Reduction of Non-Revenue Water (NRW) in South-East Europe

Survey report

Operation Unit Lipjan
Regional Water Company Prishtina

BOJAN RISTOVSKI
REGIONAL EXPERT ON WATER LOSS REDUCTION

AUGUST, 2015.
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<th>Full Form</th>
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<tr>
<td>B&amp;H</td>
<td>Bosna i Hercegovina (Bosnia and Herzegovina)</td>
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<td>NRW</td>
<td>Non-Revenue Water</td>
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<tr>
<td>UNMIK</td>
<td>United Nation Interim Administration Mission in Kosovo</td>
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<tr>
<td>WWRO</td>
<td>Water and Wastewater Regulatory Office</td>
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<tr>
<td>MED</td>
<td>Ministry of Economic Development</td>
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<td>SHUKOS</td>
<td>The water and wastewater association of Kosovo</td>
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<tr>
<td>WTP</td>
<td>Water Treatment Plant</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>HM</td>
<td>Hydraulic model</td>
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<tr>
<td>BOD</td>
<td>Board of Directors</td>
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<tr>
<td>RWC</td>
<td>Regional Water Company</td>
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<tr>
<td>OU</td>
<td>Operation Unit</td>
</tr>
<tr>
<td>J.S.C</td>
<td>Join Stock Company</td>
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<tr>
<td>DMA</td>
<td>District Metered Area</td>
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<tr>
<td>BP</td>
<td>Business Plan</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>PRV</td>
<td>Pressure Reducing Valve</td>
</tr>
<tr>
<td>IWA</td>
<td>International Water Association</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit</td>
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1. INTRODUCTION

1.1. Background

Project “Reduction of Non-Revenue Water in South-East Europe” is implemented by Aqua-san network in B&H and GIZ through Open Regional Fund for Modernization of Municipal Services and funded by German Cooperation and Swiss Cooperation. There are three participating countries (Macedonia, Kosovo and Bosnia and Herzegovina).

The fields of actions will focus on: (1) increasing both awareness and capacities of relevant stakeholders at policy, management and technical level through a series of in-classroom and on-the-job trainings; (2) designing, adapting and disseminating the tools and methods for NRW reduction including best practices from practical implementation; (3) implementation of concrete NRW reduction measures - NRW in-depth analysis, information flows’ improvement, organization of tasks, purchase and installation of NRW reduction equipment; and (4) creation of a regional pool of trained NRW experts.

The project started in November 2014 with developing of application forms and submission to the national water utilities associations in participating countries.

According to the internal agreement and decision made by SHUKOS, the following utilities have been chosen from Kosovo:

- Operation Unit Lipjan - RWC Prishtina,
- Operation Unit Drenas - RWC Prishtina,
- Operation Unit Podujevo - RWC Prishtina.

In order for one best utility to be selected as a pilot from each country, a questionnaire has been developed for evaluation purposes. After the preparations of the proposal questionnaires by the Consultant SETEC, and Regional experts Mr. Sead Badnjevic and Mr. Bojan Ristovski, a final questionnaire was adopted and submitted to the utilities. Operation Unit Lipjan RWC Prishtina has been chosen as a pilot utility. Since it is part of RWC Prishtina, the assessment in this report is mainly addressed to the Operation Unit Lipjan, but also some mostly centralized services provided by the central unit in Prishtina, have been mentioned and analysed, too.

Within the project, the utilities completed two training courses in Skopje, Macedonia (17th to 19th June 2015) and Klagenfurt, Austria (3rd to 6th August 2015) intended for technical personnel of enterprises as part of the working package designed to strengthen the capacity of water utilities and a one-day training in Klagenfurt, Austria (6th to 7th August 2015) designed for top management staff of the utility companies and municipalities.

1.2. The project area and Utility Factsheet

Lipjan is a town in the central part of the Republic of Kosovo, 17 kilometers from Prishtina. The town is 553 m above sea level and has a population of 9,047. Lipjan town is located on the junction of the main routes from Prishtina to Prizren and from Prishtina to Skopje. The town belongs to Municipality of Lipjan, which covers an area of approximately 422 km² and includes Lipjan town and 62 villages. The total population is 57,605 (according to the Kosovo Population and Housing Census 2011). The municipality is predominantly agriculture-oriented, with many shops and restaurants opened. The average annual temperature is 12.03°C (minimum average annual 5.97°C,
maximum average annual 18.07°C) with an average precipitation days 6.25 per month. The minimum average monthly temperature is 0.2°C in January, while the maximum monthly average is 30°C in July. Therefore, the annual fluctuation of the temperature is 29.8°C.

