ZAMBIA

Reform of the Water Sector Programme Phase II in Zambia (RWS II)

A Guide to Implementing Operation and Maintenance for Rural Water Supply Schemes

Luapula Water and Sanitation Company

May 2022

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ABBREVIATIONS

CBO	Community Based Organisation
LA	Local Authority
LpWSC	Luapula Water and Sanitation Company
MoU	Memorandum of Understanding
MWDS	Ministry of Water Development and Sanitation
NGO	Non-Governmental Organiation
NWASCO	National Water Supply and Sanitation Council
OCA	Organisational Capacity Assessment (from NWASCO)
RPWS	Rural Piped Water Scheme
RWSC	Rural Water Supply Committee (normally a CBO)
SSP	Support Service Provider

1   EXECUTIVE SUMMARY

The Reform of the Water Sector Programme Phase II (RWSII) is made up of a number of thematic areas, all aimed at systemic strengthening of the water sector in Zambia. Based on previous experience, RWS II has prioritised transparent planning, and ensuring water and sanitation services, with a focus on rural areas and growth centres of the Luapula Province in Northern Zambia.

Since the Commercial Utilities have recently been mandated by the National Regulator (BWASCO) to include rural areas in their operations, a number of the project activities are associated with the responsible utility in the province, namely Luapula Water and Sanitation Company (LpWSC).

This guideline document has been developed to assist the planning and decision-making processes of Luapula Water Supply and Sanitation Company as they take on operation and maintenance responsibility for Rural Piped Water Schemes. Recent changes to the National Regulations stipulate that the mandate of Commercial Utilities will be expanded from being just for urban areas, to including rural schemes too within their area of jurisdiction. This will result in a province wide responsibility for Luapula Water Supply and Sanitation Company.

Luapula Province currently has 6 towns and 932 rural settlements, of which there are an ever-increasing number of Rural Growth Centres. This spatial settlement pattern will surely shape the very nature of the company as infrastructure and service are rolled out in rural areas.

The immediate implication of this new responsibility is that, in addition to the current focus on 6 urban schemes there will be an expanded mandate that will include around 60 schemes that currently provide services in rural areas of the province. These schemes all have some operational arrangements in place through community-based organisations, NGOs, Local Authorities and private sector service providers. Of the 60 schemes, 52 of them are operated through a single private sector service provider that is based in Samfya. The amended regulations provide for all such third-party operators providing services under a single licence issued to the Commercial Utility.

The immediate responsibility of Luapula Water Supply Company will be that they must put in place arrangements to ensure that: 1) all schemes have functioning Community Based Organisations to carry out the day-to-day activities, and 2) that effective support is in place through arrangements that may include themselves as the Commercial Utility, NGOs and private sector companies. In cases where third parties (NGOs/ Private Sector) play a role there is a need to establish Memoranda of Understanding with the service provider.

The initial responsibility of LpWSSC includes: 1) establishing functional CBO, 2) implementing in-house support service capacity, and 3) developing MoUs for monitoring of third-party service

providers. To achieve these three disparate ends, it will be necessary for the company to establish a dedicated unit with having a wide range of skills.

This guideline document describes the processes that must be undertaken (instructions) as well as providing some example templates and procedures (ingredients) as attachments. The content included here has been drawn from more than two decades worth of published materials from numerous operators and supporting organisations ranging from local operators through international aid organisations. It is noteworthy that a large volume of material has been published in this regard over the years. Curious and motivated officials of any water utility will find no problem in sourcing helpful publications that provide both suggestions on, approaches to adopt as well as examples of tools and templates. Advice and guidance can be found on the full range of operational challenges.

Finally, some recommendations are also made in regard to the role that supporting agencies such as the Ministry of Water Development and Sanitation, NWASCO and other agencies should play in ensuring that the increased mandate of Luapula Water and Sanitation Company is successfully implmented.

2   INTRODUCTION

2.1   Water Sector Policies

Recent adjustments to the water sector regulations have resulted in the commercial utilities across Zambia becoming responsible for all water supply and sanitation services within their area of jurisdiction. In the case of Luapula Water Supply and Sanitation Company (LpWSC) this means that the commercial utility has a service delivery mandate that covers all urban and rural areas across the whole of the Luapula Province. To support this broadened mandate the RWS II programme of GIZ initiated a programme with the stated overall Goal as follows:

> *"The efficient, effective and non-discriminatory access in particular of the*
>
> *Poor and malnourished population of Zambia to clean drinking water*
>
> *and adapted sanitary facilities is increased"*

In particular the RWS II programme has focus areas of :- 1) improving the core process of the ministry, 2) supporting the development of planning procedures for rural areas and rural growth centres, 3) improving the quality of training offered in the water sector, 4) Improving the training offered to professionals, and 5) establishment of institutional structures to adapt vocational training to align with the requirements of the water sector.

The work described in this report is associated with output 2 and addresses specifically the challenges that may result from the broadened operational mandate, which includes rural areas.

