

Terms of Reference for small size wastewater treatment in rural areas

A. Background

The Republic of Macedonia has rural population of about 1.2 million which comprises 58% of its total population, while in terms of territory 71% is rural territory and 29% is urban (official data from the 2002 census). Macedonian rural population is scattered over the whole territory of the country i.e. in all 80 municipalities, out of which 61 municipalities are completely rural and 19 municipalities have their urban and rural areas.

Most urban and rural areas do not have any wastewater treatment facilities. Sewage water is discharged directly to the recipients without any treatment and it pollutes rivers. The quality of rivers is insufficient, due to their permanent pollution by households and industrial wastewater.

With regard to the extent of the constructed sewerage network and waste water treatment facilities, the country lags behind in comparison with the water-supply infrastructure. At national level, the sewerage network comprises 1,239.1 km of pipelines. The Census of population, households and dwellings in Macedonia conducted in 2002 collected data on the existing network and installations for collection of wastewater. The results show that almost 40.1% (see table below) of the total number of dwellings are not equipped with installations that discharge the wastewater from the households into the public sewage network, which illustrates low awareness of environmental protection from the negative effects of untreated waste water.

Table 1. Sewer collection systems in households

	Number of households	Public sewerage network	Septic tanks	Illegal individual discharge of wastewater	Without sewerage
Number	697.520	417.653	143.353	85.007	51.516
%	100,00	59,88	20,55	12,19	7,39

Source: The Census of population, households and dwellings in Macedonia conducted in 2002

At the moment, full treatment of wastewater is provided only for the urban municipalities of Kumanovo for PE 100,000 and for the municipalities Struga and Ohrid through one joint treatment plant for PE 120,000, where wastewater treatment plants (WWTPs) are operational. The next bigger WWTP for treatment of the urban wastewater from the municipality of Prilep is currently under construction. Such capacities do not exist in other urban municipalities. There are several small size WWTPs located in rural municipalities (smaller towns or villages), which usually provide single solution for treatment of the waste water of smaller settlements (Ilinden, Dolneni, Krivogastani, Cucer Sandevo, Makedonski Brod, Resen, Dojran and Berovo) (See table 2). All these facts illustrate that most of the municipalities, especially the rural ones, have neither public sewage collection systems nor facilities for treatment and disposal of wastewater. Due to this, most of the raw or untreated sewage is discharged into streams, rivers and lakes and it creates serious threat to the environment and public health.

Table 2: Wastewater treatment plants in Macedonia

	Location/City/ Settlement	Population equivalent (p.e.)	Condition	Treatment
1	Village Kucicino, Municipality of Chesinovo - Oblesevo	700 p.e	Under construction	Wetland Biological treatment and treatment of the sludge
2	Karbinci	Small village 1100 p.e	Under construction	Wetland Biological treatment and treatment of the sludge
3	Ilinden (two WWTPs for the settlements Ilinden and Kadino)	1,250 p.e. each	Operational	Biological treatment
4	Rankovce (for the settlements Petralica – Ginovce)	1,500 p.e	Constructed in 2008. Not operational yet due to lack of households connected	Mechanical, biological treatment and sludge treatment
5	Dolneni	3,200 p.e	Operational	Biological treatment
6	Krivogastani	3,500 p.e	Operational	Lagoon system with mechanical and biological treatment, treatment of the sludge and its use for agriculture purposes
7	Cucer Sandevo (for the settlements Brazda, Gluvo and Mirkovci)	The plant was in initial phase designed for 3,000 p.e., with the possibility for extension of the plant to 9.000 p.e	Operational	The mechanical pre-treatment, trickling filters and digestion of the settled sludge (Imhoff tanks) were constructed. Drying of sludge was solved by drying sludge beds.
8	Makedonski Brod	5,000 p.e	Operational	Mechanical treatment, biological treatment and treatment of drying and stabilization of the sediment.(sludge treatment in drying bed)
9	Saraj	8,500 p.e	Construction was finished in 2015, MOEPP is Investor. WWTP should be takeover by the Saraj Municipality and Municipality will be final user of the plant. It is not still in function because of administrative obstacles	Mechanical and biological secondary treatment with trickling filters, recipient Treska River
10	Resen (located in settlement Ezerani)	12,000 p.e	Operational	Two Phases: mechanical and biological treatment(sludge treatment in drying bed)
11	Dojran (located in settlement Nov Dojran)	12,000 p.e	Operational	Two Phases: mechanical and biological treatment
12	Berovo	14,000 p.e	Operational	Two Phases: mechanical and biological treatment

