



# **Partners for Water and Sanitation**

## **Note on project reports**

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# **Partners for Water and Sanitation**

**Visit to Dodoma Urban Water and Sanitation Authority,  
Tanzania**

**Submitted by:**

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Contents amendment record

This report has been issued and amended as follows:			
Revision	Description	Date	Signed
0	First final draft	29/12/09	GHS
1	First final draft with corrections by BHS	5/1/10	BHS
2	Second draft with corrections by GHS	8/1/10	GHS
3	Renumbering by GHS	11/1/10	GHS
4	Formatting edits BHS	11/1/10	BHS
5	Amendments by SE	11/1/10	SE
FINAL	Amendments by DUWASA and BHS	26/1/10	BHS

## **1. Project scope**

The original Terms of Reference and original Project Scope for the twinning arrangement within this project can be found in Appendix 1. In summary, the project is designed to achieve institutional strengthening for Dodoma Urban Water and Sewerage Authority (DUWASA). The objectives are to strengthen DUWASA's capacity for managing water supply services in Dodoma Municipality with particular reference to the groundwater extraction and distribution systems. In the first instance this was to be achieved by a visit to DUWASA where a series of interviews and a workshop were planned. It was also hoped that from this initial visit an opportunity might be developed to create a partnership between South East Water and DUWASA.

The secondary objective of the visit related to the monitoring and support of rural Dodoma water supplies, which are beyond the direct management of DUWASA. This was to be explored through a potential arrangement with MAMADO, a local NGO based in Dodoma.

## **2. The visit**

### **2.1 Background**

The background to this visit was not encouraging. Difficulties were experienced trying to find mutually convenient dates. The final dates were chosen by DUWASA, however, two weeks before the visit we learned that the Managing Director and his Engineering Manager would not be available due to a clash with a programme in Dar es Salaam. At this very late stage urgent e-mails were sent which resulted in both these key members of staff being available on day 1 to meet with us and discuss their organisation. They were not available as planned on the final day. The planned programme (see Appendix 2) would have been over four days, with three days of workshops, interviews and site visits followed by a summing up with the senior staff from DUWASA. In the event this was not possible due to the other commitments of the management team. The programme was rescheduled over three days and included two mornings of site visits. No final summing up was carried out with DUWASA. The actual programme is also shown in Appendix 2.

Throughout the visit it was frustrating that so much time was spent waiting for people to arrive for pre-arranged meetings. Good time management does not seem to be high on the agenda of many of DUWASA's staff.

### **2.2 Initial Introductions**

The visit began with an introduction by the various people at the initial meeting. For DUWASA, Mr. Peter Mokiwa – Managing Director, Mr. David Pallangyo - Engineering Manager, Mr. Sebastian Warioba - PR Officer, an Assistant PR Officer, Mrs. Everada Balati - Commercial Manager (in the UK we would call this role Customer Services Manager), Mr. Alex Maheri - Procurement Officer, the Audit Manager and Mr. Baraka Chlongani - Accountant. Partners for Water and Sanitation (PfWS) was represented by Graham Setterfield, Sandy Elsworth and Benedict Michaels.

## 2.3 Initial Presentations

- **Graham Setterfield** gave a brief PowerPoint presentation on Partners for Water and Sanitation.
- **Sandy Elsworth** gave a presentation on the concept of the water balance
- **Graham Setterfield** gave a presentation on South East Water.
- **David Pallangyo** gave a presentation on the organisation, structure and some of the major issues facing DUWASA.

Many points were raised by Mr Pallangyo's detailed presentation. The urban population of Dodoma is about 300,000 of whom DUWASA supplies 270,000. It has only 17400 customers as much of the population is supplied from domestic points in the community which will be mentioned later in the report. They have a Board of Directors nominated from various groups of society who meet quarterly. Only Mr Mokiwa, the Managing Director (MD), is an Executive Member of the DUWASA Board. Mr Pallangyo is a Technical member. They have a management team headed by the MD with three department heads, technical, commercial and financial plus the support functions such as Human Resources, Public Relations, Audit and Project Management Unit. They have a total of 170 employees of whom about 42 are qualified in some way. Of the 19 Urban Water And Sewerage Authorities (UWASAs) in Tanzania only 9 are rated category A. DUWASA falls into this category which means that they are financially self-determining and relatively free of central control.

DUWASA supply 30,000 m<sup>3</sup>/day as this is all they are able to draw from their borehole field at Makuptupora. This will be discussed in more detail later in the report. They estimate demand to be 45,000 m<sup>3</sup>/day excluding the University of Dodoma (UoD). The abstracted water is pumped through various mains to Mzakwe where they have two collector tanks of 1500 m<sup>3</sup> capacity and from there it is pumped onto the town via two delivery mains of 600 mm and 225 mm diameter. Water quality is said to be good and marginal chlorination is the only form of treatment. The 225 mm main is also being used as a distribution pipeline to serve development north of Dodoma centre. Water is pumped to a pumping station at Mailimbili where it is boosted to the town. There is an as yet unused pumping station en route between Mzakwe and Mailimbili. The only alternative water sources to Mzakwe are the existing small surface water reservoirs that are all reportedly silted up.

