The Importance of District Metered Areas in Water Loss Reduction – Case Study of Blantyre Water Board of Malawi

V.J. Kafodya, Blantyre Water Board, Box 30369, Blantyre 3, Malawi (vkafodya@bwb.mw)

D.P. Chaweza, Blantyre Water Board, Box 30369, Blantyre 3, Malawi (dchaweza@bwb.mw)

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1.0 Introduction

Despite the high costs of water production at Blantyre Water Board (BWB), non-revenue water (NRW) was around 47 % in June 2017. This was very high compared to the regional average of 25 %. BWB Directors gave management a target to reduce NRW to 33 % by June 2018. This compelled management to come up with strategies to reduce NRW. The strategies employed were; pipe replacement of frequently bursting pipes and replacement of faulty meters. Farley, Wyeth, Ghazali, Istandar & Singh (2008) advised that the most effective approach to reduce NRW in a district metered area (DMA) is to practice Active NRW Management where dedicated teams are established and sent out to look for water losses, such as leaks, reservoir overflows and illegal connections. Following this school of thought, BWB engaged three experienced plumbers to work towards reducing NRW in DMAs. They are working to reduce NRW from DMA to DMA. BWB has 110 DMAs. Usually NRW management in an open system is undertaken in a passive way where NRW reduction activities are introduced only when the loss becomes visible or is reported (Farley, Wyeth, Ghazali, Istandar & Singh, 2008).

2.0 Methodology

The DMA by DMA reduction of NRW started in September 2017 and by the time this abstract was being revised, 30 DMAs were studied. The DMAs are; Blantyre Secondary School, Chapima Heights, Namiwawa MRA, Njamba, Mudi Compound, Chirimba Industrial Area, Kameza, Chichiri Prison and Bangwe ADMARC, just to mention a few. The number of connections in each DMA ranged from 30 to 300. Chichiri Prison is the smallest DMA while Chiwembe is the largest DMA in this study.

These DMAs had bulk meters that were functional. First, the bulk meter readings were taken, and within the same time all individual customer meters were read. Thereafter, the second meter readings were also carried out. Two readings were taken in order to establish NRW before NRW reduction interventions were carried out. The calculation for NRW within a DMA is defined as follows (Farley, Wyeth, Ghazali, Istandar & Singh, 2008):

DMA NRW = Total DMA Inflow - Total DMA Consumption

After establishing NRW in a DMA, surveys were done to identify leaks, illegal connections (these were mainly discovered during meter reading), meters not being billed and faulty meters.

All these were being rectified. Pipe replacements and lowering were also done. After rectifying all the anomalies within the DMA, another set of readings were taken to establish the NRW figure after the interventions. This exercise is on-going as the aim is to reach to all the DMAs. By the time this abstract is written, 11 care takers (plumbers responsible for specific DMAs) were assigned to work on NRW reduction at DMA level. A caretaker has not more than 10 DMA to work on. It is expected that all DMAs will be reached by December 2018.

3.0 Results

Figure 1 below shows the results of NRW after interventions in each DMA.

