be compared, as follows.

Advantages	Disadvantages
- No stormwater overflows to be constructed (no investment, no operation costs)	- Illegal and wrong connections (wastewater into stormwater system and vice versa) to be avoided
- Constant inflow conditions (flows and loads) to the WWTP and thus no operational problems for biological treatment process	- If no stormwater infiltration systems or stormwater discharge into ditches is possible, two pipes to be laid in the trench (higher investments)
- No sewage discharge into recipient	- Limited storage volumes for wastewater
- Good hydraulic conditions (flow velocity)	
- In case of flooding, just rainwater instead of sewage will reach the surface	

APPENDIX 4-3 DESCRIPTION OF POSSIBLE FINAL DISPOSAL WAYS

Landfilling

Landfilling is a cheap and easy-to-implement option but on the other hand landfilling the dewatered sludge takes lot of spaces.

Several EU member states have set out a restrictive regulation that generally includes the following conditions:

- Traceability (no mixing of sludge of different origins);
- No contamination with hazardous waste (heavy metals, radioactive or infectious material, etc.);
- Conditions of monitoring (sampling, visual inspection, etc.);
- Dry solid content above 30%.

It is recommended to apply these conditions for sludge landfilling in Bulgaria.

Land spreading

Sludge can also be spread over agricultural areas to enrich the soils in organic matter and nutrients, thus reducing the needs for other soil amendments. If authorities and farmers agree on such utilization, then adequate pricing and supply chain must be set up to maximize the use of this sludge.

Since this product is unknown from the agricultural stakeholders today, it is recommended to set up an information program towards the potential users and to prepare a back-up option for sludge disposal (landfilling) in case this agricultural use is eventually not possible or not accepted.

Land spreading activities should be carefully planned and monitored to optimize agricultural benefits and ensure that no health issues arise. Frequent quality controls of the sludge quality should be implemented.

Sludge composting

Sludge composting is an alternative to the direct use of sludge in agriculture. Composting implies mixing sludge with more structuring material such as wood chips (for instance, Corey woods) or residues of gardening before the composting process itself which allows for the dry aerobic degradation of the organic matter and the hygienisation of the composted material.

Composting is economically relevant, as soon as the final composted product is recognized as a valuable product, which can be certified and sold at a price that allows covering part of the relatively high CAPEX and OPEX associated with this process. These conditions are to be studied in the local context of Bulgaria.

Cement factory

Depending of the specific regulation concerning the use of sludge in cement factories in Bulgaria, local agreements can set up between the cement companies and the water companies, when both parties are interested in this option.

The technical specifications for the sludge that can be incinerated by a cement factory include the following:

- Minimum dryness: 90%;
- Lower calorific value (LCV): 3 500 kcal/kg.

The minimum sludge dryness of 90% imposes the preliminary drying of the sludge. This is traditionally achieved through thermal drying, which is an energy intensive process. Thermal drying can be coupled to the cement kilns - which would require an additional but almost no energy cost since the heat would be taken from the cement kilns for free - or be performed at the WWTP.

Incineration

Incineration is a thermal process that burns the sludge. Today, the most commonly used technology is the “fluidized bed furnace” (FBF). FBF are based on the principle of fluidizing a bed of sand with hot air heated from the bottom. This technology results in the total combustion of the sludge at a temperature between 850 – 900°C in the span of only a few seconds of retention time.

The residues of sludge incineration and flue gas treatment consists in ashes that can be further utilized as mineral material in cement factory or concrete manufacturing process or used as building material for road construction. Ultimately, ashes can also be landfilled.

The major interest of thermal oxidation is the ability to produce energy thanks to the sludge energy potential. A huge amount of energy is recoverable through thermal oxidation processes. Practically, this energy, at high enthalpy level, is recovered on the economizer. The recovering fluid can be pressurized water, steam or diathermy oil (or air if energy is wasted). The heat can be directly used as thermal fluid for building heating, process requirements, or preheating of sludge prior to dewatering/pre-drying to improve the performances.

APPENDIX 4-4 CLIMATE CHANGE IMPACT

Introduction

Climate change is the shift in the average weather, or weather trends that are experienced over decades or longer.

Observations in the 20th century indicate rapid climatic change. A growing body of evidence indicates that the Earth's atmosphere is warming in a trend consistent with a changing climate.

Climate change affects water more than any other resource.

It leads to an **intensification of the hydrological cycle**, resulting globally in dryer dry seasons and wetter rainy seasons, and subsequently heightened risks of more extreme and frequent floods and drought.

It also has significant impacts on the **availability of water**, as well as the quality and quantity of water that is available and accessible.

Climate change projections for Central Region of Bulgaria

Date sources

In order to assess the impact of climate change on water supply and sewerage systems in Bulgaria, the following data were used:

- Current conditions:
  - Monthly and annual average precipitation (interpolations of observed data, representative of 1950-2000) – Source: WorldClim – Global Climate Data – http://www.worldclim.org/
  - Monthly and annual average temperature (interpolations of observed data, representative of 1950-2000) – Source: WorldClim – Global Climate Data – http://www.worldclim.org/
- Future conditions:

The Intergovernmental Panel on Climate Change (IPCC) brings together the available scientific and socio-economic information on climate change and on methods for its mitigation and for adaptation to its consequences. It was appointed in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environmental Programme (UNEP). Since 1990, the IPCC prepared a series of reports that are now standard works of reference frequently consulted by political decision makers, researchers and other experts.

In 2000, the IPCC published The Special Report on Emissions Scenarios (SRES) that describes six emission scenarios now commonly used with global climate models (IPCC, 2000) (Exhibit CI-7). The SRES scenarios cover a wide range of the main drivers of future

emissions, from demographic to technological to economic developments. None of the scenarios includes future policies that explicitly address climate change.

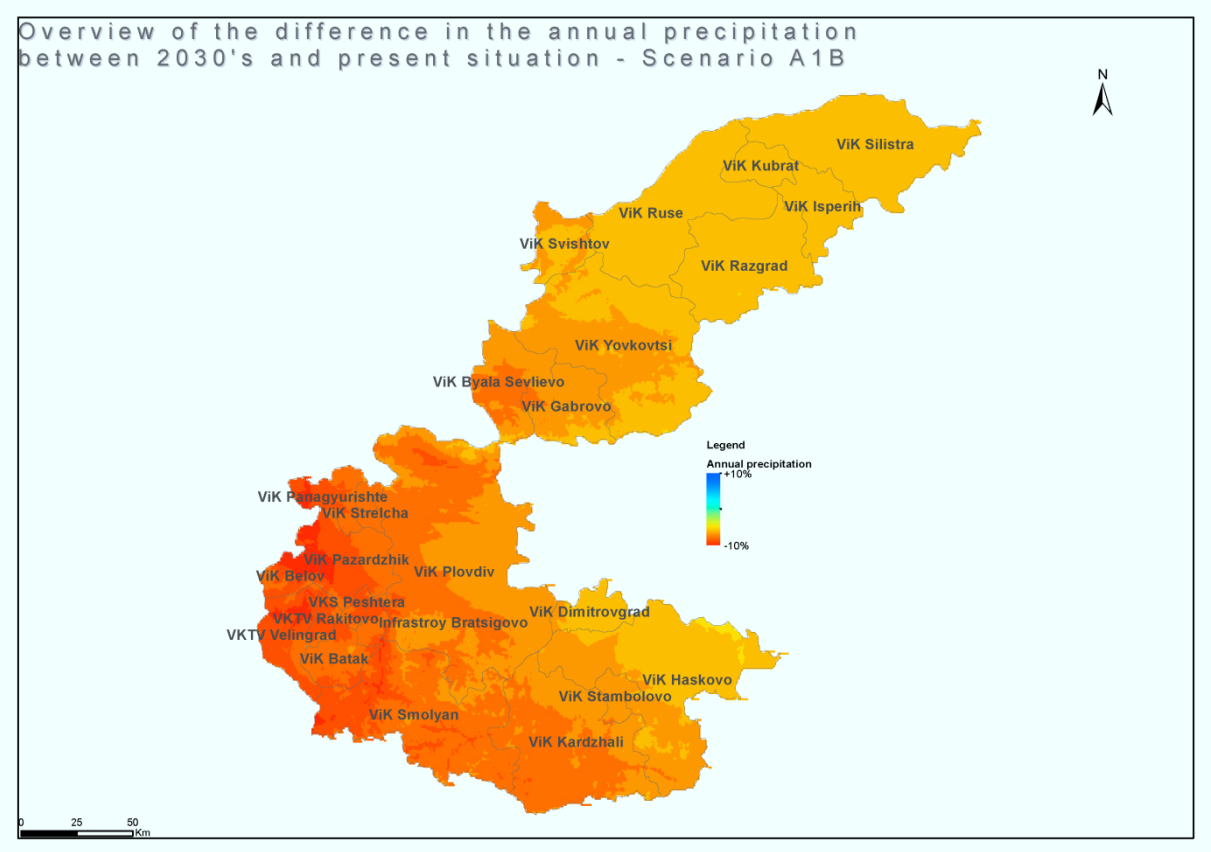
The medium (A1B) emission scenario is generally considered as representative of the climate futures we could reasonably expect to face. It represents medium emission pathways based on projected total emissions in 2100. The following analysis was performed with this scenario and the following data were collected from IPCC website:

- Monthly and annual average precipitation in 2030's – Scenario A1B – Source: IPCC 4 – CIAT – http://www.ccafs-climate.org/data/
- Monthly and annual average temperature in 2030's – Scenario A1B – Source: IPCC 4 – CIAT – http://www.ccafs-climate.org/data/

Change in precipitation

Annual precipitation and water deficit

The following figure emphasizes the variation of annual average precipitation between current and future conditions (scenario A1B – 2030's) in %.