The longer term future resource is considered to be a new dam and reservoir on the Bubu River, some 100km to the north. Central Government is in control of the capital spending on this.

The distribution system comprises mains ranging in diameter from 400 mm down to 50 mm. The total length of the system is 256 km. There are two principal storage reservoirs, with a total storage of 76,000 m<sup>3</sup>. At present the water distribution system covers about 50% of the urban area.

Recent studies have indicated that the current demand is about 45,000 m<sup>3</sup>/day excluding the demand from UoD (which is set to be the largest university in Tanzania, with a total student population of 40,000 by 2010 and a future total population of 150,000 to 200,000). The development is funded and promoted by the Central Government

The existing sewerage system is fairly minimal and comprises trunk sewers and lateral sewers with a total length of 57km. This system only serves 13% of the population. Where connected, the sewage charge is based upon 40% of water bill. Treatment of the sewerage is by waste stabilisation ponds which were not visited. The ponds have a capacity to treat flows from 68,000 people and they discharge to agricultural land. It was apparent that the managers did not wish to discuss the sewerage issues.

As previously noted there are 17,400 “live” customers, although at the end of October there were 19,250. All customers pay monthly, if they fail to pay after 60 days they are disconnected. There are 3700 sewerage customers.

## 2.4 Challenges identified during the initial presentations

Mr. Pallangyo identified the following as DUWASA’s main challenges.

- **Non revenue water.** Currently NRW stands at 44%, this includes illegal connections as well as leakage. The target set by the Government ministry is 20%. Some work has been done to identify and disconnect illegal connections to the trunk mains. It is planned to excavate all 40km of the trunk mains to find and disconnect such illegal connections. (See later discussion with Mr. Mokiwa).
- **Increasing demand.** Present demand is 45,000m<sup>3</sup>/day and production is 30,000 m<sup>3</sup>/day. DUWASA believe they need to double present output.
- **Power costs.** 30% of the present revenue is spent on electricity in part due to multiple re-pumping.
- **Distribution system.** Much of the distribution system is in very poor condition leading to frequent bursts. Little seems to be known about the condition or design of the system.
- **Borehole pumps.** The borehole pumps seem to last only 3 to 5 years. Of the existing 20 production boreholes, only 12 are operational. The main problem would appear to be with the motors.

From the discussions with the senior team, PfWS also identified the following additional challenges.

- **The scale of the proposed development at UoD,** for which there seems to be no resource availability.
- **The potential output from the borehole field.** Work done by Sandy Elsworth with the Wami Ruvu river basin authority, using recently available borehole water levels, indicates that DUWASA’s belief that there might be up to 140,000 m<sup>3</sup>/day available is grossly overstated and even at 30,000m<sup>3</sup>/day there is little or no recharge. When this was presented it came as a complete surprise. Chinese engineers have recently drilled new boreholes and more are planned. Given that only 12 of 20 boreholes are operational it is not clear why this strategy is being adopted.

## 2.5 MAMADO

Following a visit to the office of MAMADO on the Monday, at which Mr Halla was not present, a short meeting was held at the hotel with Mr Mathew Halla, the Director, and both the Partners. Currently it appears that MAMADO are involved with some externally funded projects on environmental and health aspects in the villages, but no projects directly involved with water supply.

It was agreed that, should additional local support be required for the DUWASA – South East Water partnership, MAMADO would be available. Otherwise, given that the focus of this specific visit was predominantly on DUWASA, and the limited time available, it was not considered in the best interests at this stage to progress the rural aspects of any future water supply projects. In particular, it was hoped that any support provided to DUWASA would, in the medium term, potentially filter down through the District Engineers and their relationships with the DUWASA Engineers and staff, as “good practice” approach to water management become more widely accepted and adopted.

### **3. Key points arising from other meetings with individuals**

#### **3.1 Introduction**

Over the 3 days of the visit individual interviews were held with members of DUWASA staff. These included Mr. Mokiwa – MD, Mr Edmund – Billing and Data Manager, Mr. Mayunga – Planning Engineer, Mr. Samwel – Commercial Assistant, Mr. Chilongani – Accountant, A Supplies Officer and Mrs. Upendo Shushu – Assistant Planning Engineer.

These meetings are fully documented elsewhere for the records, but the key points of the various meetings follow:

#### **3.2 Overview from MD, Mr. Peter Mokiwa**

The major challenge facing the authority is unaccounted for water. Leakage investigations for the trunk mains has begun and 98 connections have been discovered of which about 25 are legal. Illegal connections included the Army, RC missionaries and a prison warder whose connection had been made at night by a prisoner – who confessed.

DUWASA was the worst performing UWASA of the 18 in 1999 with a score of 5% and was rated Category C which means that all its finance was centrally controlled. By 2003 it has risen to Category A which means that it became self-determining financially and for 3 years prior to 2008 was the leading UWASA. In 2008 the Ministry stopped producing a league table.

The Key Performance Indicators (KPIs) used by Government include:

- Staff/Customer ratio of 10/1000 or less
- Personnel costs of <30%
- Investment of <30% excluding exceptional large schemes
- Water quality
- Availability per 24 hours
- Leakage
- Quality and timeliness of reports to the Ministry on weekly, monthly and annual basis.