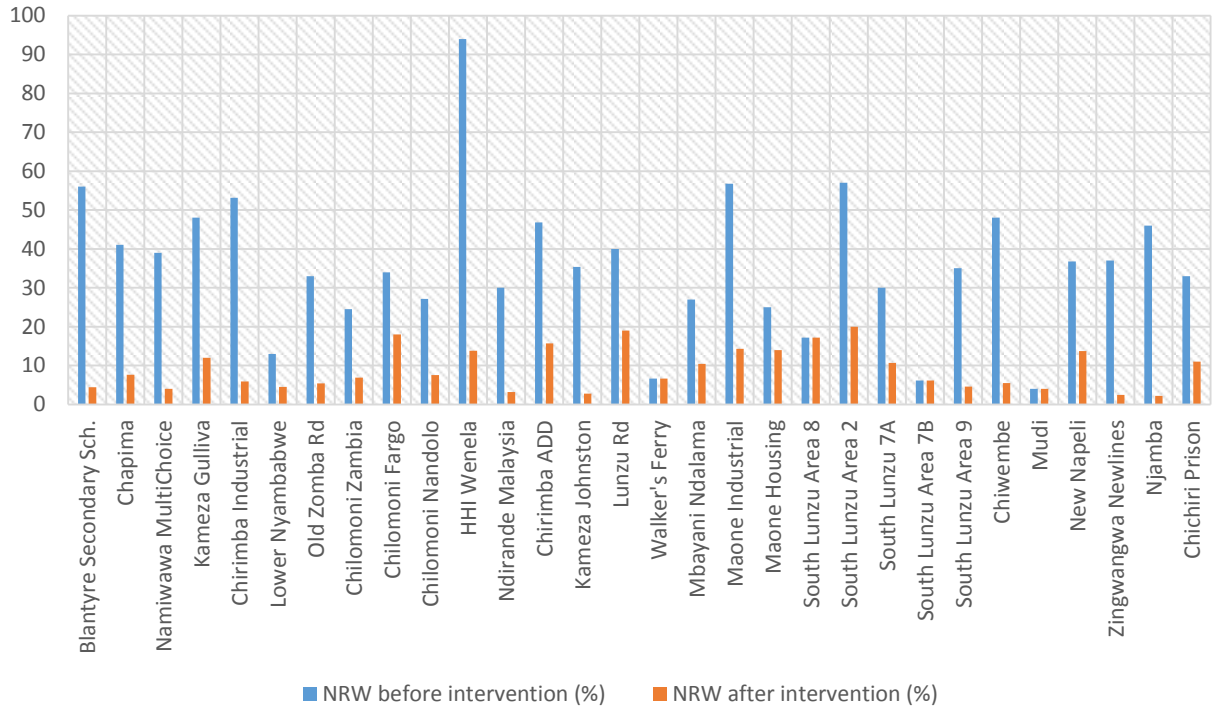

Figure 1: NRW (%) in DMAs

In some DMAs like Mudi Compound and Walker's Ferry, NRW was already low (below 10 %). As such, no intervention was taken. Henry Henderson Institute (HHI) had the highest NRW (95 %), but with the interventions, it was reduced to 12 %. This high NRW was mainly due to leaking boundary valves. Njamba DMA was installed with prepaid meters and its NRW reduced from 45 % to less than 3 %. The cause of high NRW in Njamba was a leaking 50 mm GI pipe.

This reduction of NRW in DMAs coupled with pipe replacements, faulty meter replacements and replaced of aged meters (meters that are over 7 years old) has helped BWB to be reducing its NRW. Figure 2 below shows NRW trend from April 2016 to March 2018 and figure 3 shows production, billed and NRW volumes within the same period.