Operation Unit Lipjan is part of the largest regional water companies in Kosovo-RWC Prishtina. RWC Prishtina among Lipjan, serving the municipalities of Prishtina, Podujeva, Obiliq, Fushë Kosovo, Shtime, Drenas (Gllogovc), part of Vushtrri (villages: Prilluzha, Stanovc, etc.) and the newly established municipality of Gracanica resulting from Kosovo’s decentralization process. RWC Prishtina is a joint stock company, providing to about 40% of Kosovo population, the following services:

- Abstraction, treatment and distribution of potable water,
- Collection and disposal of wastewater,
- Maintenance and expansion of drinking water network,
- Maintenance and expansion of waste water network.

RWC Prishtina J.S.C. is originated from the Regional Water Company Batllava, which in 01.07.2007., after several years of transformation and regional consolidation, became joint stock company named as Regional Water Company Prishtina. The water recourses of Prishtina started with natural resources of Germia and wells in Kolevica, and in 1961 continued with accumulative Lake Badovc started being used to supply Prishtina city and the vicinity with drinking water. In order to satisfy the increasing water demand and urban developments in Prishtina, additional quantity of water in 1997 was taken from Batllava Lake and underground Resources Fushe Kosove and Obiliq.

The water supply service area of Operation Unit Lipjan comprises the town of Lipjan and 32 villages.
The total number of population, based on the RWC Pristina estimation is 431,983 inhabitants (Table 1). It is estimated, since RWC Pristina J.S.C. does not have accurate data of supplying population by municipalities, that the number of population being provided with water supply services in the area where RWC Pristina J.S.C. operates is about 431,983 inhabitants, or approximately 72% out of the total number of inhabitants living in this part of the Republic of Kosovo.

### 2. METHODOLOGICAL APPROACH

#### 2.1. General approach to the audit process

This Survey Report on NRW practices performing in OU Lipjan RWC Pristina is based on several main source of information: submitted questionnaire by the utility, prepared and given presentation on the second training workshop, survey work and detailed discussions with relevant employees from RWC Pristina, already prepared Business Plan for 2015-2017 and literature review.

#### 2.2. Field visit

In order to get the best possible and correct filled questionnaire, the Consultant conducted a field survey on 23/07/2015, after submission of the primarily filled questionnaire. The questionnaires were updated, rectified and filled according to the possibilities.

In addition, for a more detailed survey, the project manager from Aquasan network in B&H and the Regional NRW expert for Macedonia and Kosovo Mr. Ristovski visited RWC Pristina on 01/09/2015.

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Table 1 Population in water supply service area

<table>
<thead>
<tr>
<th>NO.</th>
<th>ELEMENTS-MUNICIPALITIES</th>
<th>GENERAL CENSUS</th>
<th>% E OF WATER COVERAGE (ESTIMATION)</th>
<th>TOTAL POPULATION SUPPLIED WITH WATER (ESTIMATION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pristina</td>
<td>211,957</td>
<td>93%</td>
<td>197,120</td>
</tr>
<tr>
<td>2</td>
<td>Fushe Kosovo</td>
<td>39,340</td>
<td>93%</td>
<td>36,586</td>
</tr>
<tr>
<td>3</td>
<td>Obiliq</td>
<td>22,504</td>
<td>60%</td>
<td>14,402</td>
</tr>
<tr>
<td>4</td>
<td>Shtime</td>
<td>28,539</td>
<td>64%</td>
<td>18,265</td>
</tr>
<tr>
<td>5</td>
<td>Lipjan</td>
<td>60,164</td>
<td>77%</td>
<td>46,326</td>
</tr>
<tr>
<td>6</td>
<td>Podujeva</td>
<td>89,804</td>
<td>73%</td>
<td>65,557</td>
</tr>
<tr>
<td>7</td>
<td>Glogovc</td>
<td>60,952</td>
<td>57%</td>
<td>34,743</td>
</tr>
<tr>
<td>8</td>
<td>Gracanica</td>
<td>11,879</td>
<td>93%</td>
<td>11,048</td>
</tr>
<tr>
<td>9</td>
<td>Vushtrri</td>
<td>73,148</td>
<td>11%</td>
<td>7,936</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>597,287</strong></td>
<td><strong>72%</strong></td>
<td><strong>431,983</strong></td>
</tr>
</tbody>
</table>

Source: Kosovo Statistics Agency and RWC Pristina
### NRW utility baseline factsheet