It is understood that other KPI measures are also used but despite being promised the schedule of these it did not materialise.

The minimum salary at DUWASA is about twice the Government minimum, Mr. Mokiwa believes his staff to be highly motivated and his senior team to be highly competent.

### **3.3 Commercial Dept (Customer services) : Mr. Edimund - Billing and Data Manager**

Strengths:

- Revenue Collection Efficiency (90%). 50% paid in first 10 days. Monthly billing.

Challenges:

- Water loss Non-Revenue Water / Unaccounted for Water (NRW/UFW) is over 40%
- Water theft (meter tampering, illegal reconnections, bypasses, etc)
- Metering efficiency (under registration, meter/pipe sizes, etc)
- Tools and equipment not compatible with expansion of the service area (transport, data loggers, etc)
- Inappropriate zoning resulting in less efficient plumbing inspection.

Key points from the discussion:

- If a customer doesn't pay, a domestic bill after 60 days then they are disconnected. Each month there are about 200-300 disconnections, and similar reconnections. There are around 1,400 new connections per annum
- Average consumption is about 21 m<sup>3</sup> per month, worth about Tsh12,000 to 13,000 (£6 to £6.50)
- The billing system is "Perfect Bill". Perfect Bill can identify low average bills, but meter readers can observe surroundings to see if the bill is reasonable. If there is a high consumption, customer is notified
- Billing process currently takes about three days and no major issues with it were reported.
- There are currently 18 meter readers, with 10 using the Psion Handheld data recorder and 8 using manual records.
- Meter replacement is at three years for plastic meters
- Meter tampering and water theft is the biggest issue.
- The charges schedule is shown in Appendix 3.

Where PfWS can assist:

- DUWASA is seeking urgent assistance with intelligent metering which can assist in the identification of tampering, bypassing, switching meter round, etc. which is a major issue. They require support to investigate the types of intelligent meters available, and their functionality to see what might be available in the market to address this matter.
- DUWASA is seeking assistance with the procurement of such meters, in particular at reasonable cost. They are currently paying about US \$250 per meter, generally from South Africa. These are not necessarily Type C meters. They require support in relation to meter types and costs.
- DUWASA is seeking support for trials of new intelligent meters, subject to the outcomes from the investigations mentioned in the two previous bullet points.



### **3.4 Commercial Dept (Customer services) - Domestic Points - Lucas Suma**

Domestic points (DP) are provided in areas of low income and dense housing to bring water accessibility to poor communities. The DP requirements are identified by the various Authorities

- Each DP has a manager who pays the overall bill weekly. The manager is selected by the community. The managers who can be either men or women, are given a modest discount (see charges schedule) so they can make a small profit.
- The meter reading is taken at the DP. The average use is approximately 80 m<sup>3</sup> to 100 m<sup>3</sup> per month
- Price for consumers is set at Tsh30 (1.5p) per 20 litre “basket” (a plastic container).
- There are 87 DP’s at present and there are plans for more.
- Free services are provided to 120 of the old, disabled, extremely poor etc as identified by the Local Authorities. They are provided with coupons which allow 5 free baskets (100 litres) per day.
- From a PfWS perspective, this sounded well organised. The standard of service target is that everyone in the town should be within 150m of a domestic point. The later site visit confirmed our initial views.

### **3.5 Network and supply system discussion: Mr. Kashilimu Mayunga - Planning and Design Engineer and Mrs. Upendo Shushu – Assistant Planning Engineer**

- The distribution system has never been modelled. Mr. Mayunga is very keen to have this done but requires help. The original supply system probably dates back to 1950s with ad hoc additions. There are no zone meters installed at present.
- Some new meters are to be installed this year funded by a Swiss NGO, but DUWASA can only guess where these should be installed.
- The water balance is a major concern.
- Mr. Mayunga was unaware that there is no apparent recharge in the borehole field. This was new data produced by Sandy Elsworth who had visited the Wami/Ruvu Water Basin Office on a PfWS visit just prior to this visit to DUWASA.
- DUWASA currently plan the system expansion at 6 heads/property, and 100 l/h/d. They use 1.2 for the peak day factor and 1.5 for the peak flow factor.
- Water Programme funds for distribution and supply work are provided by the Ministry of Water. Proposals have been submitted for expansion to the borehole field and for improvements to the system.
- A feasibility study for future water has been done by EMC and Cheil, a Korean company. Korea is providing soft loans for water investment. Other work has been carried out recently by COWI. All this work is predicated upon there being more water available from the boreholes.
- Future demand, including UFW, is set to rise from the present figure of circa 45,000 m<sup>3</sup>/day to around 80,000m<sup>3</sup>/day by 2015 including the university.

### **3.6 Procurement - Ezekiel Mpili - Assistant Procurement Officer**

- Procurement of nearly all goods and services is through the procurement section. Adverts placed in papers for items. Usually 5 or 6 companies are chosen to bid. There is normally a fairly good response to adverts. In DUWASA’s view the system seems to work well.
- They work with engineers on investment schemes and jointly prepare tenders.
- Main problem area is emergencies when there is no time to prepare bids.

