Water & wastewater

Innovative solution for Kenyan water

A water services provider in Kenya's coast province has installed a new set of vertical multistage pumps at its water treatment plant following a failure. Mawasco, based in Malindi, Kenya, procured a set of Poldap Dalgic Pump sets from Konya in Turkey as replacements. Shem Oirere tells the story.

Water supply in Malindi, Kenya had been interrupted for several months after the pumps' motors failed. The failure was blamed on the erratic power supply to the facility, which obtains its electricity from the Kenya Power and Lighting Company (KPLC), based in Nairobi, a state-owned listed power utility.

"Power quality problems in the form of voltage dips, transients and harmonics contributed to the failure of the motors," said Johnson Randu, MD of Malindi Water Services and Sewerage Co (Mawasco). Mawasco is the successor company to the Gauff Utility Services Kenya Ltd., a private company based in Malindi, which managed water transmission and distribution services until 2005 when water sector reforms in Kenya ushered in a new management structure.

Andy Tola, the chief executive officer of Mawasco's parent company, the Coast Water Services Board (CWSB), based in Mombasa, said that frequent power interruptions caused the pumps' breakdown, reducing the water supply from the Baricho waterworks by 6,000 m^3. Other towns affected by the water supply disruption at the Baricho waterworks include Kilifi and Mombasa.

Responsibility unclear

The breakdown of the pumping facilities sparked a row between the CWSB and the KPLC, two state firms that traded accusations over who was to blame for the water crisis that also affected health facilities, tourist resorts and hotels in Malindi.

According to KPLC's head of corporate communications, Bomba Mahaga, the power distributor was not to blame for the water crisis and instead asked the water board to streamline its water supply services in anticipation of any interruptions. KPLC, which Mahaga said invested Sh26 million (US$ 284,000) in the power supply line to Baricho waterworks, was of the opinion that the CWSB should invest in emergency power generators to cater for the power needs of the water supply facilities in the coastal region.

This proposal was rejected by Andy Tola as expensive and not within its mandate. "Baricho is a power consuming station and if you want to use generators to supply power to the station, it means you are creating another power station," Tola said.

A new pumping solution

According to Tola, the Poldap Dalgic pump sets are suitable for the Malindi Water Company because - being submersible pumps and therefore low lift - they can easily transfer water to the reserve tank with a holding capacity of 5,000 m^3. The pumps had also been recommended because of their reliability and lifespan.

Poldap pumps are vertical multistage designs and are preferred because of the steep characteristics curve (H vs Q) giving stable pump performance. Currently, the Poldap pumps are demonstrating very good performance. Multistage pumps are, in most cases, superior in operation than single or dual stage pumps and the Poldap pumps have also proved to be very reliable. The pump installed at Malindi has a flow rate of 380 m^3/h with a pressure/head of 12.4 bar / 124 m and power capacity of 147 kW.

One of the water bowsers that was contracted by the Malindi Water and Sewerage Company to supply water to consumers resident in the tourist town of Malindi during the water crisis period.

Consumers enjoy water that has been pumped from a new private water borehole. Private boreholes in Malindi had a field day in charging US$ 0.22 and US$ 0.33 for every 20-litre jerry can.

A section of the Indian Ocean town of Malindi, which went without water for months after the pumping facilities failed.

The installation last May came after weeks of protests from water consumers in the town and its environs – many consumers were forced to drink salty water directly from the Indian Ocean and wells, exposing them to health hazards from water-borne diseases. The water shortages also meant that Malindi residents had to buy water from private water owners who charged an average of Sh20 (US$ 0.22) to Sh30 (US$ 0.33) for a 20-litre jerry can.

CWSB records show that at least 75% of Malindi's estimated 150,000 residents are supplied with water, an estimated 32% of the people getting the supply from water kiosks.

Initially, Tola said, the two water pump sets had been ordered from a manufacturer in Germany, whose identity he could not confirm. This supplier was later replaced by a Turkish manufacturer because of long delivery times to Kenya. Each of the pump sets, Tola said, cost the board US$ 22,000.

In between the delivery of the pump sets and the biting water crisis, the CWSB opted for water bowsers to supply water to the most affected areas within Malindi and Watamu towns.

Other pumping initiatives

The installation came at about the same time as the World Bank confirmed a delay in financing a US$3 million water supply project that would have boosted access in Magarini, an area served by Mawasco. The delay has been caused by a proposal by the CWSB that the World Bank loan be charged an interest rate of 4% instead of the 7% recommended by the bank. The International Finance Corporation (IFC), a lending arm of the World Bank is currently negotiating the lending rate, hence the delay to the water supply expansion project that was initially scheduled to start in the first quarter of this year.

The delay of the water sector funding by the bank also comes immediately after an admission by CWSB that it is unable to meet the daily demand for 15 million m^3 of water in Kenya's coastal region. Tola said recently that the board currently has the capacity to supply 'a mere 110,000 m^3 of water, meeting the consumer needs of 25% of the region'.

A Poldap pump similar to that installed at Malindi. It has a flow rate of 380 m^3/h with a pressure/head of 12.4 bar / 124 m and a capacity of 147 kW.

Under a new master plan developed by the board, but which remains suspended for lack of financing, towns like Malindi, Kilifi, Magharini and Mombasa will have their water supplies enhanced through an overhaul of the water supply systems including the pumping sets, which have exceeded their lifespan. The board would need Sh40 billion (US$ 437 million) to be able to implement the Mzima 2 water project, which the government of Kenya projects would supply an estimated 163,000 m^3 of water daily.

Elsewhere in Kenya's eastern province, another pumping project is underway. The National Water Conservation and Pipeline Corporation (NWCPC), a state corporation under Kenya's Ministry of Water and Irrigation based in Nairobi, has a mandate to develop state schemes and develop dam construction for water supplies, flood control and other multi-purpose uses, land drainage and construction of dykes. NWCPC is installing raw water and treated water pumping stations with the requisite pumping equipment at the Badasa Dam in eastern Kenya, to supply water to Marsabit and its environs.

The project will involve the construction of an 52 m embankment on the Buji river in Mount Marsabit forest reserve, a scour and intake works, a diversion culvert, a raw water pumping station, a water treatment plant and treated water pumping and booster stations. According to the project designs, the treated water rising main (250 mm diameter and about 10 km long) will be installed linked to water storage facilities having a capacity of about 3,000 m^3.

The pumping facility will pump water from the Badasa Dam reservoir, now 30% complete, to the proposed treatment works against a static head of 50 m and through an intake pipe 250 mm in diameter and 300 m long. From the clear water tank at the treatment works, water will be pumped against a static head of 430 m with a booster station in between. It could not be established which type of pumping facilities are to be installed at the water supply facility in Marsabit (500 km north of Nairobi), or the identity of the supplier.

Marsabit's current water supply comes from Bakuli Springs, which was constructed over 40 years ago and expanded in 1995. NWCPC says the present water production capacity in this town, with an estimated 31,000 people, ranges between 800 m^3 / day during the rainy season to 300 m^3 / day during the dry season. Water demand in Marsabit town stands at 2,750 m^3 / day, and is projected to reach 7,350 m^3 / day by 2032 when the town's population is expected to hit 80,000.

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