Institutional Arrangements

These new regulations do allow for circumstances where both government bodies and other organisations may be involved in the provision of services. Importantly though, the changes imply that ultimate accountability for service provision will be through the commercial utility. Also, in most cases the technical nature and geographic location of piped water schemes (RPWS) in rural areas necessitates that a significant involvement of local people in the day-to-day operations and maintenance will be required.

It is noted that it is the intention that all infrastructure and equipment will become the sole property of LpWSC, and not the respective communities, NGOs or Service Providers. It is further noted that the ownership of various infrastructure may have been vested in one of these types of organisations in the past, and that the issues around ownership and responsibility will have to be dealt with at the time of establishing Memoranda of Understanding (MoU) between the organisations and LpWSC. Although asset ownership will be with LpWSC, it will be the responsibility of the respective communities and support service providers to operate and manage the infrastructure, ensure its functionality and to deliver services that comply with the relevant

norms and standards. Customers, community organisation and service providers are required to respect and protect the property that ensures the delivery of water supply services. Attachment A contains the Asset Management Guidelines of NWASCO.

In all cases, it will be important that local government structures, organisations and officials, along with the traditional leadership be consulted and informed of all developments with regard to arrangements put in place for water service provision.

Water Service Providers

To realise the provision of services through the day-to-day operation and maintenance of installed infrastructure the Commercial Utility may elect to either:

Carry out this work internally,

Assign the responsibility, either wholly or in part, to third parties, such as Community-Based Organisations (CBO – hereafter called Rural Water Supply Committees - RWSC), local authorities (LA), private companies, and others.

If a third party is engaged, it is a requirement that the Commercial Utility and the Service Provider put in place a Memorandum of Understanding MoU (or contract). In this regard the National Regulator (NWASCO) has published guidelines to inform the content of such documents (see attachment B). Importantly, it is a requirement that all third parties must be companies or organisations that are formally registered within Zambia. It may therefore be necessary that each community that benefits from water supply scheme under the jurisdiction of LpWSC have a representative structure or organisation in place that can represent their interests. In cases where no such structure exists LpWSC will facilitate the creation and operationalization of such a structure. A template Memorandum of Understanding for LpWSC and third parties can be found as attachment C.

The possible scenarios of how water supply service may be currently implemented are illustrated in the diagram below (figure 1).
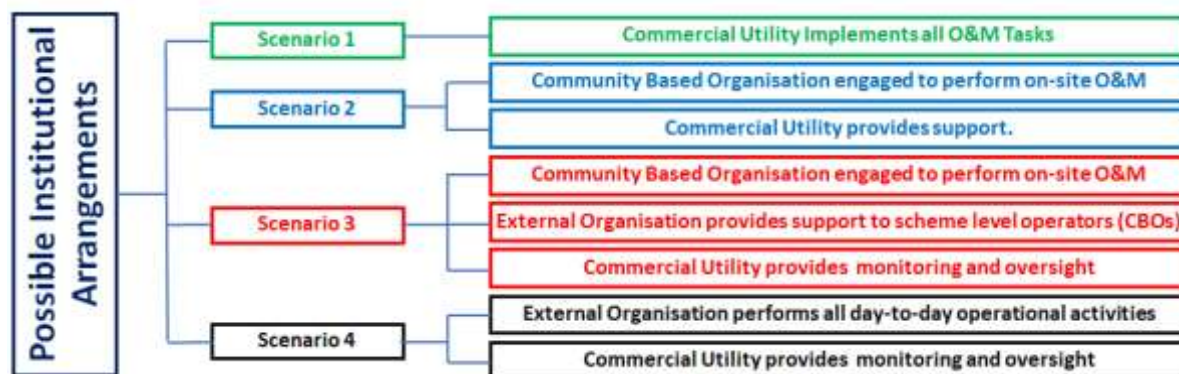
Figure 1: Current scenarios of operation and maintenance institutional arrangements.

It is currently the case that a range of permutations that includes the participation of RWSCs, LAs and private companies are in place. The task of regularising these arrangements so that they are in line with the sector regulations falls to Luapula Water Supply and Sanitation Company as the ultimate point of accountability for the province.

2.2   Service Delivery Challenge and Operational Implications

Currently LpWSC provides service in 6 towns through 5 Regional Offices, of which the provincial capital Mansa is the largest. The total population served is 116,442, through   8,934connections. Water supply in rural areas is made up of many more, but much smaller, schemes. Table 1 presents a summary of the water supply infrastructure as it currently stands in the province.

Table 1: Installed water supply infrastructure in Luapula Province

Type of Scheme	Number of Schemes	Service Providers
Urban/ Peri-urban Piped Schemes	6	• LpWSC
Rural Piped Schemes	59	• Community Based Arrangements. • Support Service from LpWSC, LAs, NGOs and Private Sector Organisations.
Rural Gravity Flow Schemes	3	• Community Based Arrangements. • Support Service from LpWSC, LAs.
Hand Pumps	3,351	• Community Based Arrangements. • Support Service from LAs.

As can be seen in the table above most of these Small Piped Water Schemes are currently operated by organisations other than LpWSC. The immediate need for resources to be allocated for day-to-day activities is therefore limited due to the small number of schemes currently operated by LpWSC.