- The Chinese work was not procured through the normal process, they did not competitively tender.
- The stores is part of the procurement section.

### **3.7 Investment programme - Mr. Mayunga**

- Investment plans are influenced from three sources. The Municipal Authority, the Capital Development Authority and DUWASA.
- There are only 20 schemes in this years programme that are “local”.
- The strategic plan (SP) is for 5 years and from this derives the annual plan. The SP is updated every year. The annual investment plan is both those schemes from the SP plus those from unplanned causes. The SP puts forward smaller 5-year proposals that are signed off by management team.
- Capital decisions are made by the management team but It was not made clear how options are considered.
- Some schemes such as the storage tanks at the UoD are paid for by the beneficiary.
- The programme is very political. Local politicians exert significant influence on the schemes carried out and there are many changes to the programme.
- DUWASA being the authority for the capital city has more political interference or pressures than others do.
- Large projects, e.g. the UoD are funded from central government. (1.8 Bn Tzn shillings)
- For 2009/2010 there are two new boreholes in the programme plus all the ancillary works to get them on stream. (1.5 Bn Tz sh)
- There is a bid for \$164.5m over 5 years for future water for Dodoma. This includes the studies needed, includes UoD, sewers for UoD, development at Mzakwe but excludes Bobu river project. There are no funds as yet for this and no sponsor. Studies have been carried out by COWI who are Tanzanian Engineers: The first phase was a review of water supply and sewage systems and a final detailed report has been submitted.
- The major difficulties with investment programme are political interference and bureaucracy, and that the rate of expansion of the city is too fast.
- The major projects at present are refurbishment and testing of boreholes, laying a new transmission main, storage and sewerage at UoD site and improvements to the town’s distribution system.

### **3.8 Finance – Mr. Baraka Chilongani**

- This meeting was less than successful as the print-out of income and expenditure was in Swahili. An English copy of the expenditure excluding investment was subsequently obtained but the income remains in Swahili.
- Overall, the income from both water and sewerage for DUWASA is 3,156 million Tsh or £1.58M.

## **4. The site visits**

### **4.1 Visit to the borehole field**

The first visit was to the borehole field and pumping station. An interesting feature of the borehole field is that DUWASA forcibly removed all the people and animals that lived in the catchment area as there were indications of nitrates appearing in the raw water. The borehole logs from the work carried out by the Chinese indicated 60m of clay above granite which questions the policy of forced depopulation. Subsequent review of all the borehole log data shows that there are clays closer to the surface in some of the area.

The pumping station was built by the Chinese 5 years ago. It has 5 pumps with fixed speed motors. Pressure gauges on the outlet mains were working but flow meters had failed. The flow meters are Chinese. No diagrams were provided and no spares are available. The pumps operate at 30,000 m<sup>3</sup>/day unless power cuts prevent this. There are 20 operators on the sites.

There are 2 principal storage reservoirs in the town each of 36,000 m<sup>3</sup> which provide storage and a buffer.

The 600mm diameter outlet main does have an operational flow meter which was purchased in India in 2009.

The borehole inspected was one of the most recently constructed. The outflow meter was inoperable. The borehole is never dipped to determine water levels. Power consumption for the borehole pump is not available.

The main issues were

- No knowledge nor recording about water levels or other hydrogeological information.
- There was limited flow measurement and failed equipment.
- It was almost impossible to improve operational efficiency without more data.

### **4.2 Visit to the university of Dodoma**

The second series of site visits began at the University of Dodoma on the outskirts of the town. This is a vast campus with 4 separate faculties located several kilometres apart. All the buildings are new and construction is taking place everywhere. Temporary water supply storage has been provided in steel tanks. Sewage is not yet collected and can be seen flowing along stream beds. New tarmac roads are being constructed to the sites.

### **4.3 Visit to a domestic point**

This visit was followed by a visit to a domestic point (DP) in one of the poorer areas of the town. We met the area elder, who gave us permission to visit the area, and then an elderly man who is in receipt of coupons due to age, infirmity and him living alone. He told us that his water is collected for him by neighbours from the domestic point. We then met the DP manager and discussed with her the process of sale to those living in the area and her billing and payment to DUWASA. The system seemed to work well, accepting that it required women to collect all their water in "20 litre baskets" which were plastic containers. The DP is metered and locked at night. We were told that no-one lived further than 150m from the DP in the area. There were several DP's evident as we

drove through the area.

## **5. 5. Conclusions and recommendations**

5.1 DUWASA seems to be a reasonably well run, enthusiastic organisation, which has improved its performance over recent years.

5.2 The most significant challenge is without doubt the apparent lack of water resources. It remains unclear just how much water will become available from the existing well field.

5.3 It is essential that DUWASA begin communicating with Wami Ruvu basin authority about the apparent lack of recharge in the well field, there is the possibility of serious political repercussions if there is less water than DUWASA currently believe is available.

5.4 The lack of any water resource expertise on the staff of DUWASA is a shortcoming.

5.5 The growth of the town combined with the development of the University of Dodoma is a major challenge.

5.6 The lack of instrumentation at the source works and in the distribution system is a challenge.

5.7 Reducing loss of water through leakage and illegal use should be a priority for DUWASA.

5.8 The implementation of effective instrumentation and metering will enable an initial water balance to be drawn up.

5.9 The distribution system has been developed over time in an ad hoc manner and now requires modelling. This will then lead to the ability to introduce zones into the system and thus implement effective leakage management and control and effective distribution management.