The average **annual precipitation** in current conditions over the study area is assumed to be **613 mm**, against **573 mm** in **2030's**, equivalent to a **decrease of 6.6 %**.

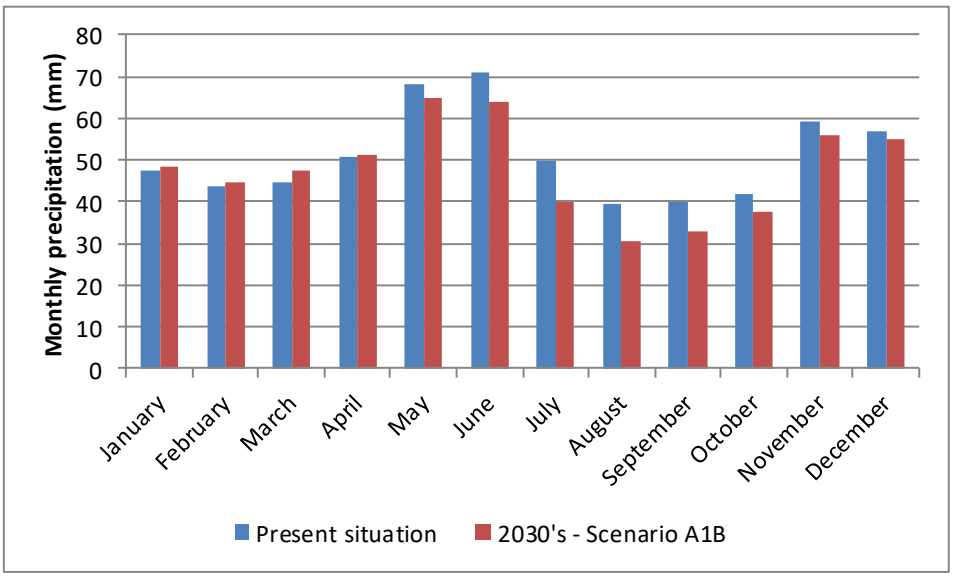
The corresponding total annual water deficit over the study area is approximately 1,500 Mm³.

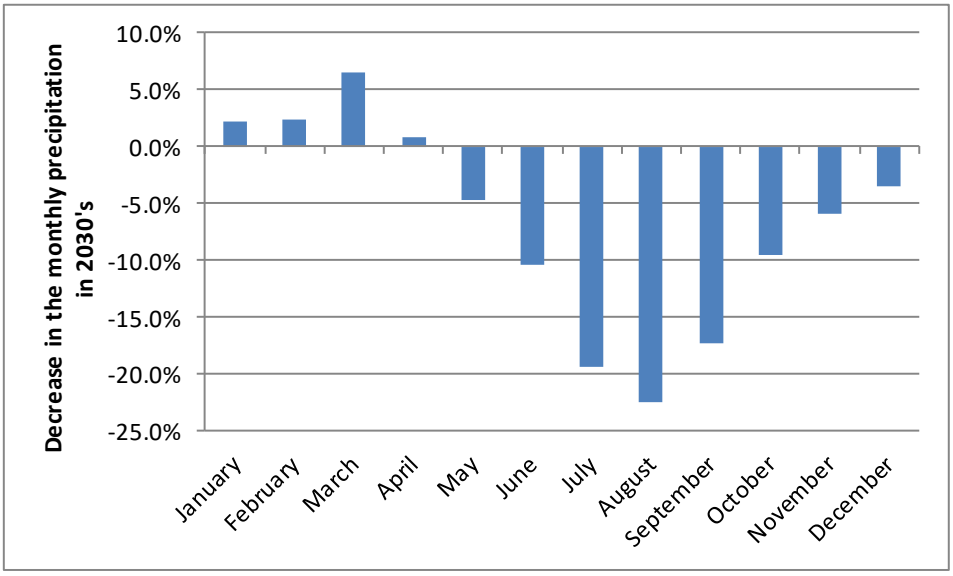
The ViKs with the higher decrease correspond to steep and high areas, such as Belovo, Velingrad or Rakitovo (more than 8% decrease). The following table emphasizes the present and future precipitation per ViK.

VIK	Area (km²)	Annual precipitation (mm)		Water deficit per year	Decrease in annual precipitation
		Present situation	2030's		
Infrastroy Bratsigovo	231	628	578	-11 Mm³/year	-7.9%
ViK Batak	604	704	649	-33 Mm³/year	-7.8%
ViK Belovo	395	645	589	-22 Mm³/year	-8.6%
ViK Byala Sevlievo	1,130	634	591	-49 Mm³/year	-6.8%
ViK Dimitrovgrad	540	566	533	-18 Mm³/year	-5.9%
ViK Gabrovo	1,096	654	612	-46 Mm³/year	-6.4%
ViK Haskovo	3,830	601	566	-136 Mm³/year	-5.9%
ViK Isperih	855	603	570	-29 Mm³/year	-5.6%
ViK Kardzhali	3,145	616	572	-138 Mm³/year	-7.1%
ViK Kubrat	473	591	559	-15 Mm³/year	-5.5%
ViK Panagyurishte	566	617	567	-28 Mm³/year	-8.1%
ViK Pazardzhik	1,141	560	514	-53 Mm³/year	-8.3%
ViK Plovdiv	6,330	603	561	-266 Mm³/year	-7.0%
ViK Razgrad	2,271	626	592	-78 Mm³/year	-5.5%
ViK Ruse	2,864	601	567	-96 Mm³/year	-5.6%
ViK Silistra	2,823	551	522	-84 Mm³/year	-5.4%
ViK Smolyan	3,336	681	628	-174 Mm³/year	-7.7%
ViK Stambolovo	276	592	554	-11 Mm³/year	-6.4%
ViK Strelcha	207	601	556	-9 Mm³/year	-7.5%
ViK Svishtov	691	585	550	-24 Mm³/year	-6.0%
ViK Yovkovtsi	4,025	615	579	-147 Mm³/year	-6.0%
VKS Peshtera	138	599	550	-7 Mm³/year	-8.2%
VKTV Rakitovo	234	646	594	-12 Mm³/year	-8.2%
VKTV Velingrad	818	656	601	-45 Mm³/year	-8.4%

Seasonal variability

Despite the general annual decrease in precipitation, the dynamic is very dependent on the season, as shown in the following figures.