In giving effect to the operationalisation of the broader responsibility that includes rural schemes consideration must also be given to the complex process of engaging with other service providers that are in themselves multi-stakeholder role-players. Negotiating and putting in place MoUs, as well as support and monitoring systems with each of these organisations is required in the short term.

The longer-term implications of the regulatory change are significantly more challenging.

- Firstly - it is necessary that LpWSC carry out monitoring and regulation of all of the schemes noted above (n = 60).

- Secondly – it is possible that many of these schemes may require day-to-day support from LpWSC as the incumbent service providers hand them over, for one reason or another.
- Thirdly – as service delivery is rolled out across the province the operational challenge of the utility will shift from being a few small/medium sized towns to many small villages and rural growth centres.

There are approximately 950 small settlements in the province. While infrastructure is unlikely to be provided in each of these villages in the short term, it is true that there will be an ever-increasing need for LpWSC to allocate resources to managing more and more rural piped water schemes.

The map below illustrates the location of all settlements in the province. The widely dispersed settlement pattern will necessitate that LpWSC establish capacity at each of their regional centres (at 5 Towns currently) for the provision of support to each scheme that will be implemented in the future.

The map further illustrates a "theoretically equal" allocation of responsibility for support to the existing regional offices in the 5 towns where LpWSC has day-to-day operational responsibility, and capacity.
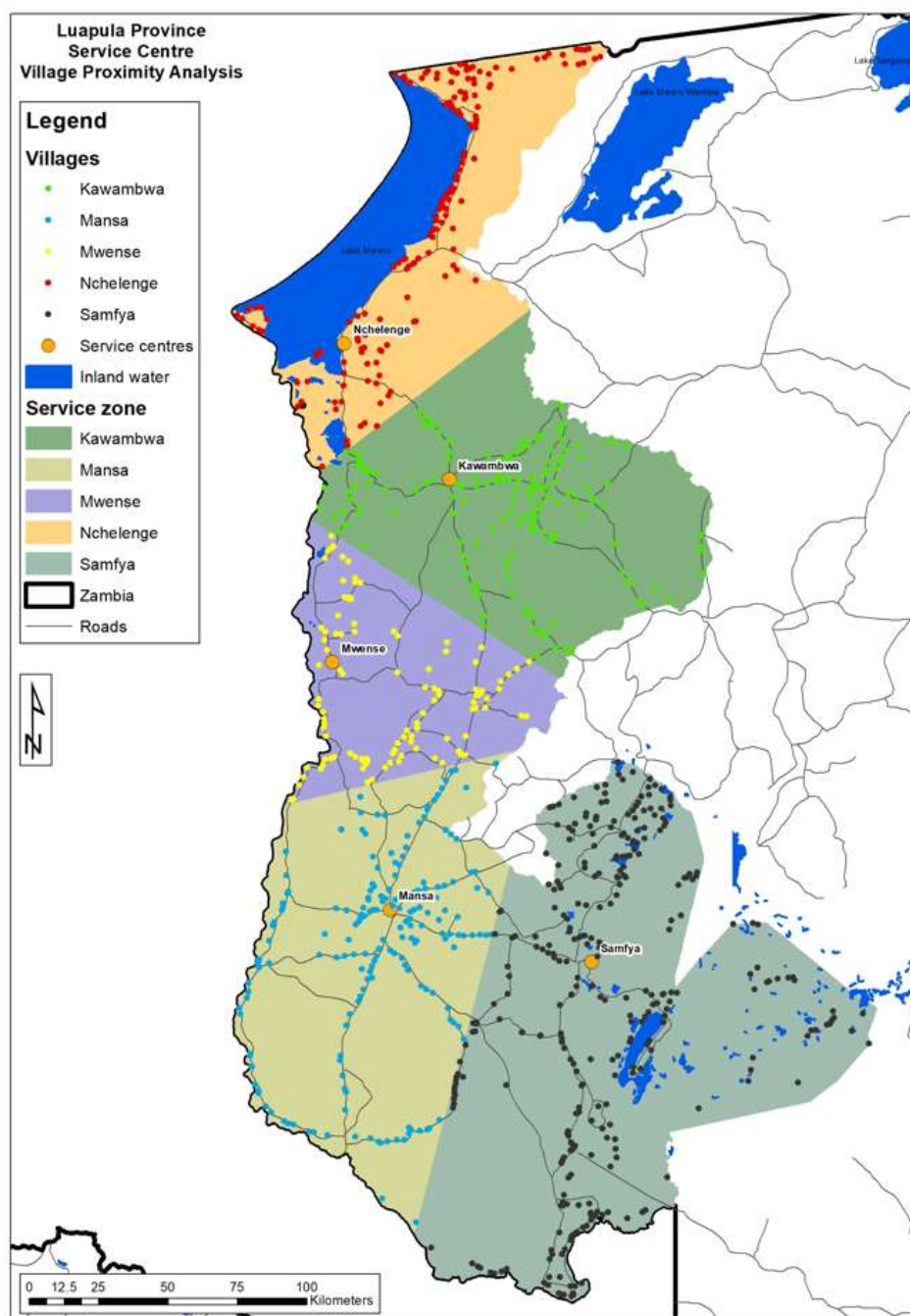
Figure 2: Location of settlements in Luapula Province showing possible service areas based on shortest distance from village to existing regional office.