5.10 There are some areas where operational efficiency could be improved, including power use.

5.11 The unit cost of meters seems high.

5.12 Time management seemed a very low priority for the staff at DUWASA.

## **6. Recommendations**

6.1 Partners for Water and Sanitation should continue to work with DUWASA and a twinning arrangement with a UK water organisation such as South East Water would be an ideal framework for this work to continue.

6.2 A series of project briefs should be produced so that future work can be directed towards those areas with the greatest payback. These include work on the water balance, water resource assistance, network modelling and zone separations, leakage detection advice and training and advice about intelligent meter strategies. Draft outlines for four of these project briefs are included as Appendix 4.

6.3 It is essential that DUWASA show commitment to any relationship with PfWS, especially as there is evidence of other countries offering soft loans, aid and support and the approach and attitude of the DUWASA executive is considered critical to making such a relationship a positive and valuable one.

6.4 Anything that PfWS are able to do to assist in the relationship between DUWASA and neighbouring basin authorities will be of value.



## ORIGINAL PROJECT TERMS OF REFERENCE

<b>Project Title and Reference</b>	<b>Institutional Strengthening for Dodoma Urban Water and Sewerage Authority , Tanzania</b>
<b>Background and Justification</b>	<p>Dodoma Urban Water and Sewerage Authority (DUWASA), established in 1998, is responsible for provision of water supply and sewerage services for Dodoma municipality, which is also the declared capital of Tanzania.</p> <p>The only major source of potable water for the approximately 300,000 inhabitants of the Municipality is groundwater from the Mzakwe Pumping Station in the Makutupora Basin, located 27 kilometres north of the town. Its current boost capacity is estimated as 24,000 m<sup>3</sup>/day, but non-accounted for water is estimated as high as 60%.</p> <p>Challenges facing DUWASA include:</p> <ul style="list-style-type: none"> <li>• Aged/outworn distribution pipelines, totalling 50km, contributing a lot to the leakage, need rehabilitation.</li> <li>• Financial constraints as the authority must cover all its operational and maintenance costs from its own revenue.</li> <li>• The rapid growth and expansion of the town - in particular since the establishment of two new universities, with the resident population expected to almost double by the year 2010.</li> </ul> <p>DUWASA needs technical as well as financial support to meet these challenges.</p> <p>An initial scoping visit was carried out by Sandy Elsworth in February/March 2008 which made key recommendations for subsequent support to DUWASA and the rural water supply schemes.</p> <p>From April 2009, discussions have been held with DUWASA, and the Dodoma regional authorities on follow-up support. DUWASA has expressed interest in receiving further technical support in the following priority areas:</p> <ul style="list-style-type: none"> <li>• Water balance and non-revenue water/leakage control</li> <li>• Network zoning</li> <li>• Operational management of boreholes and boosters</li> <li>• Billing processes and customer support</li> <li>• Chlorination and online treatment.</li> </ul> <p>DUWASA is also keen on possible twinning with South East Water in the U.K.</p>

	Discussions have also been held with <i>Maji na Maendeleo Dodoma</i> (MAMADO), a local NGO which participated in the earlier support visit. It has been agreed that Partners for Water and Sanitation (PfWS) and MAMADO develop a joint proposal to seek funding from WSDP for the rural boreholes monitoring project.
<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To strengthen DUWASA's capacity for managing water supply services in Dodoma Municipality with particular reference to the groundwater extraction and distribution systems.</li> <li>• To discuss and agree the way forward for rural boreholes monitoring and to assist MAMADO in finalizing the project proposal. Also to explore linkages with the Wami-Ruvu Basin capacity building project that PfWS is developing.</li> </ul>
<b>Deliverables</b>	<ul style="list-style-type: none"> <li>• An overview of the water supply system in Dodoma municipality.</li> <li>• 3-day participatory capacity building workshop on water balance assessment, non-revenue water/leakage control, borehole operation and management, and other related topics in the context of the existing water supply and distribution system.</li> <li>• A technical report on the visit including details on activities carried out, main findings and recommendations for further PfWS support.</li> </ul>
<b>Impact</b>	<p>This support will;</p> <ul style="list-style-type: none"> <li>• Provide DUWASA staff with increased knowledge and skills for municipal water supply management particularly on non-revenue water/leakage control and borehole management.</li> <li>• Facilitate development of an action plan for future capacity building collaboration between DUWASA and PfWS.</li> <li>• Prepare ground work for twinning of DUWASA and South East Water in the U.K.</li> <li>• Provide technical guidance for finalization of project proposal for rural boreholes monitoring in collaboration with MAMADO.</li> </ul>
<b>Scope</b>	<p>The PfWS team will:</p> <ul style="list-style-type: none"> <li>• Study the current status of water supply availability and distribution in Dodoma Municipality.</li> <li>• Facilitate a participatory workshop on strategies for water balance, and non-revenue water/leakage control, borehole management and other related topics in the context of the existing water supply and distribution system.</li> <li>• Discuss modalities for twinning of DUWASA and South East Water and the way forward to develop the partnership.</li> </ul>