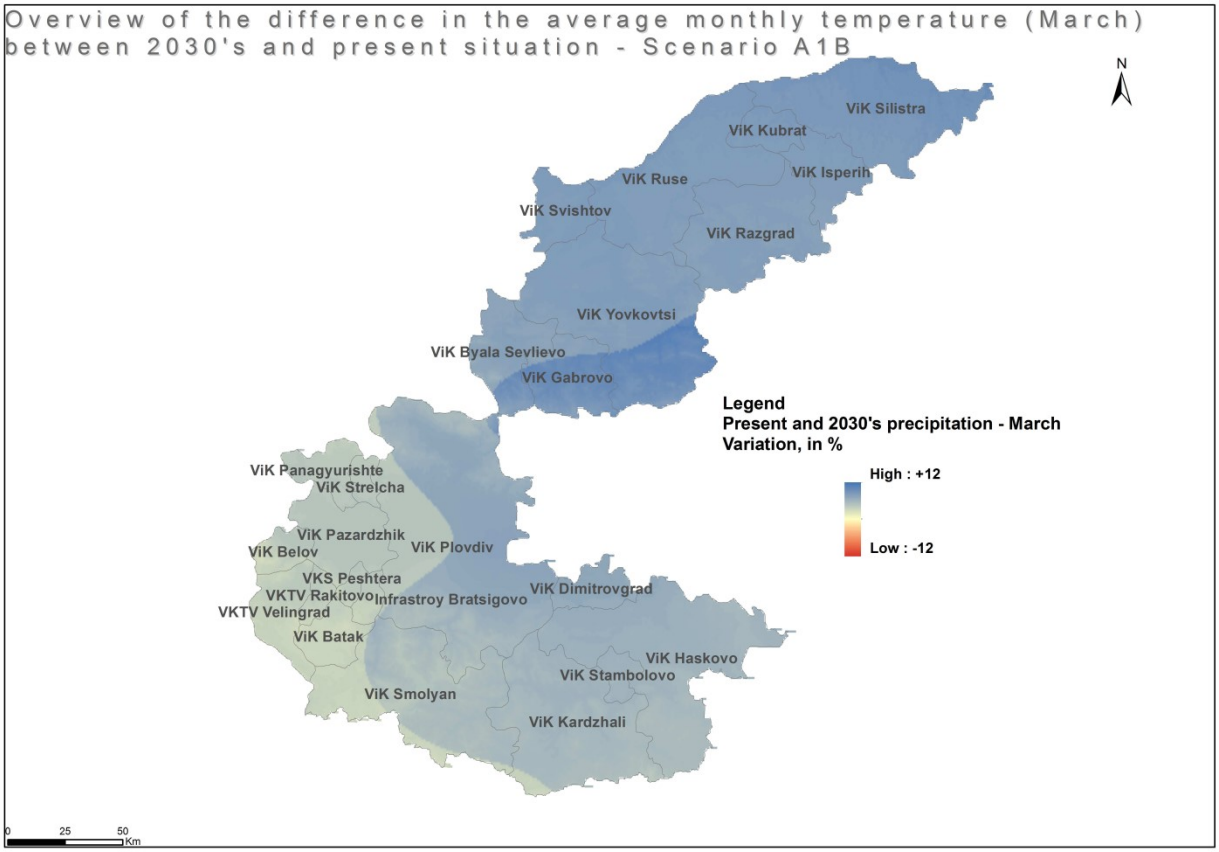




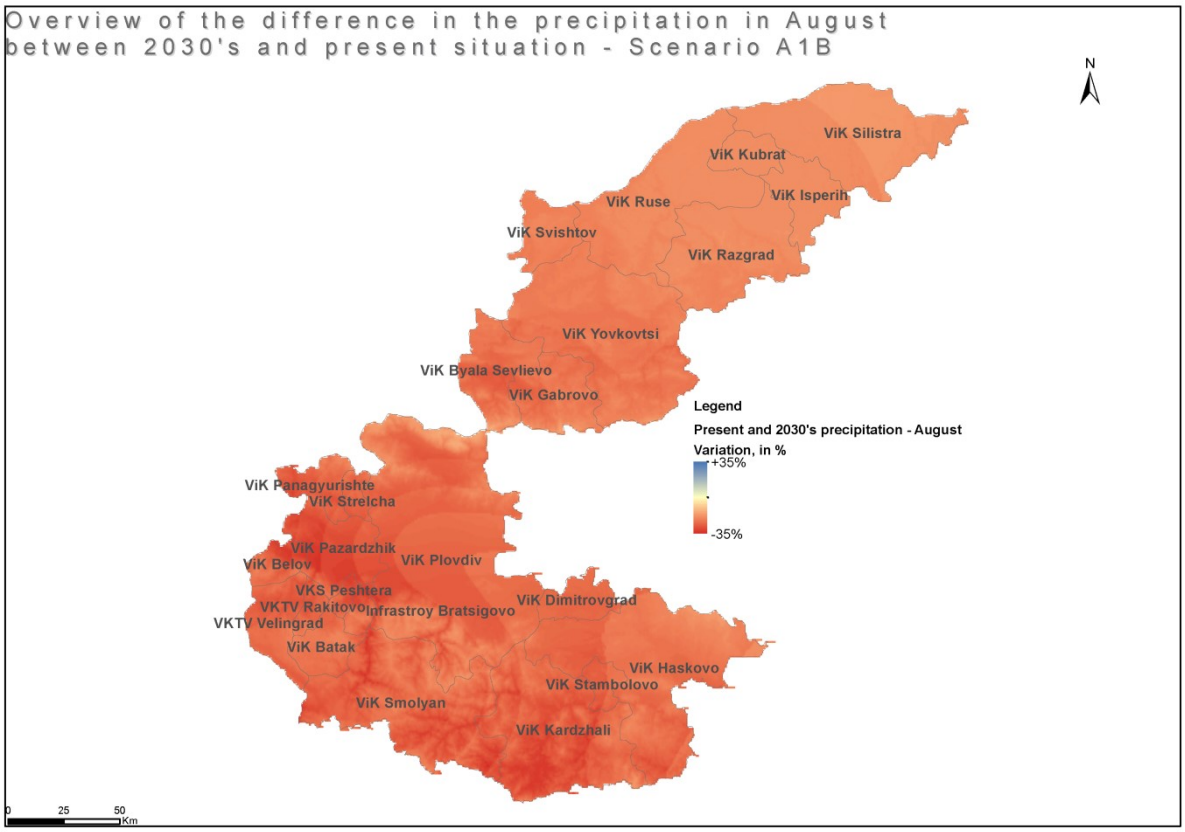
Two periods can be distinguished:

- From January until April, an increase in the monthly precipitation is expected, especially in March with more than 5% increase, and in relation with violent extreme events leading to **flood events**.
- From May until December, especially from July to September, a significant decrease is expected (more than 20% in August), which could lead to **serious drought events and consequent problems in relation with water resource quantity and quality.**

The following figure shows the repartition of the increase in the monthly precipitation in March. Lower increase is expected in high and steep areas.



The following figure shows the repartition of the decrease in the monthly precipitation in August. Higher increase is expected in high and steep areas.



Extreme events

According to IPCC, **extreme events are closely associated with changes in temperature and precipitation**, and with the frequency of events.

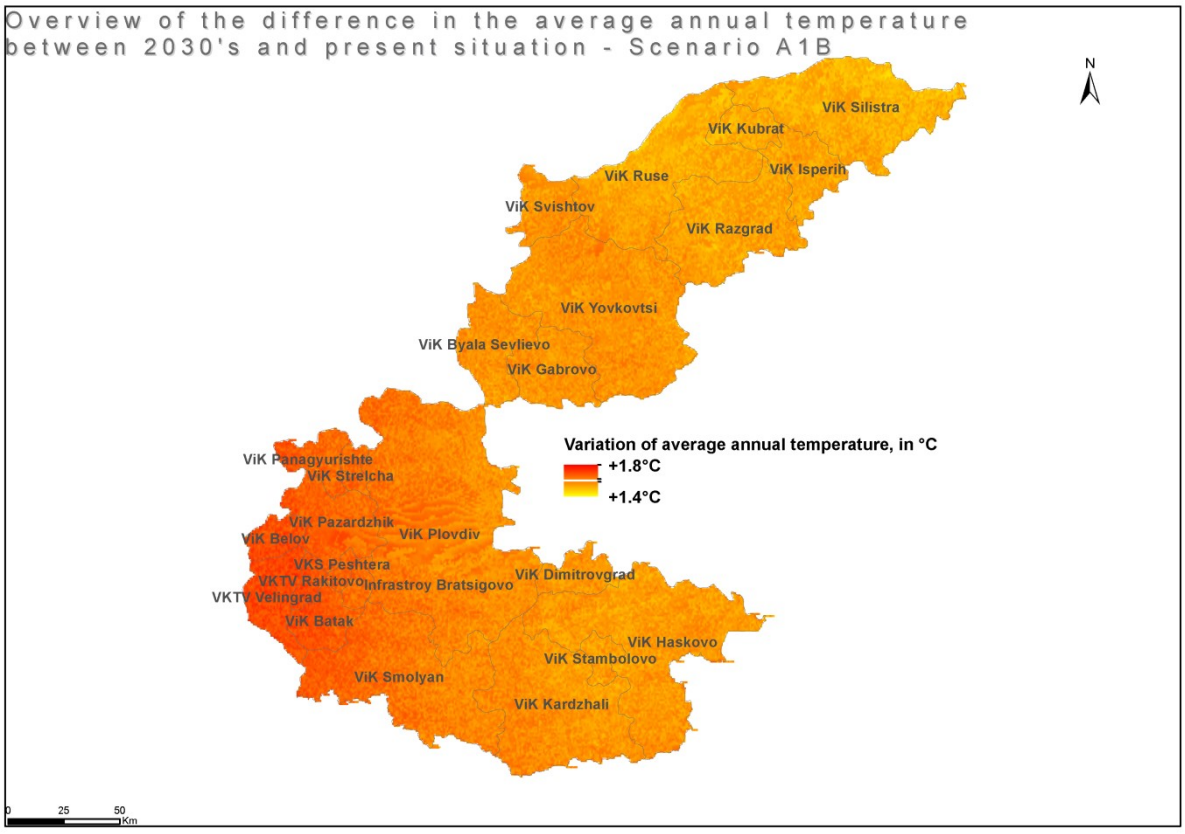
Widespread increases in heavy precipitation events (e.g., above the 95th percentile) have been observed, even in places where total amounts have decreased. These increases are associated with increased atmospheric water vapor and are consistent with observed warming.