#### GENERAL INFORMATION

| Utility Full Name: Operation Unit Lipjan - Regional Water Company Prishtina | Country: Kosovo |
| Ownership: Ministry of Economic Development / Government of Kosovo | Coverage: Region/Municipalities |
| Number of towns and villages: Town- Lipjan; Villages- 32 | Name of project area: Lipjan |
| Type of service provided: water supply, sewerage | Establishment of the utility: year 2007 |
| Is there a separate oversight regulatory agency? | YES NO |

#### TECHNICAL INFORMATION

| Population in the service area: 57,605 | Water service coverage: (%) 70 |
| Annual Volume of water produced (m³): 1,890,870 | Number of water connections: |
| Total Water Network Length (km): 200 | Number of employees: 43 |
| Average hours of supply per day: 24; summer days 6-8 | Water treatment plant capacity utilization: 9072 m³/d |

#### FINANCIAL INFORMATION

| Total Annual Revenues: Local currency: EUR: 665,770 | Unit revenue (average tariff) Local currency EUR: m³ | Collection ratio: Operating cost recovery ratio: |
| Unit cost of production: Local currency: | 0,71 0,71 |
| Collection ratio: Operating cost recovery ratio: |

#### NRW MANAGEMENT

| Non-Revenue Water 1,036,400 54,81 m³ | Is the network zoned into DMAs? YES NO |
| Is water produced metered? YES NO | Customer metering coverage ratio: 85% |
| Are production meters regularly calibrated YES NO | Is there a customer meter testing and replacement program? YES NO |
| Is there a functional NRW Department/Unit YES NO | Is there a pro-active illegal use investigation program? YES NO |
| Is the network pressure measured on regular basis? YES NO | Are there pressure reducing valves (PRVs) in the network? YES NO |
| Are there leak detection equipment? YES NO | Is Active Leakage Control practiced (searching for invisible leaks)? YES NO |
| Is there an asset management plan? YES NO | Is there an information management system for capturing and managing data on leaks, response time and customer complaints? YES NO |
| Are annual water audits conducted: YES NO | Is there an established water balance YES NO |
The further activities and the prerequisites to be carried out by the employees of the utility have been agreed to create the preconditions for the implementation of specific activities in selected pilot zone. Earlier proposed pilot zone has been changed and adopted new one which will be carried out all subsequent project activities.

3. INSTITUTIONAL ASSESSMENT

3.1. Legal framework and organization setup

Since the Operation Unit Lipjan is part of the RWC Prishtina J.S.C., the institutional assessment will be addressed to RWC Prishtina. RWC Prishtina is regional public company organized as Joint Stock Company since June 2007, in accordance with the article 35.5 from UNMIK Regulation 2001/6 on Business Organization that provides services (water and wastewater) in the southeastern part, respectively in central Kosovo to several municipalities. The Utility has its central administration based in Prishtina, but the operations, through Operation Units, are located in each municipality. The company owns the license to conduct its services and operations, issued by the Water and Wastewater Regulatory Office (WWRO). RWC Prishtina sets the level of services in accordance with the requirements of the minimum standards of services determined with the rules and regulations of the WWRO.

RWC Prishtina core values are commitment to providing quality services to customers, achieving financial self-sustainability and being transparent to the relevant stakeholders of the water sector in Kosovo. The Utility’s vision is to focus on customer satisfaction with the level of services provided. This vision keeps Utility focused on supplying drinking water for 24 hours, every day in the year that meets quality and quantity standards.

Since currently there is intermittent supply for some regions and municipalities, all human and financial resources of the company are focused to reduced Non-Revenue Water (minimize technical losses and to fully eliminate administrative losses) and to maximize all activities in order to increase the collection rate.

The overall mission of RWC Prishtina is to provide drinking water and adequate quality and quantity consistent with the standards of World Health Organization to all its customers without racial, religious, nationality and gender discrimination.

RWC Prishtina has to maintain the facilities, equipment and devices in functional and operable condition. The company also is responsible for planning of expansion of the service coverage. RWC Prishtina issues conditions and permits for connection to the water supply and sewage system for each newly built, upgraded or significantly reconstructed facility.