This first order allocation of support responsibility was based on each settlement receiving support service from the closest existing regional office of LpWSC. This analysis illustrates that the number of schemes that each office would be responsible for is somewhat skewed with Mwense having responsibility for only 105 villages whereas Samfya will have to take care of 309.

Table 2: Support Responsibility of Regional Offices (based on distance of village to nearest regional office)

Regional Office	Number of Rural Villages
Mwense	105
Nchelenge	162
Kawambwa	166
Mansa	186
Samfya	309

Any plans or systems that are put in place to ensure adequate service provision and effective operation and maintenance of infrastructure must ensure that short-term arrangements are aligned with the longer-term requirements as illustrated above.

3 IMPLEMENTING THE HYBRID SERVICE PROVISION MODEL

This document has been prepared to serve as a guideline for the implementation of the O&M model for Rural Piped Water Schemes that was adopted by Luapula Water Supply and Sanitation Company (LpWSC) in February of 2021. The agreed O&M model was debated and agreed upon through a process that included the following:

- Research on existing practice in Zambia.
- Research on international experience.
- Interviews with officials of LpWSC.
- Interviews with other Water Service Providers operating in Luapula Province.
- Interviews with officials from other water supply utilities in Zambia.
- Interviews with international key informants.
- Workshop with stakeholders to discuss the findings of the research and options that had been identified and select the most favourable approach.
- Workshop to validate the selection of an O&M model.

The sustainability of service, the practicality of implementation, and the experiences of other water service providers were key considerations in making the decision to adopt a "Hybrid Model."

Importantly the identification and selection of the hybrid model recognised the following key considerations and constraints:

- The supply of water requires that a range of administrative and technical tasks be undertaken to ensure that the infrastructure and equipment that constitute a water scheme continue to function in an effective and efficient manner. Some of these activities must be performed on-a-daily-basis while others are more periodic in nature. Some tasks may have to be undertaken "on-site," while others can be carried out central locations such as offices and workshops.

- Purely Community Based Management (Village Level Operation and Maintenance - VLOM) is not sustainable. Recent thinking advocates the need for both administrative and technical support for sustainability of water services to be achieved.

- Many poor households cannot afford the tariffs associated with full cost recovery.

- The commercial utility (LpWSC) is itself financially stressed and does not have surplus funding available for the support of schemes that will now, or in the future, fall under their broader provincial mandate.
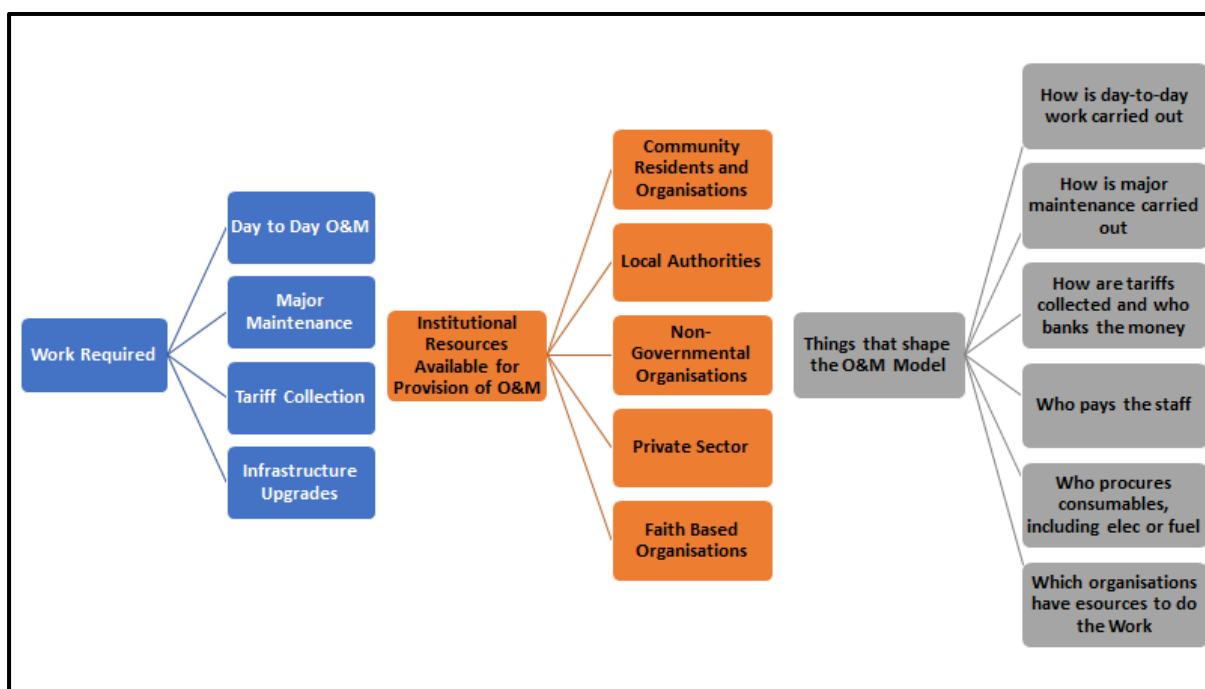
Figure 3: Considerations in deciding on Operation & Maintenance arrangements

Consideration of these constraints led to the selection of a "Hybrid Model" that limits costs by 1) delegating as much responsibility as possible to Community Based Organisations, maximises

employment opportunities at scheme level, while 2) also ensuring that adequate support is in place for administrative and technical challenges that will inevitably arise.