Precipitation is therefore projected to be **concentrated in more intense events**, with longer periods of lower precipitation in between. **It is likely that heavy precipitation events will become more frequent**. Intensity of precipitation events is also projected to increase.

Change in temperature

Annual average

The following figure emphasizes the variation of average annual temperature between current and future conditions (scenario A1B – 2030's) in °C.



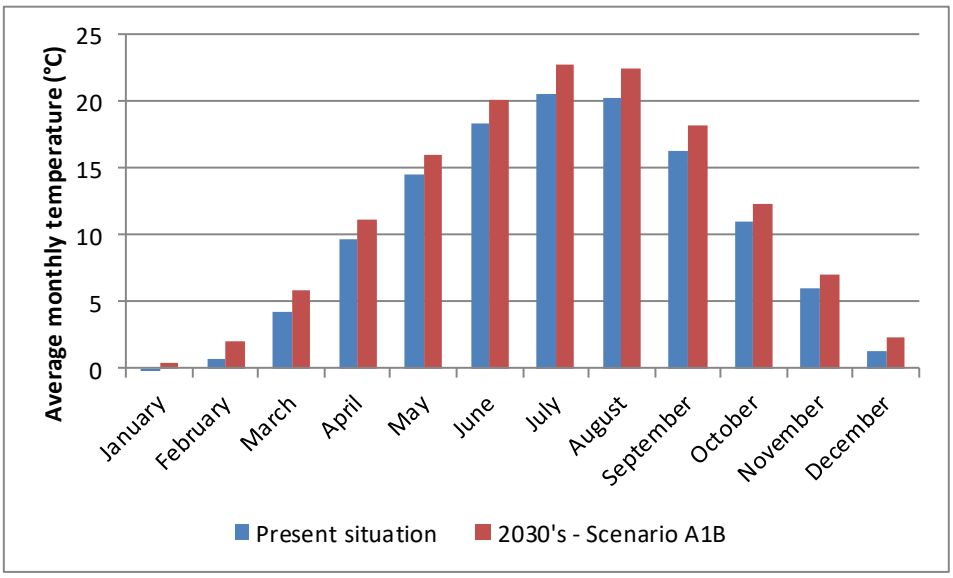
The average **annual temperature** in current conditions over the study area is assumed to be **10.1°C**, against **11.7 mm** in **2030's**, equivalent to an **increase of 1.6°C** which is quite homogeneous over the study area (see previous figure).

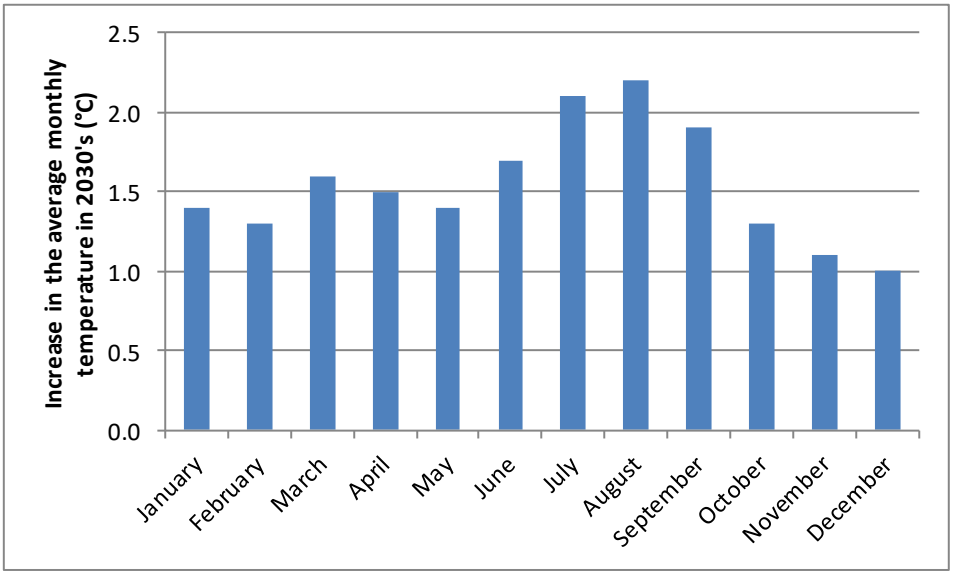
The ViKs with the higher increase correspond to steep and high areas, such as Belovo, Velingrad or Rakitovo. The following table emphasizes the present and future mean annual temperature per ViK.

VIK	Mean annual temperature (°C)		Increase in temperature (°C)
	Present situation	2030's	
Infrastroy Bratsigovo	8.5	10.1	1.6
ViK Batak	5.2	6.9	1.7
ViK Belovo	7.1	8.8	1.7
ViK Byala Sevlievo	9.5	11.1	1.6
ViK Dimitrovgrad	12.3	13.9	1.6
ViK Gabrovo	9.1	10.7	1.6
ViK Haskovo	12.2	13.7	1.6
ViK Isperih	10.2	11.7	1.5
ViK Kardzhali	11.2	12.8	1.6
ViK Kubrat	10.7	12.2	1.5
ViK Panagyurishte	9.3	10.9	1.6
ViK Pazardzhik	11.3	12.9	1.6
ViK Plovdiv	10.1	11.7	1.6
ViK Razgrad	10.1	11.7	1.5
ViK Ruse	10.7	12.3	1.5
ViK Silistra	10.9	12.4	1.5
ViK Smolyan	7.3	8.9	1.6
ViK Stambolovo	12.1	13.7	1.5
ViK Strelcha	9.9	11.6	1.6
ViK Svishtov	11.1	12.7	1.6
ViK Yovkovtsi	10.5	12.1	1.6
VKS Peshtera	9.5	11.2	1.6
VKTV Rakitovo	7.2	8.9	1.7
VKTV Velingrad	6.4	8.1	1.7
Total	**10.1**	**11.7**	**1.6**

Seasonal variability

The increase in temperature is very dependent on the season, as shown in the following figures.