13	Sveti Nikole	17,500 p.e	Under reconstruction	Mechanical and biological secondary treatment (trickling filters)
14	GjorcePetrov (located in settlement Volkovo)	20,000 p.e	At the final phase of construction	Mechanical and Biological Wastewater Treatment will be applied and the plant is designed for fully automatic operation.
15	Gevgelija	15,000 p.e	Under construction	Mechanical and biological treatment, and treatment of the sludge
16	Kumanovo	100,000 p.e	Operational	Mechanical treatment, degreasing method, aerobic treatment and sedimentation.
17	Ohrid and Struga (located in settlement Vranishte)	120,000 p.e	Operational	Mechanical and biological treatment of wastewater.
18	Prilep	95,000 p.e	Under construction	Mechanical treatment, biological treatment and treatment of drying and stabilization of the sediment (according the EU WWT Directive)
	Total	~425,000 p.e	~20% of population	

Taking into consideration all the existing treatment plants, in operation or close to commissioning, the total rate of population served with wastewater treatment would be approximately 20%.

Despite the fact that the fiscal decentralization process leads to strengthening of municipal functions, stimulation of local economic development and increase in infrastructural investments in municipalities, most of them suffer from inadequate basic infrastructure, particularly lack of sanitation capacities. Many rural settlements do not have sewage or wastewater treatment facilities.

The Republic of Macedonia has focused on environmental projects during the last decade. In line with its development goals, sectors' strategies and in close cooperation with different international financial institutions such as the World Bank, EBRD, EU and other bilateral donors, it has been implementing a few projects for water and sanitation where municipalities are the final beneficiaries. One of them is the Municipal Services Improvement Projects, in which under the EU IPA Grant component that is financed with funds provided by the European commission, 11 municipalities expressed interest to implement projects for collection and/or treatment of domestic wastewater. Four of them already have functional wastewater treatment plants, the rest do not have wastewater treatment plants but the proposed projects are with solutions for wastewater treatment. The projects are mainly dealing with construction of sewer networks, sewerage systems and construction of wastewater treatment plants (whole or first stage or pre-treatment).

Having in mind that wastewater treatment in rural municipalities is different from urban municipalities in terms of regulations, needs, design, operation and maintenance, feasibility and sustainability of the facility, there is a real need for summarizing of all available and relevant information that will help to the decision makers in the municipalities, to better understand the key issues and constraints related to small size wastewater treatment in order to be able to identify feasible solutions that will meet their needs.

B. Objectives

The main objective of this TA is to support selection of adequate wastewater treatment for the rural areas under the MSIP project.

The specific objectives of this TA are to analyze existing technical documentation for communal wastewater treatment in rural areas with population equivalent below 2000 or between 2.000 and 10.000 from 7 municipalities in the Republic of Macedonia and to propose technical solutions for sustainable and cost-effective communal wastewater treatment in all of them in line with the best EU practices. The proposed solutions have to be technically and economically adapted according to the location and other factors in the rural areas subject to this TA (see attached Table 1).

C. Scope of Work

The technical assistance is focused on three main areas: 1) to analyze existing situation, experience and treatment of the wastewater in the rural areas with population equivalent up to 10,000 and to propose future possible solutions in line with the international best practices applicable in the Republic of Macedonia; 2) to review submitted technical documentation and to propose sustainable technical-economic solutions for the treatment of communal wastewater in the subject settlements in 8 (eight) municipalities: Novaci, Rankovce, Debarca, Cheshinovo-Obleshevo, Novo Selo, Valandovo, Vasilevo and Prilep.

I) Analysis of the existing sanitation and wastewater treatment in the rural areas with population equivalent up to 10,000 in the Republic of Macedonia

Regulatory aspects

Review regulatory aspects related to sanitation in rural areas, e.g. legislation that applies to the discharge of treated effluent (quality standards), water policies, classification of sensitive or outstanding areas etc.

Describing EU water directives requirement and indicating stage of EU accession and alignment in water sector. Comparison between Macedonian and EU requirement, and reflect on any possible changes of national requirements during EU accession process.

Identification of possible obligations for the municipalities in the area of sanitation.

Organizational aspects

Review the different modalities related to the management of treatment facilities, including the role of municipalities, inter-municipalities organizations, regional organizations, public utilities providers, etc, so that they can determine their choices on the best possible technical and financial bases, with a concern for ecological integration and sustainable development.

Technical aspects

Review (in a comprehensive manner) different wastewater treatment facilities in 6 municipalities (Obligatory are Cucer-Sandev and Gorce Petrov, while the remaining 4 will be defined with close coordination with the MSIP project) for population equivalent below 2.000 and between 2.000 - 10.000, bearing in mind the various soil conditions that exist, climatically and geographically speaking and also in terms of land characteristics, with financial and technical constraints and good ecological integration.

For each of the treatment facility identified, the consultant(s) will describe and analyze:

- Type of technology;
- Collection network;
- % of population served;
- Operation and performance;
- Management mode;

- Technical skills required for operation and maintenance of installations;
- Skills and technical capacity of local firms to construct / maintain the facilities.
- Financial aspects
 - Pricing policy for treated wastewater on local level;
 - Analysis of wastewater fees recovery;
 - Financing capacities for investments, operation and maintenance of networks/systems and wastewater treatment stations.