	<ul style="list-style-type: none"> <li>• Discuss the focus, scope and timing of future capacity building support visits to DUWASA.</li> <li>• Assist MAMADO in reviewing and finalizing project proposal for monitoring of boreholes in rural Dodoma and recommend way forward.</li> </ul>
<b>Organisation and methodology</b>	<ul style="list-style-type: none"> <li>• This project requires a visit to the project location, Dodoma region, Tanzania. The PfWS Tanzania Country Manager will coordinate the visit and training sessions in Dodoma in collaboration with DUWASA.</li> <li>• Discussions will be held with DUWASA management and technical staff about current water abstraction and distribution operations and propose appropriate future PfWS support.</li> <li>• The PfWS team will carry out site visits jointly with DUWASA technical staff to study the water supply system and make necessary recommendations.</li> <li>• A practical, participatory workshop will be held for around 10-12 technical staff on water balance and non-revenue water/leakage control, and borehole operational issues.</li> <li>• Discussions will be held with MAMADO, key Dodoma regional authorities and relevant Water Basin Offices on rural borehole monitoring in Dodoma region.</li> <li>• At the end of the visit, the PfWS team will present recommendations for further key steps in the project implementation. A final technical report will be forwarded to DUWASA and other key local partners through the PfWS Tanzania Country Manager.</li> </ul>
<b>Milestone plan</b>	<p><b>November 2009:</b> Visit to Dodoma, Tanzania and field work</p> <p><b>December 2009:</b> Submission of technical report</p> <p><b>Early 2010:</b> Follow-up visit (tentative).</p>
<b>Resource estimate</b>	<p>The PfWS team will require:</p> <ul style="list-style-type: none"> <li>• 1 day preparatory reading in the UK</li> <li>• 7 days input in-country</li> <li>• 2 days input in the UK, on technical report writing</li> <li>• Follow-up support will be identified after the visit activities.</li> </ul>
<b>Dependencies</b>	<ul style="list-style-type: none"> <li>• Availability of key DUWASA management and technical staff during the visit</li> <li>• Support and approval by Dodoma Regional authorities/Ministry of Water and Irrigation</li> <li>• Willingness of South East Water to provide technical and twinning support.</li> </ul>
<b>Issues/Risks</b>	<p><b>Risk:</b> Absence of key DUWASA staff during the visit.</p> <p><b>Mitigation:</b> Visit dates to be planned after close checking and confirmation with key local partners.</p>



	<p><b>Risk:</b> Inadequate support from Ministry of Water and Irrigation/Dodoma region authorities</p> <p><b>Mitigation:</b> PfWS Country Manager to hold early sensitization meetings with key officials and keep them informed.</p> <p><b>Risk:</b> Inadequate follow up action by DUWASA or other key local stakeholders after the visit.</p> <p><b>Mitigation:</b> Action Plan to be jointly agreed at the end of the visit, with close support by the Tanzania Country Manager.</p> <p><b>Other:</b> A full risk assessment will be carried out before the visit. The PfWS Country Manager will keep the PfWS secretariat informed on any changes on risk levels in the risk assessment document.</p>
<b>Other Active Donors</b>	<ul style="list-style-type: none"> <li>• World Bank/African Development Bank (through the Ministry of Water and Irrigation's Water Sector Development Programme) supporting infrastructure development.</li> <li>• Swiss Development Corporation – support for infrastructure development.</li> </ul>
<b>Communications Strategy</b>	<p>Communication between the PfWS team, the Country Manager, and the PfWS secretariat will initially be by e-mails and phone calls if required.</p> <p>The PfWS Tanzania Country Manager will keep DUWASA and other key stakeholders well informed about the project through telephone, email and face-to-face meetings as appropriate.</p> <p>Clarification on scope of the capacity building support and project information will be through e-mails, and coordinated by the PfWS Country Manager.</p>
<b>Review Mechanism</b>	The PfWS Secretariat and Tanzania Country Manager will review the draft report document before final production.
<b>Approvals (as appropriate)</b>	Brian Skinner, Partners for Water and Sanitation UK Project Manager covering Tanzania.
<b>Compiled by</b>	Pius Mabuba, PfWS Tanzania Country Manager + DUWASA person's details?
<b>Date</b>	14 <sup>th</sup> August 2009

See following document as well.

**A PROJECT SCOPE DOCUMENT WRITTEN BEFORE THE VISIT BY SANDY ELSWORTH TO FOCUS ON THE POTENTIAL PARTNERSHIP LINK WITH SOUTH EAST WATER.**

Note that the preceding TOR are referred to in the following document which has a more detailed focus on the proposed partnership.