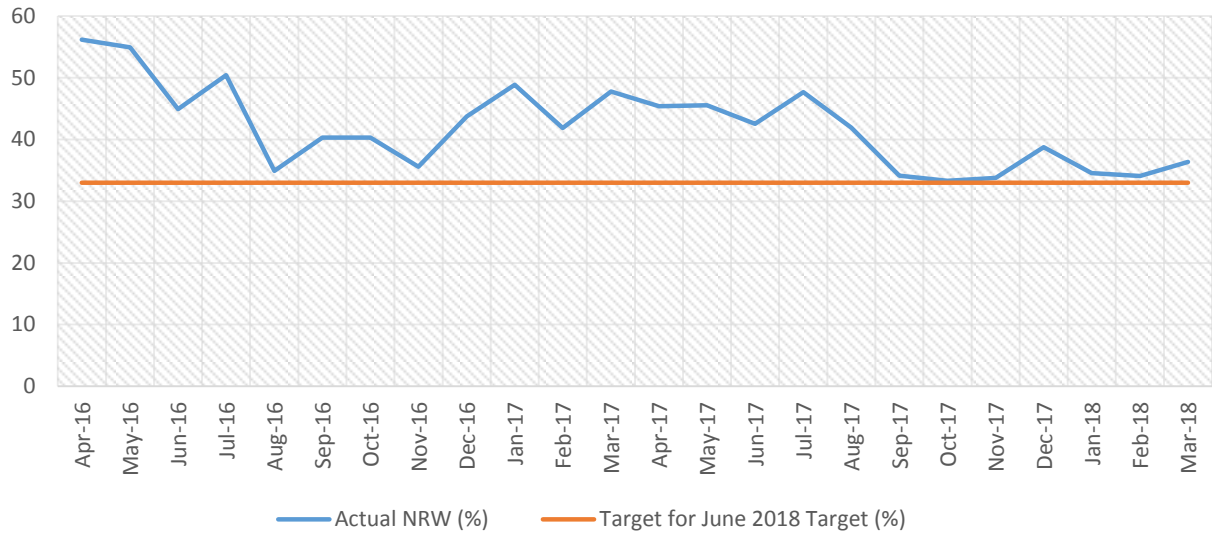

Figure 2: Monthly NRW for BWB

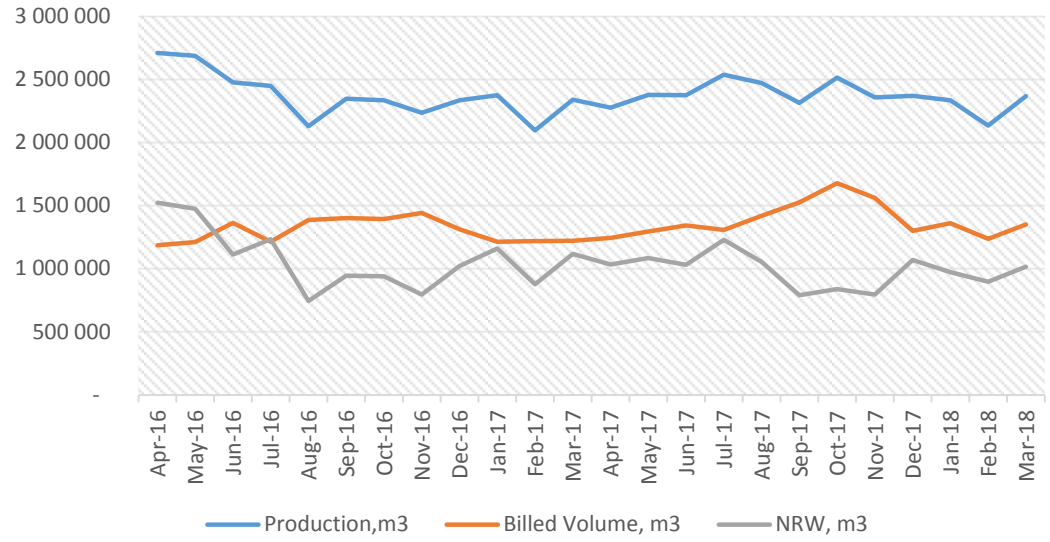

Figure 3: Production, billed and NRW Volumes

4.0 Conclusions and Way Forward

From the results, the reduction of NRW at DMA level is showing good results. This is because a DMA is a small area to manage. The interventions that are done in one DMA offer lessons for the other DMAs. BWB is still carrying out NRW reduction activities at DMA level. Each DMA where NRW has been reduced is having its water supply balanced every month to check if there are any changes. If the NRW has gone up, the intervention are repeated.

As a way forward, BWB will continue with these activities so that all DMAs are reached. More challenging DMAs will be managed by a plumber who shall attend to all NRW issues. So far 38 such DMAs have already been identified and the plumbers will also be assigned to these DMAs by July 2018. In addition to this, BWB is currently procuring mobile billing system which will be used for meter reading. Each meter reading shall be supported by a picture of the meter reading. This will assist eliminate cheating by meter readers. Furthermore, procurement of reservoir level monitoring system is underway. This will help plant operators manage reservoir levels and avoid overflow. This system will also assist management to monitor overflows. With these interventions, BWB expects to reduce NRW to 25 % by 2020.

Reference

Farley, M., Wyeth, G., Ghazali, Z.B., Istandar, A., & Singh, S. (2008). *The Manager's Non-Revenue Water Handbook: A Guide to Understanding Water Losses*