RWC Prishtina is supervising by the owner (central government) through the Board of Directors (BOD), which members are appointed by Prime Minister’s office (selected through public announcement, interviews with mandate of 3 years with possibility to be extended on 3 years more) and municipalities covered by the company services (usually with mandate of one year per municipality). The company is managed by Managing Director, appointed by the BOD. The Managing director has the competences to enter into the agreements in the name of the company, in accordance with the statute and the law in force, and reports to the Board of Directors. Each municipality has service agreement with the RWC for providing of services to the respective municipality.
Ownership of utility assets

According to the law on Publicly Owned Enterprises (POE) Law No 03/L-087, that establishes a legal framework governing the exercise of ownership rights in POEs, the central government of Republic of Kosovo, through Ministry of Economic Development (MED) is the owner of the Regional Water Company Prishtina and of all assets. MED is administrating the public utility through the Board of Directors (the chairman and half of the members are appointed by MED) and Policy and Monitoring Unit (ministerial staff). In general, MED is financing the capital investments according to the company priorities and previously prepared projects that the company applied for to the MED. With the incomes generated, RWC Prishtina is able to cover the operational and maintenance expenses, but not the capital investments. Thus, the utility apply for grants, besides to the MED, to municipalities the company is supplied with water and international donors.

A central bookkeeping, together with accounting, billing and inventory are conducted in the central unit of the Utility, in Prishtina. The financial department of the Utility carries out the depreciation of the whole assets.

Planning

RWC Prishtina is responsible for preparation of the three years Business plan, which purpose is to create a shared vision throughout the RWC that enables all employees to understand the company aim to have satisfied customers and to align its efforts to achieve the strategic objectives, mission and long-term goals that could increase the efficiency and operational performance of the utility. The three years plan is generated as a final document by the top management, with help mostly of financial department for the topics related to finances, and technical departments, for the technical issues. The last Business Plan is prepared for the year 2015-2017, with obligation to be revised each year. After each year is ended, the Board of Directors within the first quarter of the following year looks at the achieved performance if they are in compliance with the given target indicators for the evaluated year, such as a significant increasing of invoiced water, increasing of collection rate, decreasing of NRW, increasing of number of customers connected to supply network, reduction of expenses, keeping the current level of water production volume, better services to customers, etc.. One of the main strategic goals-reducing the NRW, is clearly mentioned in the business plan with relatively detail activities and plan how to be achieved, but mostly, without schedule of tasks and key milestones, application of capital and measurable milestones in improved performance. The three years business plan has to be adopted by the Board of Directors. The Business Plan in general should be available on the official web site of the company, which is the only way that customers and donors can access to the required information about the target level of services to the customer (in the moment of evaluation, there was only on Albanian language – for the period 2015-2017). The company also is responsible for planning of expansion of the service coverage. While the urban areas are very well covered with the service provision, there are considerable rural areas, managed by communities (nonpublic systems) or individual systems, which remain out of the covered area. The utility continuously plans to extend their services into the rural areas, in accordance to its capability to absorb such schemes without suffering negative financial and operative subsequences.
Figure 3 Organizational structure of RWC Prishtina
Reporting

There is an obligation for RWC Prishtina on annual basis to review the activities done in the previous year by comparing the achieved financial and technical performance with the projected performance indicators for the evaluated year within the three year business plan.

RWC Prishtina is providing to Water and Wastewater Regulation Office monthly reports on key performance financial and technical indicators, some of them stated below:

**Water Service providers**: Drinking water quality; Continuity of supply; Service coverage; Metered consumption relative to total consumption; Non-Revenue Water; Annual complaints per 1000 customers; Staffing efficiency.

**Financial KPIs**: Working ratio; Working coverage ratio; Unit operating costs; Collection rate.

In addition, the company has to prepare and submit the monthly report also to BoD, prior to their monthly regular meeting. Reports are also submitted to the Unit for Monitoring of Public Utilities within the Ministry of Economic Development, and to the National Institute of Public Health of Kosovo regarding the water quality.

Organizational Set-up

Operation Unit Lipjan–RWC Prishtina, as one of the eight operation units of RWC Prishtina, has been created for water supply and sewerage for the town of Lipjan and 32 villages with limited competences and responsibilities. All the basic and common responsibilities are shifted to the Regional Water Company Prishtina. Organizational structure, in accordance with the current statute and assigned through positions and their performance, is presented in the organizational chart of the RWC Prishtina and OU Lipjan in Figure 3 and Figure 4 below:

![Organizational chart of OU Lipjan](source: RWC Prishtina)
The practise of competence and responsibility by the Government of the Republic of Kosovo is executed through the Board of Directors. The Company is managed by the Managing Director (Chief Executive) in direct cooperation with the Executive Finance & Administration Director (Chief Financial Officer) and Executive Technical Director (Technical Director).

Under the direct management (without interference from directorates) of the managing director Internal Control & Audit and also Procurement and Supply Departments are organized.