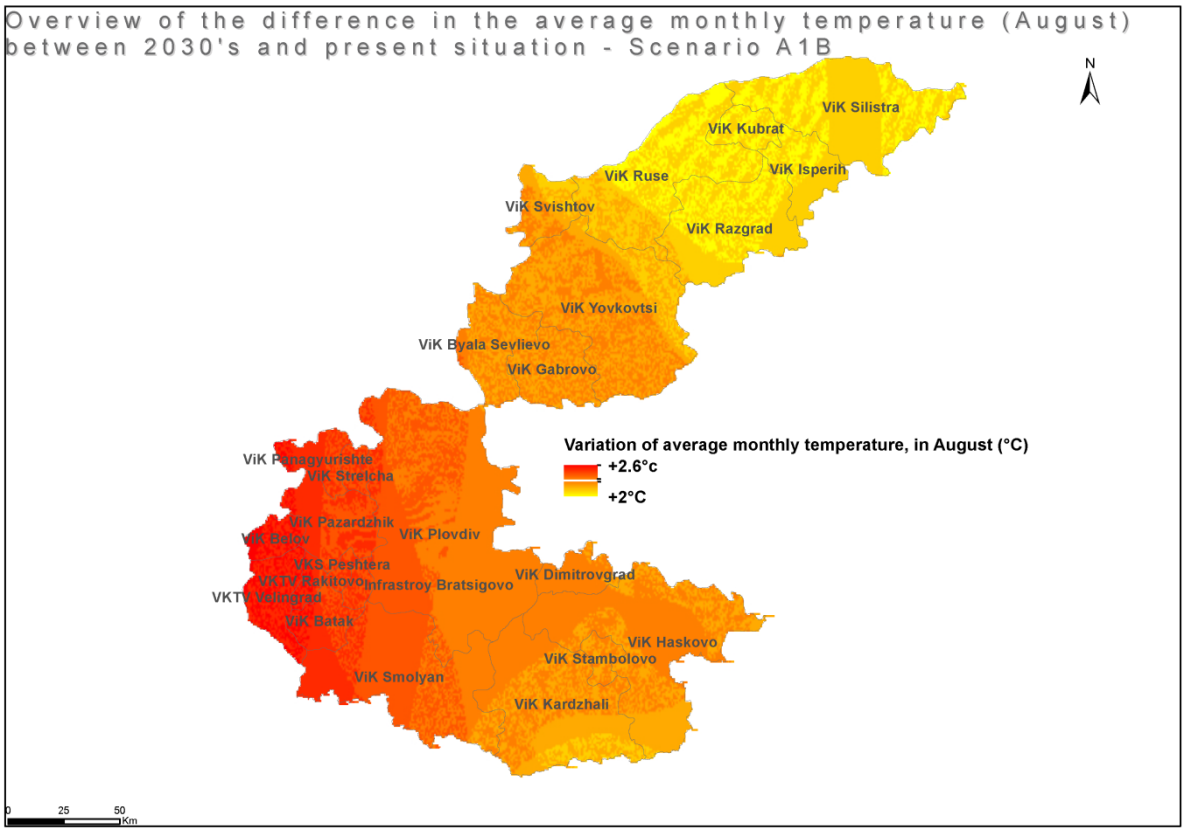




Two periods can be distinguished:

- From October until May, a quite constant increase in the average monthly temperature, between 1 and 1.5°C.
- From June until September, a significant increase is expected (from 1.5 to 2.2°C), which could lead to **serious drought events and consequent problems in relation with water resource quantity and quality.**

The following figure shows the repartition of the increase in the monthly precipitation in August. Bigger increase is expected in high and steep areas.



Impacts on water supply systems

Climate change will impact drinking water systems by altering the quantity and timing of water availability, changing water quality, and flooding related to extreme events.

Impacts on drinking water systems can be considered in two categories in the context of Central Region of Bulgaria:

- **Water availability**
  - **Changes in quantity of annual runoff**. Decreases in precipitation and increases in temperature, which were highlighted herebefore and are quite consistent from one to another climate model, are projected to lead to runoff decreases in Bulgaria. This is expected to reduce supplies in those geographies, causing drinking water utilities to seek additional water supply and management options to fill the gap between supply and demand.
  - **Changes in runoff timing**. Not only will runoff quantity change, but the timing will also shift as a result of changes in precipitation timing and the melting of snowpack. These shifts will affect the amount of water that utilities can capture in current reservoir and conveyance systems.
- **Water treatment associated with water quality changes**
  - **Changes in maximum temperature**. Temperature increases may lead to increases in disinfection by-products (DBPs) and the incidence of algal blooms, leading to toxicity and taste and odor problems.

Impacts on sewerage systems

Climate change will impact wastewater utilities on a number of fronts:

- **Extreme storm events and** overall precipitation increases will drive the need for wet weather program enhancements:
  - **Changes in precipitation quantity and timing**. Changes in the frequency and intensity of precipitation events are assumed to correlate with changes in wet weather program capital costs related to wastewater collection and treatment systems. Wet weather programs aim to reduce the volume and frequency of untreated sewer overflows, including combined sewer systems and separate sanitary sewer systems. It is important to note that in the Central Region of Bulgaria, despite the projected decrease in annual precipitation, the intensity of storm events is expected to increase, but the existing models diverge strongly and it is very difficult to assess quantitatively the impact of climate change on extreme storm events.
- **Effluent quality considerations such** as temperature will lead to investments at treatment plants:
  - **Changes in maximum temperature and other environmental variables**. Higher temperature effluent from wastewater treatment may have detrimental effects on aquatic life fisheries, requiring cooling and additional treatment of wastewater discharge. In addition, reduced summer river flows, in relation with the decrease in summer precipitation, increase the proportion of wastewater flow in a stream and may lead to stricter effluent water quality requirements for constituents such as dissolved oxygen, total dissolved solids, and nutrients. Strategies to deal with the increased degradation of receiving water quality are likely to be greater treatment of effluent prior to discharge.
- **Flood protection adaptation measures** such as levees or retention zones will be needed to address rising floods associated with increased extreme precipitation and runoff:
  - **Increased flood events**. To enable flow by gravity, many wastewater treatment plants and collection systems are in areas prone to flooding during extreme precipitation events. Anticipated increases in the frequency or magnitude of these events may put critical infrastructure at risk.

APPENDIX 4-5 INVESTMENT COSTS (WATER SUPPLY)

Description	Unit	Unit Cost (€)
Construction of well		
Q = 5 l/s	mWC	230.00 €
Q = 10 l/s	mWC	260.00 €
Q = 25 l/s	mWC	345.00 €
Q = 50 l/s	mWC	485.00 €
Q = 100 l/s	mWC	765.00 €
Construction of Drinking Water Treatment Plant3		
Capacity = 10 l/s	U	300,000 €
Capacity = 25 l/s	U	750,000 €
Capacity = 50 l/s	U	1,500,000 €
Capacity = 100 l/s	U	3,000,000 €
Capacity = 250 l/s	U	7,200,000 €
Capacity = 500 l/s	U	10,300,000 €
Capacity = 1,000 l/s	U	13,350,000 €
Capacity = 2,500 l/s	U	17,950,000 €
Supply and installation of water mains and distribution pipes		
DN75	m	75.00 €
DN90	m	80.00 €
DN110	m	90.00 €
DN125	m	95.00 €
DN140	m	100.00 €
DN160	m	110.00 €
DN180	m	115.00 €
DN200	m	125.00 €
DN225	m	135.00 €
DN250	m	145.00 €
DN280	m	160.00 €
DN315	m	175.00 €
DN355	m	200.00 €
DN400	m	225.00 €
DN450	m	255.00 €
DN500	m	285.00 €
DN560	m	325.00 €
DN630	m	380.00 €
DN710	m	440.00 €
Supply and installation of service connection		
Cost per service connection	U	400.00 €
Construction of water tower		
Capacity = 50 m³	U	70,000.00 €
Capacity = 100 m³	U	120,000.00 €
Capacity = 250 m³	U	245,000.00 €
Capacity = 500 m³	U	420,000.00 €
Capacity = 1,000 m³	U	720,000.00 €

[3] *Costs refer to "classical" raw water treatment, including Flocculation/Sedimentation, filtration and disinfection*

Description	Unit	Unit Cost (€)
Capacity = 2,500 m³	U	1,480,000.00 €
Capacity = 5,000 m³	U	2,550,000.00 €
Capacity = 10,000 m³	U	4,395,000.00 €
Capacity = 15,000 m³	U	6,040,000.00 €
Construction of ground reservoir		
Capacity = 50 m³	U	45,000.00 €
Capacity = 100 m³	U	70,000.00 €
Capacity = 250 m³	U	135,000.00 €
Capacity = 500 m³	U	220,000.00 €
Capacity = 1,000 m³	U	360,000.00 €
Capacity = 2,500 m³	U	685,000.00 €
Capacity = 5,000 m³	U	1,110,000.00 €
Capacity = 10,000 m³	U	1,805,000.00 €
Capacity = 15,000 m³	U	2,400,000.00 €
Construction of pumping station - H = 40 m		
Capacity = 5 l/s	U	24,000.00 €
Capacity = 10 l/s	U	32,000.00 €
Capacity = 30 l/s	U	57,000.00 €
Capacity = 55 l/s	U	69,000.00 €
Capacity = 80 l/s	U	78,000.00 €
Capacity = 100 l/s	U	110,000.00 €
Construction of pumping station - H = 80 m		
Capacity = 5 l/s	U	49,000.00 €
Capacity = 10 l/s	U	89,000.00 €
Capacity = 30 l/s	U	193,000.00 €
Capacity = 55 l/s	U	232,000.00 €
Capacity = 80 l/s	U	260,000.00 €
Capacity = 100 l/s	U	379,000.00 €
Implementation of District Metering Areas for leakage reduction and operational management		
Control Centre	U	100,000.00 €
Network	km	735.00 €
Facilities (production points, water tanks and pumping stations)	U	8,000.00 €