<b>Project Title and Reference</b>	<b>Institutional Strengthening for Dodoma Urban Water and Sewerage Authority ,Tanzania</b>
<b>Background</b>	<p>This project builds on the earlier Terms of Reference document which details the project programme.</p> <p>In particular, this document seeks to define the range and scope of a partnership arrangement between the two parties: Dodoma Urban Water and Sewerage Authority (DUWASA), Tanzania, and South East Water (SEW), UK.</p>
<b>Objectives</b>	<p>To strengthen DUWASA's capacity for managing water supply services in Dodoma Municipality with particular reference to the groundwater extraction and distribution systems.</p>
<b>Support Mechanisms</b>	<p>A range of support and capability building opportunities are potentially available in developing a relationship between the companies:</p> <ul style="list-style-type: none"> <li>• Support and general relationship building visits by SEW staff to DUWASA and DUWASA to SEW;</li> <li>• Specific short duration projects of varying scope using SEW staff working with DUWASA staff;</li> <li>• Focussed technical workshops supported by SEW staff;</li> <li>• Provision of equipment or other resources released from SEW requirement;</li> <li>• Remote email "staff to staff" support for technical and general enquiries and issues.</li> </ul> <p>These are to be further explored and the mechanisms scoped in discussions with the parties.</p>
<b>Areas of support</b>	<p>From April 2009, discussions have been held with DUWASA, and the Dodoma regional authorities on follow-up support. DUWASA has expressed interest in receiving further technical support in the following priority areas in particular:</p> <ul style="list-style-type: none"> <li>• Water balance and non-revenue water/leakage control</li> <li>• Network zoning</li> <li>• Operational management of boreholes and boosters</li> <li>• Billing processes and customer support</li> <li>• Chlorination and online treatment.</li> </ul> <p>Other areas of support to include:</p> <ul style="list-style-type: none"> <li>• Asset maintenance</li> <li>• General project management</li> <li>• Company structure and administrative issues</li> <li>• Finance and reporting processes</li> <li>• Decision making procedures</li> <li>• Quality Assurance and Health and Safety issues</li> <li>• Regulatory support</li> </ul>
<b>Benefits</b>	<p>Benefits include:</p> <ul style="list-style-type: none"> <li>• Improved levels of service to customers in terms of water</li> </ul>

	<p>supply and delivery, quality and pressure</p> <ul style="list-style-type: none"> <li>• Improved cost control;</li> <li>• Enhancement to the company administrative function</li> </ul>
<b>Workshop</b>	<p>Initial 3 day workshop to define and scope the areas of support, and mechanisms of support, in November 2009 at DUWASA offices with the programme suggested as follows in the core areas:</p> <ul style="list-style-type: none"> <li>• Company structure, administrative, financial, regulatory, control and planning processes;</li> <li>• Water supply and treatment issues</li> <li>• Water distribution and operational issues</li> </ul> <p>A proposed agenda is attached.</p>

A suggested programme for the visit (see Appendix 2) was also attached to this document.

## Appendix 2 Programme for visit

### Originally suggested agenda:

Day	Session	Agenda Item
Day 1	Morning 1	Introduction between participants and Welcome to DUWASA. Presentation by DUWASA on company. Background to water and waste water operations in Tanzania. Regulatory, cost and administrative framework. Key issues.
	Morning 2	Presentation by South East Water. Background to Company and regulatory, etc environment of the UK.
	After-noon	Decision making processes in DUWASA. Proposed Capital programme and Key Deliverables. Key issues. Areas of support and way forward on these primary issues
Day 2	Morning	Visit to Pumping Station and Treatment works at Mzakwe Pumping Station. Discussions on site with manager on aspects of borehole management, supply, treatment, pumping.
	After-noon	Follow up to the visit on Key Issues: <ul style="list-style-type: none"> <li>• Borehole operation and management</li> <li>• Raw water treatment</li> <li>• Quality and output flow monitoring</li> <li>• Booster / pump operation and maintenance</li> </ul>
Day 3	Morning	Visit to Service Reservoir, booster site, customer metering, quality monitoring, leakage operations, etc.
	After-noon	Follow up on the visit on Key Issues: <ul style="list-style-type: none"> <li>• Network design and modelling</li> <li>• Zonation, DMA establishment, improvement and valve operation control</li> <li>• Leakage operations</li> <li>• Customer metering issues</li> <li>• Quality issues</li> <li>• General monitoring</li> </ul>
Day 4	Morning	Agree areas of support and mechanisms Agree way forward.

### Actual agenda:

Day	Session	Agenda Item
Day 1	Morning 1	Introduction between participants and Welcome to DUWASA. Presentations on PfWS. Presentation by DUWASA.
	Morning 2	Presentation on South East Water and on theory of water balance.
	Afternoon	Further discussions between staff and PfWS.
Day 2	Morning	Visit to boreholes at Makutupora, pumping station and works at Mzakwe. Discussions on site with manager on aspects of borehole management, supply, treatment, pumping
	Afternoon	Interviews with key members of staff about their parts of the organisation.
Day 3	Morning	Visit to University of Dodoma area, visit to domestic point in poor area of city, visit to customer on coupons.
	Afternoon	Follow up interviews with members of staff including planning engineer and assistant, finance manager, procurement assistant, metering officer.
	Evening	Dinner with staff and discussions
Day 4	Morning	Return to Dar Es Salaam

