Technical note:

UNIDO/CTCN: NAWASA Grenada
Improvement of water supply management through a GIS based monitoring and control system for water loss reduction in Grenada

Project Output 3: A 2-3 day South-South exchange mission to another Caribbean water utility who has developed a more comprehensive GIS monitoring and assessment system

Deliverable 3A: South-South exchange mission report

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1. Introduction

The following report issued on the 17th October 2019 was developed by the Wood/GISCAD team as a core deliverable of UNIDO/CTCN project entitled "Improvement of water supply management through a GIS based monitoring and control system for water loss reduction in Grenada". This project was delivered in collaboration with technical staff within the National Water and Sewerage Authority of Grenada (NAWASA).

The scope of the report relates to Output 3 of the project which was:

- A 2-3 day South-South exchange mission to another Caribbean water utility who has developed a more comprehensive GIS monitoring and assessment system.

The remainder of the document provides a factual summary of the discussions undertaken with staff in the Water and Sewerage Authority (WASA) of Trinidad and Tobago over 3 days (25th-27th September 2019).

We would like to thank WASA for their time in meeting members of the project team and their willingness to discuss their ongoing work to manage clean water systems within Trinidad and Tobago.

2. Day 1 - Wednesday 26th September 2019

2.1 WASA – CEO / Introductory meeting

An initial introduction meeting was held on the 26th September at WASA's head office on Farm Road, St Joesph's, Trinidad (Plate 1).

This meeting was attended by Alan Poon-King (WASA's Chief Executive Officer), Denise Lee Sing Pereira (Director, Programmes and Change Management) and Ms Cheryl Wyke, (Manager of WASA Geographical Information Systems (GIS) Unit); Damani Bruno and Annel Roberts (NAWSA) and three members of the CTCN project team, Neil Thurston (Wood Project Manager) and Sudesh Botha / Keyon Santlal (GISCAD).

The key objective of this meeting was to enable face-to-face introductions between NAWASA and WASA staff; provide WASA with an overview of the objectives of the CTCN project; gain an initial understanding of WASA business and approaches to clean water supply and management and to plan for additional meetings during the visit and future collaboration between WASA and NAWASA.

The introductory meeting also provided an excellent context setting for the more detailed meetings which followed.

Plate 1 WASA Head Office, St Joesph's, Trinidad

2.2 WASA - GIS team meeting

After the completion of the introductory meeting, a technically focused meeting was held with Cheryl Wyke and members of the WASA GIS team. During this meeting, Ms Wyke gave a presentation summarising the development of WASA GIS capability since the 1990s. This reproduced in Appendix A.

WASA's current GIS capability has been built since the early 1990s around the commercial ESRI software product with continued update and maintenance of a suite of desktop ESRI GIS licences. In developing WASA capability, the organisation has invested considerable time and effort to create a comprehensive detailed mapping database across Trinidad and Tobago.

Some of the datasets created are available to the general public, contractors, consultants and students on application. Datasets include maps, frequency curves, rainfall, streamflow and groundwater data, and are provided at cost and under specific licence terms.

WASA's capability has continued to develop in recent years, with the development between 2017-2019 of an on-premises ESRI Portal mapping system. An illustration of this system is provided below in Plate 2.

Plate 2 WASA ESRI Portal mapping system

This system has been developed to enable WASA to delivery of focused mapping products to different internal users and service groups. Over time, this will provide a range of benefits to the organisation including providing secure and control access to WASA's mapping data, anytime, any place and on any device.

The discussions also provided the opportunity for NAWASA staff to discuss specific approaches to hydraulic modelling with WASA staff and the basis for future communication between staff on this topic.

A follow up meeting to discuss, in more detail, the GIS data held by the unit was arranged for Day 3 (Friday 28th September). Further details of this meeting are provided in Section 3.1 of this report.