APPENDIX 4-6 INVESTMENT COSTS (WASTE WATER)

Description	Unit	Unit Cost
Supply and installation of gravity collectors		
DN200	ml	165.00 €
DN300	ml	200.00 €
DN315	ml	205.00 €
DN400	ml	240.00 €
DN500	ml	285.00 €
DN600	ml	340.00 €
DN700	ml	395.00 €
DN800	ml	460.00 €
DN900	ml	530.00 €
DN1000	ml	605.00 €
DN1100	ml	690.00 €
DN1200	ml	775.00 €
DN1400	ml	970.00 €
DN1600	ml	1,190.00 €
DN1800	ml	1,430.00 €
DN2000	ml	1,695.00 €
DN2200	ml	1,985.00 €
DN2400	ml	2,300.00 €
Installation of service connections		
Installation of service connection	U	700.00 €
Construction of Pumping Station		
Power = 5 kW	U	12,000.00 €
Power = 10 kW	U	16,500.00 €
Power = 20 kW	U	23,000.00 €
Power = 50 kW	U	35,500.00 €
Power = 100 kW	U	49,500.00 €
Power = 200 kW	U	69,000.00 €
Power = 500 kW	U	107,500.00 €
Power = 1,000 kW	U	150,000.00 €
Power = 2,000 kW	U	209,000.00 €
Power = 5,000 kW	U	324,500.00 €
Supply and installation of pressure pipes		
DN63	m	28.00 €
DN90	m	37.00 €
DN110	m	44.00 €
DN125	m	49.00 €
DN140	m	55.00 €
DN160	m	62.00 €
DN180	m	68.00 €
DN200	m	75.00 €
DN225	m	84.00 €
DN250	m	92.00 €
DN280	m	103.00 €
DN315	m	115.00 €
DN355	m	129.00 €

Description	Unit	Unit Cost
DN400	m	144.00 €
Construction of Wastewater Treatment Plant[4]		
Capacity = 2,000 PE	U	1,650,000.00 €
Capacity = 5,000 PE	U	2,550,000.00 €
Capacity = 10,000 PE	U	3,500,000.00 €
Capacity = 20,000 PE	U	4,800,000.00 €
Capacity = 50,000 PE	U	7,300,000.00 €
Capacity = 100,000 PE	U	10,050,000.00 €
Capacity = 150,000 PE	U	12,100,000.00 €
Implementation of flow monitoring		
Control Centre	U	60,000.00 €
Network	km	260.00 €
Facilities (overflows and pumping stations)	U	7,000.00 €

[4] *Cost refer to "classical" wastewater treatment, including pretreatment (screening, grit removal, fat and grease removal…), primary treatment and secundary treatment (activated sludge).*

APPENDIX 4-7 TENTATIVE PRIORITIZATION SYSTEM

The overall score is calculated based on the following formula:

V = Vpe X 0.25 + Vee X 0.10 + Vcc X 0.10 + Vpr X 0.10 + Vtp X 0.45

The rating system for Prioritisation of Investments uses an integrated approach, which covers water supply networks and drinking water treatment plants together, and sewerage networks and wastewater treatment plants together as well. The criteria, as defined below, will automatically give a higher priority to projects that fulfil the necessity of integration (in particular the "Economic efficiency" criterion), for example in the case where the networks or the treatment plants only partially meet the needs of the area considered.

- **Size of agglomeration** (Vpe) – Max. 100 points – **Weighting factor 0.25**

This parameter is calculated based on the following formulas:

- Below 10,000 PE: Vpe = ((PE x100) / 100,000) x 1.5
- Equal and above 10,000 PE: Vpe = ((PE x100) / 100,000) x 2

- **Economic efficiency (Vee)** – Max. 100 points – **Weighting factor 0.10:**

This parameter is calculated based on the following formulas:

- Investment costs ≤ 350 € / PE: **Vee = 100**
- Investment costs ≥ 350 € / PE: **Vee = (350 X 100) / (investment cost / PE)**

- **Service coverage (Vcc)** – Max. 100 points – **Weighting factor 0.10:**

This parameter refers to the current water supply or wastewater service coverage rate:

- 0% ≤ Coverage rate ≤ 90%: Vcc = 100 - (current coverage rate *100/90)
- Coverage rate ≥ 90%: Vcc = 0

- **Project Readiness** (Vpr) – Max. 100 points – **Weighting factor 0.10:**

The project readiness for networks and / or treatment plants is assessed on the basis of the readiness of the investment measure to be implemented. The idea behind this is to encourage the initiatives of local governments in the preparation of mature projects.

For construction projects (typically for WS&WW networks) and refurbishment of treatment plants, or pumping stations (e.g. new equipment, making tanks watertight, structural reinforcement, etc.), "YES" means legitimate[5] Detailed (Technical) Design. For Design-Build projects "YES" means legitimate Preliminary Design (typically for construction of new WWTPs and re-construction of existing WWTPs).

Following scores are considered:

[5] Design finally approved for financing by MoEW and/or MRDPW.

- YES: **Vpr = 100**
- NO: **Vpr = 0**

- **Type of Investment Measures (Vtp)** – Max. 100 points – **Weighting factor 0.45:**

Code	Scores	Measure
WW1	100	Construction of WWTPs and/or Main Feeding Collectors (to the WWTP) aiming to ensure compliance with the Urban Wastewater Treatment Directive
WS1	100	Investments in Water Supply Systems aiming to remediate major deficiencies related to water quality and water quantity.
WW2	80	Investments that ensure the effective operation of the WWTP aiming at the rehabilitation of connected sewer networks (e.g. through reduction of infiltration) and remediation of other major deficiencies (e.g. poorly functioning overflow structures)
WS2	50	Investments in Water Supply Systems aiming to increase efficiency (NRW reduction, energy efficiency, etc.)
WW3	40	Re-construction and Extension of Wastewater Systems (wastewater network and WWTPs) aiming to ensure sustainability and efficiency (replacement/ modernisation of infrastructure)
WS3	30	Rehabilitation and Extension of Water Supply Systems aiming to ensure sustainability (rehabilitation and adaptation of infrastructure)
WW4	20	Re-construction and Rehabilitation of existing WWTP aiming to reduce nutrients for agglomerations below 10,000 P.E. (compliance with Water Framework Directive)

As a next step, the project measures are grouped into **project components** (measures, which have to be combined to ensure technical feasibility). If several measures with different scores for the type of measure are combined, the highest score of these measures prevails. Example: For an agglomeration currently having a low sewerage connection rate (i.e. below 70 %) construction of a WWTP (WW1) has to be combined with an extension of the sewerage network (WW3). Both measures will be given 100 scores.

All project components in each phase will then be ranked according to their scores. This priority list of project components including investment costs is presented in the chapters below.

APPENDIX 4-8 REVIEW OF THE RESERVOIRS' VOLUME IN THE TOWN OF PESHTERA

REVIEW OF THE VOLUME OF THE PRESSURE RESERVOIRS OF THE TOWN OF PESHTERA

According to Ordinance №2, Art. 4(1), item 2, Water Supply System of the Town of Peshtera is IInd category. For systems in this category regulation volume of the pressure reservoirs has to be between 50 and 60% of the maximum daily consumption.

The review was made for the maximum daily consumption in the period between 2021 and 2038- Qmax daily = 57.72 l/s (for 2038).

All calculations, regarding necessary regulation volume, have been elaborated to provide reserve corresponding to 50% of the maximum daily consumption.

The table below shows the characteristic flow of all reservoirs of the town of Peshtera, minimum flow of the water sources which will supply them and the necessary regulation volume for the respective flow.

Table: Existing reservoirs for the Town of Peshtera and flow of the water sources which will supply them

Name and total volume	Regula-tion volume	Fire protection volume	Feeding water source	Minimum flow	Necessary regulation volume for the respective flow	Free capacity	Insuffi-cient volume
m3	m3	m3		[l/s]	m3	m3	m3
PR V=1250 m3 Chepinski vriz-new	1,142	108	"Siniyat Kainak" catchment system	12	518	624	
PR V=180 m3 Chepinski vriz-old	180	-	3 catchment systems	6	259		79
PR V=500 m3	446	54	Novomahlenski catchment system	12	518		72
PR V=600 m3	546	54	4 catchment systems, south of the town of Peshtera, Novomahlenski catchment system	22	950		404
PR V=1000 m3 - Lukovitsa	892	108	River intake	8	346	546	
Total	**3,206**	**324**		**60**			

Remark: In the period between 2021 and 2038 tube wells will be dismissed as a main water source for the Town of Peshtera. It is foreseen that the pressure reservoir V=500 m3 will be supplied from Novomahlenski catchment system via a new water supply connection between DWTP - the town of Peshtera and a PR V= 500 m3

We point out that larger water quantities are discharged initially in the reservoirs during larger part of the year and these quantities are similar to the operational flow of the water sources.

