



WASAC
Water & Sanitation Corporation

"Dignifying Life"



KARENGE WTP 2017

February 1st, 2017

1 GENERAL INTRODUCTION

Karenge Water treatment Plant was initiated since 1975 with the installation of famers in the region from former GIKONGORO and RUHENGELI subsequently at the famine due to lack of arable land.

The Plant was built in 1975 by AIDR (Association International de Développement Rural) had a nominal capacity of 160 m³/hour and should deserver former Bicumbi; Gashora and Kanombe.

In 1985; an extension of this plant was carried out by SADE and increased production to 300 m³/hour and so added KANZENZE district on the extension of its network.

In 2008; another extension and rehabilitation by SOGEA-SATOM has increased production to 500m³/hour and strengthened distribution network to Kigali City, and the year 2014 left the plant working completely very good with 14,500 m³ /day exceeding the nominal capacity (12,000 m³).

The plant still gives opportunity to improved quality and quantity of production. This has been confirmed through promising optimization operations, initiated by the partnership between WASAC ltd and HAMBURG WASSER and the continuing Performance Improvement programs (PIP), which led the Plant production Baseline to 465,000 m³/month (15,500m³/Day).

This infrastructure has necessitated diligent exploitation and maintenance operations to accomplish its mission from which the chemicals and energy consumption were reduced and justified the decision of WASAC ltd Management, to declare KARENGE WTP the winner in the category of **Cost Optimization** Certificate of Performance 90 Days Program after the Overall trophy won in October 2015.

2 KARENJE WTP OVER VIEWS

The images below show:

- 1. the general plan of KARENJE WTP;*
- 2. Aerial view of the Plant*



3 WATER TREATMENT UNIT

KARENJE water treatment unit is an infrastructure composed with different parts where each part has its specific task during the treatment process such as aeration, prechlorination, flocculation, sedimentation, filtration disinfection and store of clear water.



Aeration

Coagulation

Flocculation

Sedimentation

4 KARENGE WTP LABORATORY RELATED OPERATIONS

Supplied water is rigorously analyzed to comply with RBS norms. The plant analyzes water at each treatment process step and the network water divided into 3 sample zones:

ZONE A composed by 4 sites: KABUGA Ville, MASAKA Centre de sante, APAER College, Ecole Technique St Emmanuel

ZONE B composed by 5 sites: TTC Nzige, MUREHE BF, MUYUMBU BF, NYAKARIRO College, BIHEMBE College

ZONE Composed by 5 sites also: Centre de Santé karenge, Groupe Scolaire ASPESKA, Groupe Scolaire karenge ,Centre Karenge ,NYABUBARE supplied water reservoir.

4.1 Jar test

Jar test determines the quantities of chemical to apply in water treatment process, especially for flocculation.

4.2 Physical analysis

Physical analysis test assess the physical properties of drinking water, according to the RBS guidelines of drinking water quality. Physical properties analyzed include pH, conductivity and turbidity just to name a few. Conductivity and pH helps detect nutrient composition. Turbidity relates to color and sediment concentration.

4.3 Chemical analysis

Chemical analysis of water determines nutrient, pollutant and toxic constituents and concentrations. These constituents are important to monitor, considering some, including arsenic and lead, can cause cancer. The KARENGE WTP complies with RBS standards, of how much of these constituents can be present in the water without harming humans, wildlife, and aquatic life.

4.4 Physico-chemical analysis

Physico-chemical analysis combines both physical and chemical analysis to determine whether treated water meet the requirements of drinking water.

4.5 Bacteriological analysis

Bacteriological water analysis is done at KARENGE WTP Laboratory, to estimate the numbers of bacteria present and, if needed, to find out what sort of bacteria they are. This microbiological analytical procedure uses samples of water and from these samples determines the concentration of bacteria. It is then possible to draw inferences about the suitability of the water for use from these concentrations. This process is used, to routinely confirm that water is safe for use for human consumption; bathing and recreational.



Figure 1: KARENGE WTP Laboratory

5 KARENJE WATER SUPPLY NETWORK

Karenje WTP achieves the production of 15,500 m³ in average; more than the nominal capacity of plant 12,000 m³ per day.