2.3 Site visit to the WASA Malabar Wastewater Treatment Plant

During the afternoon of Day 1, the project team were given a site tour of the newly built Malabar Wastewater Treatment Plant, located approximately 15km east of the Port of Spain in the Trinidad Central Belt (Plate 3). Although the CTCN project is focused on wastewater issues, this tour was interesting for the NAWASA staff attending, including an insight into a "state of the art" wastewater treatment facility; including a sophisticated IT based Supervisory Control and Data Acquisition (SCADA) system.

The meeting also provided the opportunity to meet with some of WASA most experienced staff who had previously worked in the development and management of clean water systems. This experience included previous trials of different customer water meters – including comparing the benefits of different manufacturer types.

Plate 3 WASA Malabar Wastewater Treatment Plant

3. Day 2 Thursday 27th September 2019

3.1 WASA Customer Service and Metering department meeting

On day 2, a meeting was held with Nigel Carter, head of WASA's Customer Service and Metering department. The key purpose of this meeting was to discuss the current systems used to capture, manage and analyse customer metering information by WASA. The key observations arising from the meeting are outlined below:

- WASA currently has around 400,000 customer accounts but only 20,000 (5%) of the accounts are currently metered. A majority of WASA's customer accounts are therefore billed based on their functional class (commercial, residential, industrial and other surface abstraction functions such as agriculture) combined with an evaluation of the account's annual taxable value.
- Each of the 20,000 currently metered locations are read manually by one of WASA's 10 staff, either monthly (typically commercial properties) or quarterly (typically residential properties). Meter readings are recorded in written form in metering books, which serve as WASA primary records of water consumption for each these properties. The information included in these books include: name of the site, functional site; meter number, date of the reading; meter reading; comment/trouble codes; and initials of the surveyor.
- WASA maintains a centralised Customer Care and Billing (CCAB) system which is based upon Oracle database software. All meter reading values captured during the manual meter recording process are entered into this system. The CCAB system also includes a range of

quality assurance rules which are used to generate regular exception reports. These reports are used to cross-check values entered and make any necessary adjustments required.

- The 20,000 sites metered are typically larger water consumers (commercial and industrial premises) and/or area/sites which have been subject to previous trials of meters. It is also possible for new locations to be proposed for the installation of a meter. These sites are typically identified by meter readers during their metering rounds, with examples including new apartment developments; laundrettes, car wash facilitates or other commercial functions, which have above average water use.
- The meeting also highlighted WASA's long term interest in technological changes in meters (including smart meters) and a guided long-term objective to increase metering coverage. This is reflected in continual monitoring of meter activities in other Caribbean islands. It was also acknowledged that any future increases in metering coverage would be subject to future budgeting/financial constraints within WASA.

4. Day 3 - Friday 27th September 2019

4.1 GIS technical meeting with Darryl Hinds, WASA's GIS team

The primary focus of this meeting was to review, in more detail, some of GIS layers maintained by the WASA GIS unit. This included a visual review of WASA main pipeline layer which includes over 20 attribute fields, including pipe type; construction material and date laid. This layer has been produced over a long period of time and been developed to be topologically correct (i.e. all features are split and snapped at defined point features). The pipeline features have also been captured to reflect their location in relation to road centrelines.

The review also examined in detail WASA's GIS layers detailing network valves. These features have been snapped to specific nodes on the main pipeline layer. Pipelines features have also been split to ensure the creation of a topologically correct network system.

WASA also holds a point dataset which stores address information for a majority of its account locations. This dataset was originally developed in 1998, with selected updates undertaken in 2009/2010. However further updates are not currently being undertaken. This layer also stores an estimate of the population living at each address, calculated from population data for each of the Enumeration Districts in Trinidad.

The GIS unit also holds a series of ESRI shapefiles which store the location of the 20,000 customer meters which are regularly read by WASA. It is planned that these datasets will ultimately be combined into one single GIS data layer but this work has yet to be undertaken.