## Appendix 3

### DUWASA charges schedule (2000TSH =£1 sterling)

Category	Consumption (m <sup>3</sup> )	Approved Tariff (TSH./m3)	Connection Fee - Water (TSH.)	Reconnection Fee - Water (TSH.)	Service Charge (TSH.)	Connection Fee - Sewer (TSH.)
Domestic	0 - 3	500	20,000	10000	1180	35000
	6 - 10	530				
	11 - 30	550				
	>30	600				
Commercial and Institutions	0 - 5	780	40000	25000	3000	70000
	6 - 50	700				
	51 - 150	670				
	>150	650				
Worship Houses	0 - 3	400	40000	20000	3000	70000
	4 - 10	370				
	11 - 30	350				
	>30	350				
Kiosks (Domestic point)	Uniform	300	20000	10000	1180	-
Bowzer	Uniform	1500	n/a	n/a	n/a	n/a

## Appendix 4

### Potential Support Projects

<b>PROJECT 1: DUWASA / Reduction in Unaccounted for Water</b>	
<b>Project Title</b>	<b>Network Leakage Reduction</b>
<b>Background</b>	Leakage reduction is the priority for the management of DUWASA. This is an area where the UK water industry has significant transferable expertise.
<b>Objectives</b>	Current Performance indicators: Total UfW 42% Target 30% Burst rates? Reduction in Illegal Usage
<b>Support Requirement</b>	<ul style="list-style-type: none"> <li>• Update the existing records systems</li> <li>• Construct/ Update and support of Network modelling of system</li> <li>• Establishment of District Metering Areas (DMAs) through the installation of valves, bulk meters, etc.</li> <li>• Once DMAs set up, Identification of areas for piloting of pressure management</li> <li>• Interpretation and application of the DMA flow data</li> <li>• Workshop and training for the use of listening sticks, correlators and other leak location devices</li> <li>• Assist in developing a mains replacement programme.</li> </ul>
<b>Support Mechanisms</b>	Project workshop? On site training? Email support from the UK Data analysis in the UK?
<b>Benefits</b>	Reduction in Unaccounted for Water from 15,000 m <sup>3</sup> /day to less than ? m <sup>3</sup> /day

<b>PROJECT 2: DUWASA / Reduction in Unaccounted for Water</b>	
<b>Project Title</b>	<b>Reduction in illegal usage</b>
<b>Background</b>	It is recognised that illegal connections are a significant drain on the water network. A recent study identified a number of illegal tapplings into a main transmission main, some up to 4". The reduction in this usage is considered a high priority.
<b>Objectives</b>	Current Performance indicators: Total UfW 42% Target 30% Reduction in Illegal Usage
<b>Support Requirement</b>	<ul style="list-style-type: none"> <li>• Following from the establishment of Zones and district metering areas (DMAs), compile a record of billing accounts by zone.</li> <li>• Appointing of zonal leaders responsible for the zone performance: meter readers, plumbers, leakage technicians.</li> <li>• Assistance in location and management of illegal connections.</li> </ul>
<b>Support Mechanisms</b>	Project workshop? On site training? Email support from the UK Data analysis in the UK?
<b>Benefits</b>	Reduction in Unaccounted for Water from 15,000 m <sup>3</sup> /day to less than ? m <sup>3</sup> /day

<b>PROJECT 3: DUWASA / Reduction in Unaccounted for Water</b>	
<b>Project Title</b>	<b>Pressure Management</b>
<b>Background</b>	It is recognised that pressure is a primary driver of background losses and burst rates. The management and reduction in systems pressure is considered a useful method to reducing these component and total leakage.
<b>Objectives</b>	Current Performance indicators: Total UfW 42% Target 30% Reduction in Illegal Usage.
<b>Support Requirement</b>	<ul style="list-style-type: none"> <li>• Construct/ Update and support of Network modelling of system</li> <li>• Establishment of District Metering Areas (DMAs) through the installation of valves, bulk meters, etc.</li> <li>• Once DMAs set up, Identification of areas for piloting of pressure management</li> <li>• Advice on pressure management techniques and equipment and subsequent management of system</li> </ul>
<b>Support Mechanisms</b>	Project workshop? On site training? Email support from the UK Data analysis in the UK?
<b>Benefits</b>	Reduction in Unaccounted for Water from 15,000 m <sup>3</sup> /day to less than ? m <sup>3</sup> /day



<b>PROJECT 4: DUWASA / Reduction in Unaccounted for Water</b>	
<b>Project Title</b>	<b>Water Balance and measurement of components</b>
<b>Background</b>	It is recognised that a comprehensive water balance is the key to understanding many aspects of demand and water loss.
<b>Objectives</b>	Current Performance indicators: Total UfW 42% Target 30% Estimate of Illegal Usage and Leakage
<b>Support Requirement</b>	<ul style="list-style-type: none"> <li>• Assistance with the construction of the water balance</li> <li>• Calculation of the Infrastructure Leakage Index (ILI) for the Company and for the Zones if possible.</li> <li>• Identification of the key improvements to assist in the compilation of the water balance and enhance the understanding of water delivered</li> </ul>
<b>Support Mechanisms</b>	Project workshop? On site training? Email support from the UK Data analysis in the UK?
<b>Benefits</b>	Reduction in Unaccounted for Water from 15,000 m <sup>3</sup> /day to meet KPI for DUWASA