The plant supply treated water in two areas:

1. **Kigali network**; by 85 % (Remera, Kanombe, Kabeza, Masaka, Kabuga; Ndera; Free Zone & AZAM)
2. **Rural area**; by 15 % (Karenje Sector; Nzige Sector; Gahengeri Sector; Muyumbu Sector and Nyakariro Sector)

5.1 PUMPING STATIONS

From Lake MUGESERA level of 1300m height the raw water undergoes treatment process to be supplied to KIGALI city at an elevation of 1660m high, the reason of multistage pumping stations.

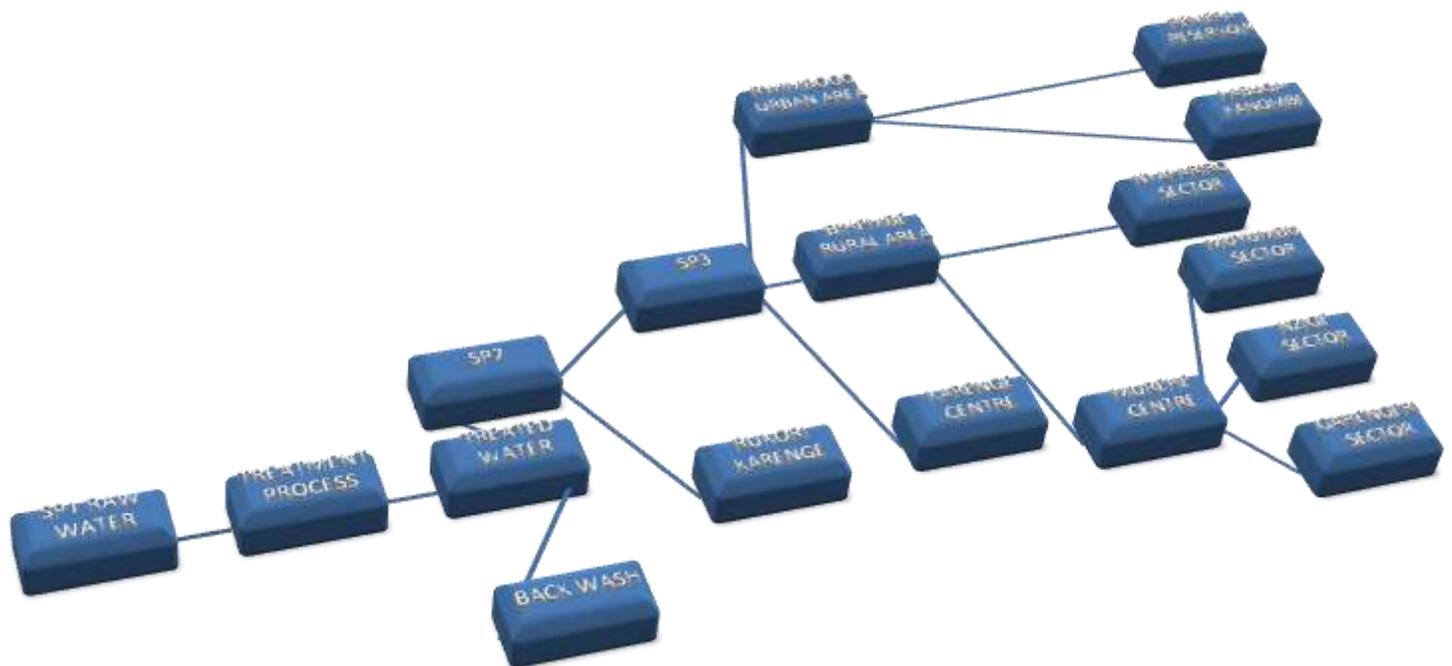
The WTP comprise 3 pumping stations that are SP1, SP2 and SP3 respectively the raw water pumping station, the treated water pumping station and the booster pumping station.

Each station is made by Power booster, motor pump room and the hydraulic fittings for the product transport.

SP1: Pumping Station 1 (Raw Water pumping Station)

SP2: Pumping Station 2 (Treated Water from KARENJE WTP)

SP3: Pumping Station 3 (Booster pumping station)



Captage SP1



Figure 2: KARENGE Raw Water Pumping Station



Figure 3: KARENGE WTP Pumping Station



Figure 4: NYABUBARE Booster pumping Station

6 KARENJE WTP INNOVATION

Karenge process or (split dosing points) an innovation in water treatment process consisting of splitting the treatment chemical into differed dosing points to optimize the treatment process with less chemicals and much more production of better quality.



Figure 5: Treatment chemical split dosing points