It is recognised that for historical reasons some service provision arrangements are currently in place that do not wholly conform to the "Hybrid Model". Notably some NGOs in the province have implemented arrangements where they take on full responsibility for service provision, with varying degrees of involvement and activities by community members and structures.

The options available within the "Hybrid Model" are illustrated below.
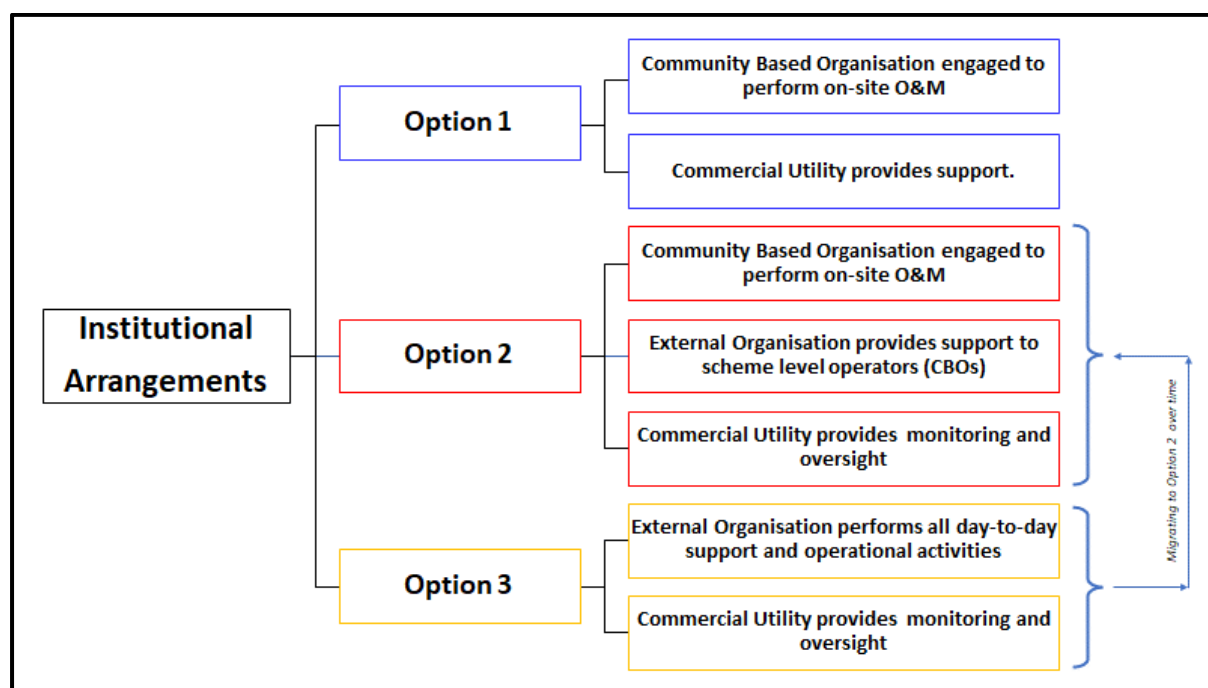
Figure 4: Possible institutional arrangements under the "Hybrid Model"

The key aspects of the "Hybrid Model" are:

- Local activities are undertaken by local residents through a Community Based Organisation
- Higher level technical and administrative support for Community Based Organisations is made available, either through LpWSC itself, or a contracted third party.

It is recognised that some of the existing arrangements may not be wholly aligned to these "key aspects" and that implementation of the "Hybrid Model" will not take place from a uniform starting point at all schemes. There are many RPWSs that have already been installed, and which are currently all providing water services under some form of management arrangement. These existing arrangements include the involvement of community members, community organisations, local authorities, traditional authorities, support service providers, NGOs and Luapula Water

Supply and Sanitation Company. The variety of existing arrangements will have to be taken into account as the process of creating RWSCs, assigning Support Service Providers, putting MoUs in place and monitoring performance is implemented.

It is a requirement of the National Regulator (NWASCO) that the Commercial Utilities put MoUs in place whenever the utility does not carry out the water service provision function internally. The reason for implementing such MoUs is to formalise the relationship between the "service provider" and the Commercial Utility. Such formalisation will facilitate mutual understanding of the respective roles and responsibilities and hence result in improved accountability and ultimately, better performance of the individual organisations, and improved service delivery.

Importantly, clarity on roles and responsibilities reduces the possibility of conflict between the parties and having a clearly defined process for the resolution of disagreements will make for improved relations and co-operation in the longer term.