### Human Resources

Currently OU Water Lipjan RWC Prishtina has 43 employees, from which 37 male and 6 female; 20 male and 0 female working in the technical and operation and maintenance department; and only 1 engineer.

The Staff productivity per 1,000 connections is 5.38 and 1.1 per 1,000 water population served (if only the employees of OU Water Lipjan are included).

In practice, there are insufficient trainings to the employees from the utilities, especially related to technical staff. In recent years, stakeholders have gained competence and expertise in areas such as operational management, NRW, economic regulation, policy planning, and service compliance. Despite evident progress, further enhancement of capacities is needed in the fields of efficiency improvement (especially related to NRW activities) capital investment planning, and service compliance. However, a number of NRW training measures have been carried out as part of the project "Reduction of NRW in South-East Europe", financed by GIZ. For now, donor projects play the main role in capacity building of utility staff in RWC Prishtina. The water and wastewater association of Kosovo, SHUKOS, established in 2001, also aims at developing more structured training and capacity-building programs.

### 3.2. Management commitment to NRW reduction

The current level of NRW in the system managed and operated by OU Lipjan RWC Prishtina, represented in % is 54.89, and expressed in absolute volume is 1,036,400 m$^3$. Related RWC Prishtina, the same figures are as follows: 49% and 3,332,033 m$^3$. The OU Lipjan does not have a leakage detection strategy or any equipment for detecting leaks. Since the leak detection is a centralized service carried out by the Leak detection department from RWC Prishtina, it could be understood that OU Lipjan in general, is covered with this service. However, since the Leak Detection department has just one team operated with 3-4 technicians, managed by an experienced engineer and equipped by sufficient equipment for flow and pressure monitoring, pipe tracing, leak detection, noise logging, which is responsible for eight municipalities in total, the need of separate Leak detection team which will operate only in OU Lipjan is more that recommended and needed. There is a strong management support and commitment to all activities aimed at reducing water losses in RWC Prishtina system. One of the proofs could be the Business plan for the period 2015-2017, where decreasing the technical and apparent losses remain a great challenge and one of the first priorities of RWC Prishtina management.
4. OPERATION MANAGEMENT ASSESSMENT

4.1. Technical Operations Assessment

Infrastructure and network characteristics

Water sources

OU Lipjan RWC Prishtina

The population in Lipjan municipality is mostly supplied with water through:

- the wellfield at “Paper factory”, which consists of 7 wells, with total capacity of 80 l/s and installed capacity of 40 l/s, with Reservoir capacity of 450 m³;

- the wellfield near “Sitnica River”, which consists of 5 wells, with total capacity of 40 l/s and installed capacity of 25 l/s, with Reservoir capacity of 450 m³;

- the wellfield at “Grachanica birder”, which consists of 6 wells, with total capacity of 70 l/s and installed capacity of 40 l/s, with Reservoir capacity of 350 m³; with buster pump station, the water is pumped and feed 2 Reservoirs;

  - Reservoir in Gadime with $V = 1000$ m³
  - Tank in Upper Gushterica $V = 500$ m³
  - Tank in Janjeva $V = 200$ m³

RWC Prishtina

- artificial accumulating lakes, Batllava (the accumulation surface in the maximum quote has the size of 3.27 km²);

Figure 5 Network of Water Supply System in Lipjan Town
Source: OU Lipjan RWC Prishtina
Badovc (the accumulation surface in the maximum quote has the size of 2.57 km²);

6 production facilities with underground water resources, which are: Kroni, Kastrioti, Shtime, Lipjan, Podujeva and Drenas;

tens of other small separate resources in the villages of municipal centres (Lipjan and Shtime).

The water supply system of Lipjan town is shown on Figure 5.

**Water treatment**

The water from the sources in Lipjan is treated by two WTPs located at Paper factory and near Gracanica border. The treatment plant near Gracanica border was built in 2010 and second one, at the Paper factory in 1980/1995.

The treatment process comprises only the disinfection with chlorine;

- Treated water tank, 2,390 m³.

The Prishtina sources are treated by two water treatment plants located in Albanik (Shajkovc of Podujeva) and Badovc.

**Reservoirs Capacity**

There are several water reservoirs in the system serving the Lipjan town and other villages. The total volume of these reservoirs is 2,390 m³ (450 m³, 240 m³, 1,000 m³, 500 m³, 200 m³). All reservoirs are in good condition, fully and completely functional and are constantly in operation. Cleaning, testing and disinfection of the reservoirs take place two times per year.

Due to their altitude, some areas which are located near the reservoirs cannot be supplied directly from the reservoirs, so booster pump stations are used.