WASA's GIS team also maintains a GIS layer which defines 620 Schedule boundary areas covering its clean water service delivery areas. This layer includes attributes to record unique IDs, names; primary, secondary and (if required) alternative water sources for each of the areas. Additional fields have been added to this dataset which store estimates of the number of buildings and population in each store. The population has been calculated using the values calculated for individual address (see above).

The meeting also highlighted that WASA does not maintain a single layer defining the location of bulk meters on the key distribution mains. This is due to constant changes in the location of these meters.

The meeting also involved a short discussion of the process used to create and manage digital products derived from the GIS. This highlighted that there is no current standardised WASA template/style for the creation of digital outputs but each figure does include information which ensures its traceability.

The meeting concluded by discussing some of the key challenges which affect the current and future use of products by the GIS team. Key topics which were covered included ongoing efforts across all levels of WASA to promote the need to capture and provide good spatial data. This includes ensuring that all staff use a consistent referencing/naming system across all operational activities.

4.2 Meeting with Devon Guiseppie - WASA Water Optimisation Unit

The final meeting of the mission focused in more detail on the current processes used by WASA for water optimisation, including the process for installing bulk meters; managing flow logging data and undertaking Non-Revenue Water analysis for District Metering Areas (DMAs).

The discussion during this meeting highlighted that WASA manages these functions within in its Water Loss Control department and geographically within a series of different operations units , namely North West, North East and South. The remainder of the meeting focused on the work undertaken in the North-West area, which currently operates seven DMAs.

Within each area, a monthly "Unaccounted for Water" (UFW) report is produced which provides an assessment of levels of non-revenue water within the DMA. These reports are based upon available flow monitoring information and calculation based upon minimum nightline flow figure. However, it was acknowledged that there are challenges in undertaking a systematic DMA assessment process due to the current coverage of DMA flow meters and the fact that some areas are prone to scheduled (non 24/7) water supply. This presents a number of difficulties in undertaking a full analysis typical of a DMA based NRW assessment.

At the sites, which are subject to more detailed monitoring, WASA confirmed that flow and pressure monitoring is undertaken largely using HWM RadCom loggers, with data received remotely from these sites. The meeting also confirmed that a variety of flow meters are currently using on the main clean water network – including ABB and Badger meters.

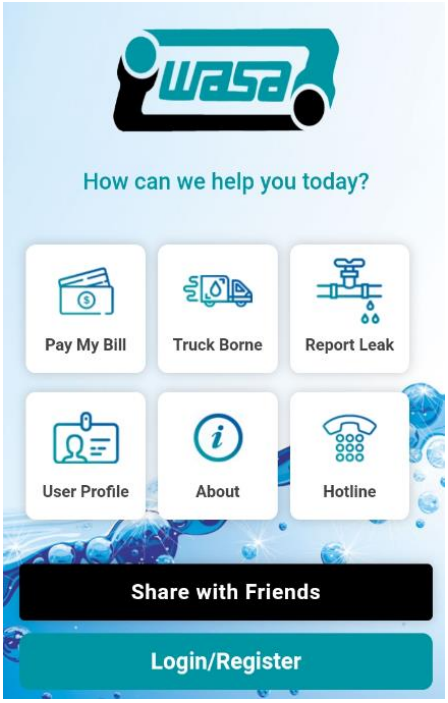
The discussion in the meeting also confirmed that WASA undertakes feasibility studies prior to the install of any new meters. This work typically involves the installation of a temporary strap-on flow meters for a period of 2days to a week to acquire data for the network concerned. This information is then used to help evaluate the size and configuration of the meter which would be installed.

The work of the water optimization team also extends to working with operational colleagues to identify and fix leaks on the clean water systems.

This work includes responding to surface leaks reporting by members of the public either via phone or WASA's service app (Plate 3) and WASA field workers.

WASA staff also use a variety of different sounding pipe locator techniques to assist in the identification of underground leaks. This information is also used in the creation of the UFW reports as described above.

Plate 4 WASA Customer Services App



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