The need to put in place MoUs will create an opportunity for open and frank discussions about how best to facilitate the transition from existing circumstances to arrangements aligned with strategy of Luapula Water Supply and Sanitation Company.

4   SETTING UP A RURAL WATER SUPPLY SUPPORT UNIT

For the "Hybrid Model", and the use of external service providers for rural water supply to succeed it will be necessary that a specialist unit be established to manage, support, monitor, regulate, the various organisations that will be role-players in the day-to-day operation and maintenance of infrastructure. It is also likely that LpWSC will require external support in creating and developing this internal unit.

Previous research and analysis highlighted the need for capacity building on a number of aspects of the operations of LpWSC. The findings of a number of such reports were consolidated into a document titled "Combined Assessment Report of LpWSC organisational and technical capacities, GIZ, RWS IIC. Griesauer 2021". As can be seen from figure 5 below there are many areas of organisational weakness that must be addressed to ensure that LpWSC has internal capacity to deliver on their mandate of water services to all residents, both urban and rural.

This report was followed by a two-day workshop at which the capacity building needs and possible approaches to addressing the needs were discussed. From the outcomes of the workshop and long-term capacity building plan has been developed and published under a separate title as part of the RWS II programme.

Indicator	Score
Non-existent	1
Exists but only to small extent	2
Exists to a fair extent	3
Exists to a good extent	4
Fully exists and working well	5
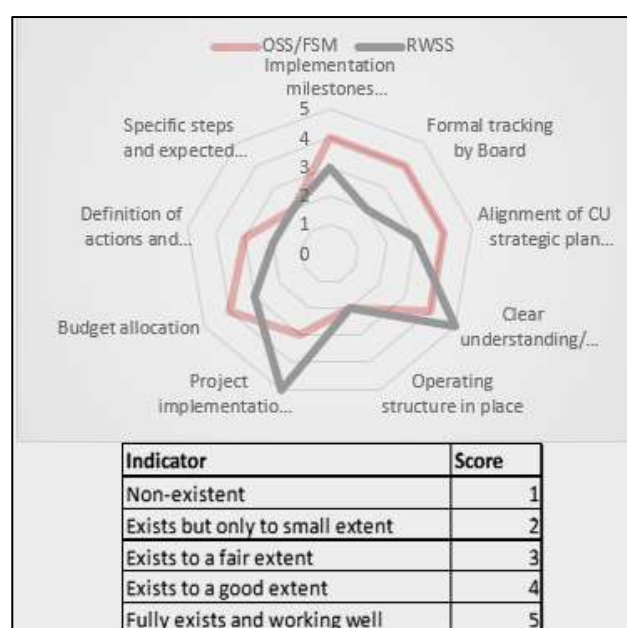
Figure 5: Implementation readiness with respect to rural water supply and sanitation and on-site sanitation and faecal sludge management in the peri-urban areas *(OCA – GIZ, Griesauer 2021).*

As stated previously, the long-term scenario is one in which operation and maintenance of many small-piped water schemes in rural villages and growth centres will form a significant component of the mandate of LpWSC. However in the short term this responsibility is limited, particularly in that the majority of existing rural schemes are currently operated, maintained and supported by other organisations such as private operators and NGOs.

In view of the current scope of work LpWSC will establish a dedicated department (section) within the company that will focus on:

1. Monitoring, regulation and contract management of external water service providers and ensuring that MoUs are in place with each of these service providers
2. Establishment of community-based organisations at all schemes and ensure that that RWSC Constitutions are in place with each of these organisations. A draft template can be found as attachment D.

Initially this department will be small comprising of 1 or 2 staff members with skills in contract management and community work. This department / section will be located at the head office in Mansa. It is noted that certain tasks may need to be delegated to staff in the regional offices, but at this stage no dedicated office will be established in the regions. These offices will be created when the number of schemes in a particular area justifies such.

The key tasks of the Unit will be:

1. Development of policies and operating procedures for Rural Water Services Provision.

2. Coordinate regular water quality monitoring and testing of the pipe water supplied by the schemes.

3. Implementing MoUs with external Service Providers.

4. Implementing Community Organisations:

   a. Facilitate elections.

   b. Facilitate appointment of a technical operator.

   c. Introduce reporting requirements.

5. Implementing Service Charters with RWSCs, including lists of all customers at each scheme:

   a. Family name, occupants, level of service received, etc).

6. Monitoring of Service Providers.

7. Establish modes of communication with RWSCs and Support Service Providers:

   a. Written reports.

   b. Cell phone reports.

   c. Internet based platforms (e.g. Mwater, a platform currently used by a private service provider in the Samfya District, https://www.mwater.co

8. Monitoring of Community Based Organisations

   a. Receive reports and advise technical department of work required. A set of examples report templates can be found in attachment E.

   b. Analysis of data to report on performance and trends.

9. Ensure that stores are kept for crucial parts and equipment. (Stores will be integrated with the main facilities of LpWSC).

10. Hold monthly meetings with RWSCs to receive reports and provide support that may be required (e.g. conflict resolution, technical matters, financial challenges, etc).

This department will be provided with the necessary office equipment and resources to enable travel to the various schemes for routine meetings and for ad-hoc engagements as needs may arise.