The total reservoir capacity of RWC Prishtina is 70,000 m³.

**Distribution network**

The water supply distribution network of OU Lipjan RWC Prishtina has a total length of 200 km and is made up of AC (20%), HDPE (75%), DCI, PVC (5%) pipes with diameters of 50 mm to 315 mm. The number of valves in the distribution network – 250; hydrants in the distribution network – 11 (2 pcs inside the town, 9 in villages). The water supply network inside each zone is branched out and looped.

Related to RWC Prishtina, there are 1,200 km primary and secondary pipelines.

The average network pressure in the water system of Lipjan is around 3,1 bars.

**Infrastructure and network Documentation**

There are digitized maps for the city of Lipjan from 2010 in AutoCAD, but not for the whole area of coverage.

There is no GIS team established currently at OU Lipjan RWC Prishtina. This service is centralized at head office in Prishtina, through separate GIS department, working on ArcGIS software. There is no active GIS network updating by the Operating Unit. Only sketches are made and photos are taken during the reconstruction of the network and repairing of leaks, which are transferred.
in dwg. form and submitted to the GIS office at RWC Prishtina.

**Network management**

There is no Hydraulic modelling team currently established at OU Lipjan RWC Prishtina. This service is also provided by the central unit in Prishtina, and currently, hydraulic model has been designed for Prishtina and Fushe Kosovo region. The HM team is working on the other parts of the system.

Related to SCADA, it is only installed in the main water treatment facilities for RWC Prishtina. There are no other installed monitoring points for water flow and pressure in the water supply system.

The water network in OU Lipjan RWC Prishtina has not been divided into DMA’s and there are not identified and verified DMA zones. Since there is no info about any night flow and pressure measurements carried out, deeper analysis of NRW has not been performed yet.

The idea of organizing the system into DMA’s is active among the utility and therefore, especially for the purpose of the current project “Reduction of NRW in South-East Europe” three DMA’s have been proposed (Figures 6,7,8.)

*Figure 6 Proposed DMA’s – Bujari-Callapek*
Bujari-Callapek;

Characteristics of the network (No. Connections: 263; No. of inhabitants: 1,315; Length of network: 10.2 km; Pipe diameter and material: DN 125 – DN 50, HDPE)

Janjeve – Gushterice;

Characteristics of the network (No. Connections: 814; No. of inhabitants: 4,070; Length of network: 17.1 km; Pipe diameter and material: DN 150 – DN 60, AC)

Part inside Lipjan Town;

Characteristics of the network (No. Connections: 470; No. of inhabitants: 2,350; Length of network: 3.2 km; Pipe diameter and material: DN 150 – DN 75, AC + HDPE)
Lipjan OU has provided details of the number of leaks in pipes in 2014 according to the DN of the pipes, and 2015 (until August).

In the current year 2015, for the period from January to July, OU Lipjan RWC Prishtina reported in total of 18 leaks on distribution network including connections (only in the urban area of the city of Lipjan).

**Water consumption**

OU Lipjan RWC Prishtina, including the Regional Water Company Prishtina J.S.C. couldn’t provide 24 h water supply service to all the customers. There are some restrictions in the system, mostly during the 3-4 summer months. According to the data provided for the 2014 fiscal year by OU Lipjan RWC Prishtina, the average water consumption was 51 l/p/d.

The average total consumption of sold water of almost 51 l/person/day is much lower than the Europeana verage of 160 l/person/day. Taking into consideration the habits of population with regard to water usage and the relatively low awareness of water savings, this indicator shows significantly inadequate quantities of water served to the customers, is either under estimated due to smaller amounts of invoiced water (probably due to the intermittent water supply or/and illegal consumption) or/and overestimated number of population served.

**4.2. Commercial Operations Assessment**

Regional Water Company Prishtina J.S.C. applies the tariff set by Water and Waste Water Regulatory Office as the competent authority for setting Service Tariffs for Water and Wastewater Services, Bulk Water Supply in accordance with Regulation 2004/49 and the secondary legislation (WWRO Tariff Rules). Although the already set and approved service tariffs for regulated services, should ensuring that tariffs are fair and reasonable and enable financial viability of service providers, according to RWC Prishtina, only operational costs can be covered, but not maintenance costs and capital investments. The existing tariffs do not guarantee larger investments on improving the assets and better customer services without the support of other funds including donations, commercial loans, grants and governmental subsidies.