Based on this analysis of the existing facilities in rural areas, the consultant(s) will:

- Identify and analyze the main elements responsible for success/failure of previous experiences in the Republic of Macedonia;
- Draw lessons to be learned;
- Develop a typology of treatment techniques adapted to different local contexts with examples in Europe where this technology is applied.

For this task, the expected number of working days is estimated at 30 days.

2) Detailed review of the technical documentation for sanitation and treatment of domestic wastewater in the subject settlements in 8 (eight) municipalities: Novaci, Rankovce, Debarca, Cheshinovo-Obleshevo, Novo Selo, Valandovo, Vasilevo and Prilep and if improvements are needed propose a sustainable technical and economic solution.

- Analysis of the current sanitation and water supply situation;
- Analysis of the needs (including the volumes to be treated);
- Analysis of the specific needs (sludge, etc.);
- Analysis of the specific constraints (topography, remote households).

For each of the rural municipalities, based on the analysis of the needs/constraints, the consultant(s) will:

- review the solution proposed by the municipality (if any);
- propose an alternative solution(s) that takes into consideration:

The consultant(s) will take into account in their assessment and proposals:

- the financial capacity of municipalities (or other public utilities providers), including the capacity of households to pay for the service;
- the technical capacities available for the operation and maintenance of the treatment facility.

The proposed solution(s) will also take into account any regional plan in terms of sanitation.

For the municipalities which have proposed a solution which is assessed "adapted and sustainable", the consultant(s) will review the technical documentation available, identify any issue / shortcoming / gap and list all remaining tasks to be performed up to the tendering. Additionally, the consultant(s) will check several elements:

- investment costs;
- operating costs;
- any possible recommendations;

For the municipalities which have proposed a solution which is assessed "non-adapted and/or non-sustainable", as well for the municipalities which have not proposed any solution, the consultant(s) will perform the following tasks for each of these rural municipalities:

- provide a detailed description of the proposed solution(s) including the different elements, their role and capacity (including diagram(s));
- recommendations for the operation and constraints;
- estimate the investment costs;
- estimate the operating costs per m³ (with and without depreciation and renewal)

For this second task, the estimated number of working days is 42.

D. Required outputs

The required outputs are as follows:

Output n° 1: Prepared Assessment Report for 6 municipalities after completion of task 1;

Output n° 2: Prepared Assessment and Recommendation Report for 8 municipalities after completion of the task 2.

Output n° 3: Prepared Final Summary Report with recommendations.

E. Language of the Contract

The language of the specific contract will be both Macedonian and English.

F. Consultants' Qualifications

Consultant Company will be engaged through the qualification based selection.

Firm qualifications

- The consultant firm has provided services under at least 3 projects in the field of preparation of designs, technical specifications, and bill of quantity and schedule of price for sanitation and construction of waste water treatment facilities out of which at least 1 project for small size and low cost wastewater treatment facilities.
- A brief description of the firm's organization should be submitted. The consultant should possess a mixed team of experienced staff. The overview of the required staff and its minimum qualifications is given below. CV's of the proposed experts should be attached, including the proof of employment, number of years working for the firm/entity and projects working on. At least 2 permanent staff currently working in the field related to this contract.

Key Staff qualifications

Team Leader

Wastewater/Wastewater Treatment Specialist

I. General Qualifications

- University Degree in civil or environmental engineering, wastewater engineering or similar qualification. Masters & PhD degree would be an advantage;
- Excellent project management skills including strategic planning and implementation of complex projects.

II. Adequacy for the Project

- Minimum 10 years of relevant professional experience, comprising of 5 years of specific experience in sanitation and wastewater management planning, wastewater technology and designing, evaluation and comparison of different treatment alternatives;
- Extensive knowledge of the EU Urban Waste Water Treatment Directive requirements and well familiarity with the sanitation and wastewater management best practice in EU countries for the areas up to 10.000 PE.

- Proven successful experience in collaboration with government institutions including local self government (municipalities) and international financial institutions.

III. Experience in Region & Language

- Experience in Western Balkans;
- Excellent knowledge of English language.

Designer Specialist (1 expert)

I. General Qualifications

- A University Degree in engineering, preferably hydraulic, wastewater engineering or similar qualification. Masters & PhD degree would be an advantage;

II. Adequacy for the Project

- Minimum 7 years of relevant professional experience, comprising of 3 years of specific experience in sanitation and wastewater management planning, wastewater technology and designing, evaluation and comparison of different treatment alternatives;
- Extensive knowledge of the EU Urban Waste Water Treatment Directive requirements and well familiarity with the sanitation and wastewater management best practice in EU countries for the areas up to 10.000 PE.
- Proven successful experience in collaboration with government institutions including local self government (municipalities) and international financial institutions.