5 ESTABLISHMENT OF RURAL WATER SUPPLY COMMITTEES

In order for the "Hybrid Model" to function, it is necessary that representative structures be put in place at all RPWS. This will require that the RWSC Support Unit engage with all communities that are beneficiaries of water services within the jurisdiction of LpWSC to formulate the terms and conditions of service delivery, the role of the community and support from LpWSC.

The process will include the election of community members to fulfil specific roles and responsibilities.

Table 3: Members and Staff of a Rural Water Services Committee

Category	Number	Function
Board Member	3	• Monitoring of usage of water from the scheme. • Managing finances of the scheme. • Monitoring of the performance of the Technical Caretaker. • Monthly reporting to the Support Service Provider. • Communication of emergencies to the Support Service Provider.
Technical Caretaker	1	• Day-to-day operation of installed infrastructure. • Carry out minor repairs. • Keep records of readings from meters and gauges • Keep records of all technical faults that occur. • Prepare monthly reports. • Timely requisition of spare parts from the stores.
Cashier	1	• Revenue collection and receipting • Billing • Safeguarding and banking the collected revenues • Reconciliations of revenue and expenditure • Preparation of monthly financial report
Sanitation Promotion Agent	1	• Communication of good sanitation practice to community members. • Keep records of the sanitation conditions. • Prepare monthly reports.

The nature of the infrastructure that is usually utilised in rural piped water schemes, and the need for water to be supplied daily, dictates that all of the positions within the RWSC will require part-time work from those that are elected by the community. It is therefore important that any person that takes up one of the posts appreciates the working conditions and makes themselves available to fulfil the responsibilities as demanded. A preliminary estimate of the time required, and the associated remuneration has been prepared and is presented in table 4 below.

Table 4: Working Hours and Remuneration for Rural Water Service Committee Staff

Category	Type	Remuneration Structure	Estimated Monthly Remuneration
Board Member	Part-time	20 hrs per mth @ K7-61/hr	ZMW 152
Technical Caretaker	Part-time	60 hrs per mth @ K7-61/hr	ZMW 456
Cashier	Part-time	60 hrs per mth @ K7-61/hr	ZMW 456
Sanitation Promotion Agent	Part-time	20 hrs per mth @ K7-61/hr	ZMW 152

- *Hourly wages estimated from national minimum wage https://wageindicator.org/salary/minimum-wage/zambia*
- *More precise calculations can be found in attachment D*

It must be recognised that there is likely to be a high turnover of members and staff of the RWSCs. The planning of the Rural Water Supply Support Unit must recognise this and have mechanisms in place to have replacements appointed and trained at short notice. The appointment of women to posts of operational responsibility at water schemes has been shown to result in less turnover of staff. Therefore, for reasons of gender representivity and operational effectiveness it is a requirement that at least 60% of all posts within the Rural Water Services Committee will be occupied by women.

The main tasks of the RWSC are detailed below (aslo see attachement F):

1. Establish an organisation/ committee that will be responsible for liaison and communication with all stakeholders that have an interest in the provision of water supply services in the community.
2. Hold annual elections for the various posts of employment within the organisation.
3. Cooperate with the Support Service Provider in all aspects of operation and maintenance of installed infrastructure at the scheme.
4. Sign a Community Water Supply Charter with the Service Provide and the Commercial Utility.
5. Perform all day-to-day operations and maintenance of the infrastructure and equipment that is utilised to supply water to consumers within the community. A detailed programme of work will be established between the Community Based Organisation and the Support Service Provider.
6. Give advice to consumers on the use of water in relation to the quantity, quality and continuity of service.

7. Keep records and provides reports on the water supply infrastructure and service at the scheme. The content of these reports will be identified and agreed to with the Service Provider.

8. Implement the tariff and billing for water supply that are agreed from time to time between the commercial utility and NWASCO

9. Collect user fees from consumers of water within the community. The collected funds will be kept in a dedicated water account held with the Service Provider or a Commercial Bank.

10. Pay all salaries of employees of the RWSCs.

11. Purchase all equipment and materials for minor maintenance.

12. Pay all energy accounts associated with the supply of water.

13. Keep records of all income and expenditure of the RWSC.

14. Ensure that consumers adhere to the rules and regulations as detailed in the Community Water Supply Charter.

15. Ensure that day-to-day operations and maintenance work is carried out in a safe manner and that there is due care given to protection of the environment.

16. Collect water samples and ensure that they are analysed at LpWSC laboratory.

The day-to-day operational activities are the cornerstone of effective water supply services. Neglect of minor problems inevitably leads to major problems. It is therefore imperative that good systems of record keeping, monitoring, reporting at scheme level are put in place to ensure that there is effective communication with the Support Service Providers (SSP) so that support activities can be planned and carried out systematically and in a sustained way.

To assist in this regard a series of examples of reporting templates have been provided in attachment G. The Support Service Agents and LpWSC should review these examples and adapt them to the local circumstances.

6   IDENTIFICATION OF A SUPPORT SERVICE AGENT.

The need for support of scheme level operation and maintenance is well established. It is therefore essential that consideration is given to ensuring that all existing and future RPWS have support arrangements in place, whether these be provided by LpWSC, or by an external organisation.