RWC Prishtina has adopted a written policy on metering, billing and collection. It is still necessary to upgrade the procedures so that the whole process of reading, billing and collection as well as customer relation is covered. RWC “Prishtina” delivers bills on a monthly basis to all its customers at the customer’s property for the services provided. The bills contain all necessary financial and information elements and it is in conformity with the regulation determined by Water and Wastewater Regulation Office.

### Table 2 Number of breaks/leaks in distribution network, 2014

<table>
<thead>
<tr>
<th>Profiles/Diameters on OD or DN</th>
<th>No. of Cases</th>
<th>Solved Cases</th>
<th>Un Solved Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>75</td>
<td>266</td>
<td>0</td>
</tr>
<tr>
<td>3/4”</td>
<td>80</td>
<td>266</td>
<td>0</td>
</tr>
<tr>
<td>1”</td>
<td>90</td>
<td>106</td>
<td>21</td>
</tr>
<tr>
<td>5/4”</td>
<td>100</td>
<td>53</td>
<td>17</td>
</tr>
<tr>
<td>6/4”</td>
<td>125</td>
<td>32</td>
<td>5</td>
</tr>
<tr>
<td>2”</td>
<td>150</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>75</td>
<td>200</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>80</td>
<td>250</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>90</td>
<td>300</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source RWC Prishtina OU Lipjan
Financial statements are prepared in line with the national accounting standards as well as to International Accounting Standards.

RWC Prishtina is using accounting software, which is updated on a regular basis. The software allows for cost centre accounting associated with the general accounting system. Revenues and costs are recorded for different services that at the RWC Prishtina is providing. Financial statements comprise balance sheets, income statements, and statement of equity.

### 5. WATER BALANCE

Some of the components of the water balance and NRW performance indicators defined by the International Water Association / Water Loss Specialist Group are presented below. The water balance (annual average presented in m³) has been prepared on the basis of data available for the period January 2014 to December 2014 inclusive.

#### Table 3 Tariff structure of RWC Prishtina

<table>
<thead>
<tr>
<th>CUSTOMER CATEGORY</th>
<th>FIXED TARIFF EURO/MONTH</th>
<th>VOLUMETRIC TARIFF FOR WATER SERVICES EURO/M³</th>
<th>VOLUMETRIC TARIFF FOR WASTEWATER SERVICES EURO/M³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>1.00</td>
<td>0.3850</td>
<td>0.0459</td>
</tr>
<tr>
<td>Institutional and Industrial/Commercial</td>
<td>3.00</td>
<td>0.8623</td>
<td>0.1050</td>
</tr>
</tbody>
</table>

**1.1. Tariff without inflation determined for year 2015 (01.01.-31.12.2015)**

### Table 4 Water Balance data and performance indicators for year 2014

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total water produced in m³</td>
<td>1,890,870</td>
</tr>
<tr>
<td>Billed metered consumption in m³</td>
<td>615,218</td>
</tr>
<tr>
<td>Billed unmetered (lump sum) consumption in m³</td>
<td>239,252</td>
</tr>
<tr>
<td>Unbilled metered consumption in m³</td>
<td>-</td>
</tr>
<tr>
<td>Unbilled unmetered consumption in m³</td>
<td>-</td>
</tr>
<tr>
<td>Consumption per capita (liter/person/day)-produced/sold</td>
<td>112/51</td>
</tr>
<tr>
<td>Average number of persons in a household</td>
<td>5-6</td>
</tr>
<tr>
<td>Estimated error in metered consumption in %</td>
<td>3</td>
</tr>
<tr>
<td>Estimated error in unbilled metered consumption in %</td>
<td>3</td>
</tr>
<tr>
<td>Estimated error caused by meter malfunction in %</td>
<td>3</td>
</tr>
<tr>
<td>Estimated error during data processing in the office in %</td>
<td>5</td>
</tr>
<tr>
<td>Total length of distribution and transport mains (from DN50) in km</td>
<td>200</td>
</tr>
<tr>
<td>Number of connections of registered consumers</td>
<td>8,000</td>
</tr>
<tr>
<td>Number of inactive connections</td>
<td>730</td>
</tr>
<tr>
<td>Average connection length (from parcel border to water meter) in m</td>
<td>5-15</td>
</tr>
<tr>
<td>Average pressure in the whole system in m</td>
<td>31</td>
</tr>
<tr>
<td>Average water price in €</td>
<td>0.71</td>
</tr>
<tr>
<td>Annual operating costs (without depreciation) in €</td>
<td>439,105</td>
</tr>
<tr>
<td>NRW (m³)</td>
<td>1,036,400</td>
</tr>
<tr>
<td>NRW (%)</td>
<td>54,81</td>
</tr>
</tbody>
</table>