When the flow is larger and similar to the operational or to the maximum flow, PR V=1250 m3 and PR V= 1000 m3 regulation volume will be fully used. During the most unfavorable conditions (minimum flow of the water sources), it is desirable, water quantities which supply the reservoirs with insufficient volume to be directed to reservoirs with free volume.

Water supply connection- Ø140 PE, from collection chamber (located south of the Town of Peshtera) to PR V=1000 m3- Lukovitsa is foreseen. 12 to 13 l/s. will be transferred along this connection to PR V=1000 m3.

The table below shows the characteristic flow of all pressure reservoirs for the Town of Peshtera and the new repartition of the minimum flow which will supply them after the construction of this connection: collection chamber - PR V= 1000 m3.

Table:Existing reservoirs for the Town of Peshtera and flow of the water sources which will supply them after construction of the following connection: collection chamber - PR V= 1,000 m3

Name and total volume	Available regulation volume	Feeding water source	Water quantity fed to the reservoir	Necessary regulation volume	Free volume	Insufficient volume
m3	m3		[l/s]	m3	m3	m3
PR V=1250 m3 Chepinski vriz- new	1,142	“Siniya Kainak” catchment system	12	518	624	-
PR V=180 m3 Chepinski vriz- old	180	3 catchment systems	4	173	7	-
PR V=500 m3	446	Novomahlenski catchment system	10	432	14	-
PR V=600 m3	546	4 catchment systems, south of the Town of Peshtera, Novomahlenski catchment system	12	518	28	-
PR V=1000 m3 - Lukovitsa	892	River intake, 4 catchment systems, south of the Town of	20	864	28	-

Name and total volume	Available regulation volume	Feeding water source	Water quantity fed to the reservoir	Necessary regulation volume	Free volume	Insufficient volume
m3	m3		[l/s]	m3	m3	m3
		Peshtera,				
Total	**3,206**	**Qmax daily = 57.72 l/s**	**58**	**2,505**	**701**	**0**

From the table above, it becomes clear that after the construction of the necessary water supply connections which will supply the reservoirs, the regulation reservoirs are completely sufficient.

REVIEW OF THE FIRE PROTECTION VOLUME OF THE RESERVOIRS FOR THE TOWN OF PESHTERA

Necessary fire protection water quantities

The population of the Town of Peshtera is 16,746 inhabitants (2011). It is foreseen that until the end of the project period (2038) the population will be 16,209 inhabitants.

Due to the fact that the town will be divided into three water supply zones supplied by different pressure reservoirs, the zones are taken into consideration as separate urbanized territories with their respective number of inhabitants.

When the number of fires and the consumption for one fire is calculated the following circumstance is taken into account: there are buildings in some of the water supply zones (industrial buildings, warehouses, public buildings etc.) with volume above 3,000 m3 and above 5,000 m3, with functional danger class Ф5В or adjusted to it with I and IInd stage of fire resistance.

These buildings require larger water consumption during firefighting from the one set out for the respective urbanized territory.

The fire protection water quantities are determined in accordance with Ordinance № I 3-1971 regarding construction and engineering principles and norms for assuring safety in case of fire from 05.06.2010, Art. 171, Table 15; Art.172, Table. 16; Art.179 and Art. 180(1).

The necessary fire protection water quantities for each zone are listed in the table below:

Table; Necessary fire protection water quantities for each zone

Zone (urbanized territory)	Inhabitants in 2038	Number of simultaneous fires	Water consumption for one fire	Total water consumption for all fires	Remarks
			l/s	l/s	
High zone- North	4,036	1 in the urbanized territory	5	10	According to Art.179, item.2
		1 in a big public building	10		
Low zone	10,157	2 in the urbanized territory	10	25	According to Art.179, item 4
		1 in an industrial building	15		
High zone- South	2,016	1 in the urbanized territory	5	5	According to Art.171 and Art.179, item 1

REVIEW OF THE FIRE PROTECTION VOLUME of THE RESERVOIRS

According to Ordinance № I 3-1791, Art. 180 (1), the required fire protection volume in the pressure reservoirs is calculated for firefighting with continuity of 3 hours.

Table: Review of the fire protection volume of the reservoirs

Zone (urbanized territory)	Feeding reservoir	Available fire protection volume	Water consumption for all fires	Necessary fire protection volume
		m3	l/s	m3
High zone- North	PR V=1250 m3 Chepinski vriz- new	108	10	108
	PR V=180 m3 Chepinski vriz- old	-		
Low zone	PR V=1250 m3	108	25	270
	PR V=180 m3	-		
	PR V=500 m3	54		
	PR V=600 m3	54		
	PR V=1000 m3	108		
		Total: 324		
High zone- South	PR V=600 m3	54	5	54

The water supply zones in the distribution network of the Town of Peshtera will be divided via pressure reducing valves. This division of the zones allows supplying the low zone from all existing pressure reservoirs of the town of Peshtera.

From the table above, it becomes clear that the available fire protection volume in the reservoirs of the Town of Peshtera are sufficient and cover the requirements of Ordinance № I 3 – 1971.

APPENDIX 4-9 DEVELOPMENT OF THE SEWERAGE NETWORK OF THE TOWN OF PESHTERA

Short term period 2016- 2020 (Main Collectors)

Main Southern Collector

The main Southern collector is the main collector, setting off from the North- western part of the town, Padaritsa Neighbourhood (the crossing of the streets Saint Konstantin and Al. Konstantinov OT126), passes through the central part of the town and at Treti Mart Street OT229, passes under Stara Reka River towards the Southern part of the town up to the point where it is connected to the Main Northern Collector.

According to the elaborated hydraulic calculations in accordance with Norms for design of sewerage systems, it is stated that the capacity of collector is insufficient in this current state reaches 4,000 l/s in some areas after connecting the sewerage branches, part of the Main Southern Collector. It is desirable to keep it to a maximum extent during reconstruction and use the conductivity of the existing collector to keep it where it is possible. Regarding the preliminary design which is validated by Peshtera Municipality and the combined sewerage network in accordance to it, on one hand taking into consideration the existing situation of the sewerage network and the impossibility to separate the waste waters, we propose to replace the sections of the collectors which are compromised as well as the ones with reverse gradients and with insufficient capacity to be replaced with ones with necessary capacity to conduct the waste water quantities from the adjacent terrains.

It is foreseen that the section from OT126 to OT76 Al. Konstantinov Street will be replaced in the above mentioned detailed design.

Two storm overflows are envisioned in order to reach maximum efficiency of the network and to reduce its cost price.

One of them is located on sewerage branch at Vl. Rilski Street at the crossing with Al. Konstantinov Street near OT71. In this way about 1,600 l/s pour out from the Main Southern Collector, the collector is relieved and optimal diameter is reached bearing in mind the small width of the street.

The second storm overflow is situated on Treti Mart Street at the crossing with Doyranska Epopeya Street, close to OT229. In this way storm waters, collected from the adjacent territories of the collector, are discharged before it passes under Stara Reka River.

The section of the collector with insufficient capacity which is proposed for replacement is from OT76, Al. Konstantinov Street to OT375 Petar Rakov Street.

The proposed storm overflows and the section for reconstruction of the collector are shown on Situation 10

Table: Technical specification of the envisioned measures for reconstruction of the Main Southern Collector

№	Name	Diameter [mm]	Length [m]
1	Reconstruction of the Main Southern Collector	-	**669**
		300	82
		800	124
		900	90
		1,000	236
		1,200	70
		1,400	67

Collector II

Collector II is a main collector in 125 Neighbourhood and Sivata Mahala Neighbourhood, situated on the right bank of Stara Reka River, along Petar Rakov Street from OT 252 up to the point where it is connected to the Main Southern Collector, OT375. The collector has insufficient capacity and its depreciation period has expired.

Table: Technical specifications of the envisioned measures for reconstruction of Collector II

№	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Collector II	-	**781**
		500	183
		600	216
		800	338
		1,200	44

Medium term Period 2021- 2028 (Main Collectors)

Collector I

Collector I is the main collector for Padaritsa Neighbourhood. It starts from OT500, along Saint Konstantin Street and connects to the Main Southern Collector, OT 176. The current condition of the collector is described in Chapter 3.5 and after the elaborated hydraulic calculations, it is stated that it has insufficient capacity and has to be rehabilitated.