III. Experience in Region & Language

- Experience in Western Balkans;
- Excellent knowledge of English language.

Finance Analyst (1 expert)

I. General Qualifications

- University Degree in economics and finances. Masters & PhD degree would be an advantage;

II. Adequacy for the Project

- Minimum 7 years of relevant professional experience, comprising of 3 years of specific experience in investments, financial and economic analysis of investments;
- Proven successful expertise in the last 3 years in preparations, evaluation or appraisal of infrastructure investment projects;
- Proven successful experience in collaboration with government institutions including local self government (municipalities) and international financial institutions.

III. Experience in Region & Language

- Experience in Western Balkans;
- Excellent knowledge of English language.

Environmental Specialist (1 expert)

I. General Qualifications

- University Degree in Civil engineering, technology, environmental sciences or similar. Masters degree would be an advantage;

II. Adequacy for the Project

- Minimum 7 years of relevant professional experience, comprising of 3 years of specific experience in environmental management, water and waste water management and communal services management;
- Proven expertise in environmental assessment and environmental reporting;
- Proven successful experience in collaboration with government institutions including local self government (municipalities) and international financial institutions.

III. Experience in Region & Language

- Experience in Western Balkans;
- Excellent knowledge of English language.

Social Analyst (1 expert)

I. General Qualifications

- University Degree in social sciences. Masters degree would be an advantage;

II. Adequacy for the Project

- Minimum 7 years of relevant professional experience, comprising of 3 years of specific experience in preparation of social surveys and detailed reports;
- Proven successful experience in collaboration with government institutions including local self government (municipalities) and international financial institutions.

III. Experience in Region & Language

- Experience in Western Balkans;
- Excellent knowledge of English language.

G. Duration of the assignment

The duration of the assignment is expected to be 4 months.

Table 1: Submitted projects for sewerage networks and waste water treatment plants under the MSIP EU IPA Component

#	Municipality				Project name	Project details	Planned waste water treatment
	name	region	population	households			
1	Novaci	Pelagonia	3,549	1,125	Construction of waste water treatment plant in the settlement of Bach, and construction of sewerage networks in the settlements of Ribarci, Germijan and Dobromiri	Ribarci (population 100, length 1,920m), Germijan (population 280, length 3,263m), Dobromiri (population 300, length 2,753m)	Pre-treatment of waste waters
2	Rankovce	Northeastern	4,144	2,177	Construction of sewerage network for the settlement of Ljubinci	Ljubanci (population 164, households 44, length 1,940m)	Waste water treatment plant
3	Debarca	Southwestern	5,507	1,995	Construction of the first phase of the waste water treatment plant in the settlement of Grko Pole and construction of sewerage network in the settlements of Velmej and Leshani	Velmej and Leshani (population 700, length 9,354m)	Pre-treatment of waste waters
4	Cheshinovo - Obleshevo	Eastern	7,490	2,423	Construction of section of the sewerage system in the settlement of Sokolarci with pre-treatment	Sokolarci (population 956, length 7,720m), pre-treatment on 1,500pe.	Pre-treatment of waste waters
5	Novo Selo	Southeastern	11,567	3,131	Completion of the construction of the sewerage network in the settlement of Novo Selo	Novo Selo (population 2,727)	Pre-treatment of waste waters
6	Valandovo	Southeastern	11,890	3,545	Construction of the sewerage network for the settlements of Brajkovci and Balinci	Brajkovci (population 437), Balinci (population 328)	Pre-treatment of waste waters
7	Vasilevo	Southeastern	12,122	3,306	Construction of a branch of the sewerage network in the settlement of Angelci	Angelci (population 913, length 2,371m)	Pre-treatment of waste waters
8	Prilep	Pelagonia	76,768	24,398	Construction of the secondary sewerage network and waste water treatment plant in the settlement of Malo Konjari	Malo Konjari (population 727, households 186)	Full treatment of waste water
9	Struga	Southwestern	63,376	14,485	Construction of sewerage network for the settlement of Frangovo	Frangovo (length 3,887m)	Existing waste water treatment plant
10	Chucher Sandevo	Skopje	8,493	2,321	Construction of sewerage network for the settlements of Chucher, Mirkovci, Banjani and Gornjani	Chucher (population 299), Mirkovci (population 969), Banjani (population 597), Gornjani (population 80)	Existing waste water treatment plant
11	Gjorche Petrov	Skopje	41,634	11,886	Construction of secondary sewerage network for the region of Volkovo - settlement of Stopanski Dvor and Kisela Jabuka	Volkovo (length 1,853m) , Kisela Jabuka (length 503m)	Existing waste water treatment plant