Source: WWRO Kosovo
6. CONCLUSIONS, RECOMMENDATIONS AND KEY ACTIONS

General conclusion

One of the main factors affecting the efficiency and stability of providing services, as well as the OU Lipjan RWC Prishtina as a whole, is the high level of Non-Revenue Water. According to the latest data for 2014, displayed in Table 6, the value of the Non-Revenue water is 54,81 percent of the total inflow in the system displayed as absolute value – 1,036,400 m³/annually. The current value of the Non-Revenue water should be real concern for the OU Lipjan RWC Prishtina and it only indicates the necessity of starting most of the activities, and continuing and intensifying already started for decreasing Non-Revenue Water.

Based upon the technical part of the survey report, the main technical challenges for OU Lipjan RWC Prishtina may be grouped into short, medium, and long-term measures and activities.

Short-term measures (in less than one year):

- To take part, through updating the cadaster of the water supply network and facilities of OU Lipjan RWC, in building the GIS and Hydraulic Modell of the Lipjan network by GIS/HM team located in Prishtina; It is strongly recommended to have on license of GIS software for viewing purposes.

- Desk top design of DMA’s throughout entire water supply system to ensure delivering the services without causing pressure or water quality problems. This also entails confirming the outer limits of the system, height/contours with the DMA, boundary valves being present or identifying where to install valves or which valves to be closed that will make the DMA work, meter location to measure single flows if possible.

- Develop a detail plan for flow and pressure measuring in 24 h period of time (input in the system-flow, pressure, average and the highest point in the system-pressure.) Pressure measuring campaign should be carry out with pressure data loggers and flow measuring with already and newly installed mechanical type of water meter or mobile ultrasonic flow meter).

- To establish at least one-two DMA’s.

- To develop a strategy and/or Action Plan for reduction of Non-Revenue Water.

- Analyzing of minimum night consumption and calculate approximately Real water losses in the measuring zone.

- Repairing of visible leaks (Repairing visible and reported leaks (preferably within 24 hours of being reported) is without doubt one of the most obvious and basic interventions that should be implemented as a top priority.

- To establish Leak Detection Department, since the LDD in Prishtina head office has to cover very big area and practically, it is impossible to carry Active Leakage Control on the whole territory. So whilst NRW theoretical training has been provided to the OU Lipjan RWC Prishtina staff during the project, the next real step is to move towards implementing the methodology and techniques provided on training with respect of various leak detection activities on site. The establishment
of a Leak Detection Department and identification of an appropriate number of staff to work as part of a NRW action team is an absolute requirement in the first instance. There is a clear need to address the problems and constraints associated with introducing a NRW reduction programme within OU Lipjan Prishtina. Tackling NRW requires a dedicated core of highly motivated and trained specialist personnel using own “state of the art equipment” and techniques. The use of local knowledge with an understanding of the day-to-day operation of the distribution system and water demand patterns is also essential.

- Reducing of Apparent Losses (Unauthorized consumption; illegal connections, theft and fraud; Customer meter inaccuracies; Customer data base errors; Data collection and transfer errors; Water meter selection and sizing).

**Medium-term measures (in one to three years):**

- To calibrate the hydraulic model of water supply network that provides access to the values of hydraulic parameters and a summary of the main water supply lines and water supply network as a whole. Its calibration is necessary to obtain the values of flow and pressure as in a real system. It is possible to compare the results obtained from the hydraulic model with the numerous measured data on field.

- To install variable speed drive pump on one of four already installed pumps which supplied the Lipjan city, in order to regulate the flow during the night hour.

- To establish more DMA’s in the system and dividing the selected DMA’s into small zones (sub DMA’s -permanent or virtual) in order to better interpreting the data from flow and pressure measuring campaign. Prioritizing of sub DMA’s with higher water loss.

- Analyzing of customer meter accuracy, customer meter database (age, type, brand, class of accuracy) and customer meter reading and billing procedure;

- Continuation of the program of replacement of customer water meters which will assist in reducing Commercial losses/Non-Revenue Water;

**Long-term measures (in more than three years):**

- To reduce NRW which are assessed to be 54.81% (2014) of the total water system input by following the Action Plan (i.e. implementation of measures such as proactive leak detection, pipe replacement, pressure reduction…); to 46.30% until 2017.

- Replacement of old and bad-condition pipes and galvanized iron and steel service connections will assist in reducing Real water losses/ Non-Revenue Water;

- To install pressure reduction valves on some critical locations in order to reduce the pressure and reduce variations during the day and night;

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