In the above mentioned detailed design it is foreseen the section from OT500 to OT134 along Saint Konstantin Street to be replaced

The foreseen measures for the section from OT134 to its discharge into the Main Southern Collector, OT176 are shown in the table below.

Table: Technical specifications of the envisioned measures for reconstruction of Collector I

№	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Collector I	-	**754**
		600	250
		800	329
		900	175

Collector IV

Collector IV is the main collector in Cherveniya Kvartal Neighbourhood. It starts from OT444, along Mihail Takev Street, passes under the central part of the town and connects to the Main Southern Collector, OT229. The current condition of the collector is described in Chapter 3.5 and after the elaborated hydraulic calculations, it is stated that it has insufficient capacity and has to be rehabilitated.

It is foreseen the collector to be rehabilitated in its full length.

Table: Technical specifications of the envisioned measures for reconstruction of Collector IV

№	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Collector IV	-	**784**
		400	290
		500	138
		600	265
		800	91

Collector V

Collector V is the main collector in Izgrev Neighbourhood, starting from OT463 along Simeon Nabat Street, passes through a terrain owned by Vinprom Peshtera and through the Bus station up to its discharge into the Main Nothern Collector.

In the above mentioned detailed design it is foreseen the section from OT126 to OT76 along Al. Konstantinov Street to be replaced.

Two storm overflows are envisioned in order to reach maximum efficiency of the network and its cost to be reduced.

One of them is located on sewerage branch at Vl. Rilski Street at the crossing with Al. Konstantinov Street near OT71. In this way about 1,600 l/s pour out from the Main Southern Collector, the collector is relieved and optimal diameter is reached bearing in mind the small width of the street.

The second storm overflow is situated on Treti Mart Street at the crossing with Doyranska Epopeya Street, close to OT229. In this way storm waters, collected from the adjacent territories of the collector, are discharged before it passes under Stara Reka River.

The section of the collector with insufficient capacity which is proposed for replacement is from OT76, Al. Konstantinov Street to OT375 Petar Rakov Street.

The proposed storm overflows and the section for reconstruction of the collector are shown on Situation 10

Table: Technical specifications of the envisioned measures for reconstruction of Main Collector Southern

№	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Collector V	-	**584**
	New sewerage	300	220
	Reconstruction of existing sewerage	600	231
	Reconstruction of existing sewerage	1,000	133
	L=110m □630 (terrain owned by Vinprom Peshtera) drops out		
1.1.	Reconstruction of sewerage along Sokola Street		
		600	55
1.2.	Outflow of Oborishte storm overflow.		
		1,000	215

Collector VIA and VIБ

These are the main collectors in Lukovitsa Neighbourhood and discharge in the Main Southern Collector

Table: Technical specifications of the envisioned measures for reconstruction of the collectors in Lukovitsa Nejghbourhood

№	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Collectors VIA and VIB	-	**993**
		300	215
		600	778

Long Term Period 2029- 2038 (Secondary Network)

In this period the rest of the network which is not encompassed in the previous two phases to replace should be replaced, this is shown in the table below:

Table: Technical specifications of the envisioned measures for reconstruction

No	Name	Diameter [mm]	Length [m]
1.	Reconstruction of Secondary Network	-	**26,852**
		300	20,112
		400	2,609
		500	2,542
		600	954
		700	152
		800	483

APPENDIX 7-1 ENVIRONMENTAL ASSESSMENT PROCEDURE

Environmental Assessment (EA) of plans and programs is a preventative tool for evaluating the potential significant effects on the environment, resulting from the implementation of plans and programmes at national, regional and local level. The assessment is carried out simultaneously with its development, i.e. the approach aims to integrate processes. EA execution is fully consistent with statutory national procedures for preparation and approval of plans/programs and the authorities responsible for their endorsement should conform to EA statement.

EA gives a notion of the expected changes that will occur in the environment, as a consequence of the performance of the investment intentions set out in plans and programmes.

The goal is to provide a high level of environmental protection by determining the expected impact of the activities covered by the strategic planning.

EA execution is mandatory for the plans and programmes under Art. 85, para. 1 of the Environmental Protection Act (EPA) in the different planning areas, where those plans and programmes outline the framework of the future development of investment proposals in accordance with Annex n° 1 and 2 of EPA and have a significant impact on the environment.

Plans and programmes, concerning the areas specified in EPA, but at a local level, also on small areas, and modifications to the above-cited plans and programmes are evaluated when their application is likely to have significant impacts on the environment.

The need for EA of a proposed plan and programme or their amendment shall be determined by decision of the competent authority, which in the present case is the Ministry of Environment and Water.

In the elaboration of the environmental assessment, it is necessary to take into account the objectives of the proposed plan, the territorial scope and level of detail that can be identified at this stage in order to describe, analyse and evaluate the potential impacts on human health and environmental components that arise during the plan implementation.

EA contains the information required under Art. 86, para. 3 of EPA and is consistent with the level of detail in the plan. EA takes into account the recommendations made during the consultations with stakeholders and institutions.

The following regulatory framework and methodologies is used for preparation of EA:

- Environmental Protection Act (Promulgated, SG, No 91/ 2002; last amended and supplemented, No 53/2012);
- ORDINANCE on the terms and conditions for carrying out environmental assessment of plans and programmes - Adopted by Decree of the Council of Ministers № 139 of 24th June 2004, last amended and supplemented, No 38/11th January 2012 (transposed Directive 2001/ 42/ EC on the assessment of the impact of certain plans and programmes on the environment.).

- ORDINANCE on the terms and conditions for carrying out compatibility assessment of plans, programmes, projects and investment intentions with subject and objectives of conservation of Protection areas – (SG, No73/2007, last amended and supplemented, SG No 3/1 2011 (*According to Biodiversity Act only Plans affecting the territory of Protection Zones are subject to compatibility assessment*).
- "Guidelines on Environmental Assessment of Plans and Programmes in Bulgaria" Sofia, 2002. (http//www.moew.government.bg, key topic „Preventive activity").
- EC instructions and methodologies on strategic environmental assessment.
- The conditions of ORDINANCE on environmental assessment of plans and programmes, as well as of ORDINANCE on compatibility assessment with Protection areas are observed.

Two approaches are applied for preparation of EA:

- Approach based on the principles of integrated environmental management;
- Communication approach.

The following methodology is employed:

- Collecting and complementing the information required for elaboration of Environmental assessment and Compatibility Assessment.
- Assessment of the current situation in order to identify positive and negative aspects of interconnections in environment. It is necessary to determine potential conflicts related to the impact on individual environmental components and factors.
- Suggesting measures to reduce to the minimum the negative impacts on environment in order to meet the requirements of the effective legislation in the implementation of proposals included in the investment programmes.
- In the plan development process, the Contracting Authority shall conduct consultations with the competent authorities in accordance with Art. 19 (2) of the Ordinance on the terms and conditions for carrying out environmental assessment of plans and programmes.

EA procedure is as follows:

- Preparation of a written request for evaluating the need for EA;
- Participation in the scheme development and conduct of consultation with the public, stakeholders and third parties, which are likely to be affected by the plan;
- Preparation of Environmental assessment and Compatibility Assessment Reports, if requested by the competent authority.
- Participation in the organisation and conduct of public discussion of EA Report. Carrying out consultations with the public, stakeholders and third parties, which are likely to be affected by the plan or programme; public discussion (if required for the draft plan, under a special law or if more than

two reasoned negative statements or suggestions for alternatives have been received during the consultations);

- Including the results of the consultations in the EA report;
- Defining measures to monitor and control the implementation of the plan or programme;
- Issuance of EA statement;
- Monitoring and control during the implementation of the plan or programme.

EA shall be assigned as an independent report only by Decision of the competent authority after considering the Information on Evaluation of the need for environmental assessment.

According to Art. 2, para. 2 of Ordinance on the terms, conditions and methods for carrying out EA of plans and programmes - Decree of the Council of Ministers № 139/SG. No 57/2004, amended and supplemented, SG. 38/2012, the Regional Water and Wastewater Master Plans and investment programmes attached to them are subject of evaluation for identifying the need for EA, as they fall within the scope of item 6 Water Resources Management, item 6.1 Water Act, of Annex № 2 to Art. 2, para. 2, item 1 of the same Ordinance (Area under Art. 85, para. 1 of EPA).