The Commercial utility will approach all of the existing Support Service Providers and begin negotiations towards putting in place a Memorandum of Understanding that stipulates the roles and responsibilities of all interested parties.

The version of the MoU that is attached is comprehensive and may indeed be somewhat overwhelming for some Support Service Agents. This level of detail may also not be appropriate for all potential SSPs. However, the development of such a document was driven by the need to have a template that could be used across the range of potential contracting parties. The contractual stipulations may need to differ between organisations where some may have a short time horizon for being in the Water Supply business in Luapula (such as NGOs on relief missions), whereas others (such as private operators in Samfya) may have a vision that encompasses a much longer timeframe. The content and detail required in each situation will be determined through a process of negotiation between the contracting parties. Facilitating these negotiations and implementation of the agreements will require dedicated effort of skilled staff from the Rural Water Supply Unit within LpWSC.

Importantly, the initial version of such an MoU will be binding, however, the first a period of 2 years of the contract period will be regarded a trial period in which no legal action will be pursued by any party and all disputes and disagreements will be resolved through negotiation. It is be expected that, based on the experience gained in this trial period will result in agreeable implementation of the binding clauses of the MoU.

The reason for this initial trial period is that all parties will be venturing into unknown territory and hence it is difficult to predict what circumstances might arise. It is expected that all parties enter into such agreements "in good faith". with the interest of providing safe water supply to beneficiary communities and customers. It is anticipated that during the period of the non-binding agreement all disputes and points of disagreement will have to be solved by negotiation rather than reverting to legal proceedings. After this initial period, all parties will have better understanding of the required roles and responsibilities and be in a better position to negotiate and confirm improved agreements and accept them as binding on all parties.

The main roles and responsibilities of a Support Service Provider are:

1. Supply water to residents within the geographic service area that forms the jurisdiction of the Service Provider.
2. Provide a Water Supply Service that complies with the standards of the World Health Organisation and the guidelines of NWASCO.
3. Ensure that the Water Supply Service complies with any other regulatory requirements or guidelines of the license conditions that apply to the Commercial Utility.
4. At all times strive to provide a safe water supply service and implement good customer care practices.
5. Design and implement systems for the collection of user fees from customers on a regular basis. These user fees from customers will be utilised for the payment of

operational costs, including but not limited to, energy, staff costs, chemicals and spare parts for minor maintenance.

6. Apply the tariff prescribed for the Commercial Utility by NWASCO from time to time.

7. Ensure that customer agreements with all customers are put in place recorded in writing. These agreements will describe the service that will be provide, including the right of the Service Provider to cut off supply to customers that do not pay their user fees.

8. Operate in accordance with existing standards, laws and regulations related to water supply services.

9. Comply with general directives issued by NWASCO and/or the Ministry of Water Development and Environment from time to time. Such directives will be communicated through the Commercial Utility.

10. Adhere to any Standard Operating Procedures developed by the commercial utility.

11. Adopt and implement the standard institutional arrangements (Hybrid Model) between Service Providers and beneficiary communities as described in the O&M Plan of the commercial utility. At all schemes, the Service Provider must establish a representative Community Based Organisation (RWSC) for the management and governance of the water supply services which are the subject of this Memorandum of Understanding. A Water Supply Charter between the Service Provider and the beneficiary communities must be developed and implemented. This Charter will describe the roles and responsibilities of the Service Provider and "The Community", as represented by the afore-mentioned RWSC.

12. The Service Provider will employ qualified, experienced and competent staff.

13. Indemnify consumers against any claims in any proceedings arising from any breach or failing on the part of the licensee.

14. Implement suitable performance monitoring systems and submit monthly reports on Financial, Technical and Administrative matters to the commercial utility by the end of the second week of the following month. Such reports should contain details on:

    a. Quality of water supplied at all schemes (sampling to be undertaken by suitably trained staff).

    b. Quantity of water supplied and analysis of consumption at all schemes.

    c. Continuity of the service provided (hours per day).

    d. Reliability of Infrastructure.

    e. Reliability of Water Sources.

    f. Costs incurred.

    g. Income received.

    h. Community Information (performance of RWSC, Population changes, health related issues (clinic reports)

    i.   Customer complaints and/or reports received.

    j.   Injuries on duty and other occupational health and safety issues.

    k.   Levels of Non-Revenue Water in a format, recommended by the International Water Association Water Balance methodology and in alignment with the guidelines of the Ministry of Water Development and Environmental Protection.

    l.   Incidents where the quality, quantity and continuity of supply have been compromised

15. The Service Provider will keep financial records that adhere to internationally accepted accounting practice. External audits must be undertaken annually and submitted to the commercial utility upon request.

16. Develop Standard Operating Procedures for all business processes and include these in the business plan that will be prepared.

17. Ensure that all staff are immunised against Cholera, Typhoid, Hepatitis B and other relevant infections.

18. Ensure that good practise is adhered to in all matters of Occupational Health and Safety, and in particular that all staff (including scheme level operatives) are issued with appropriate personal protective equipment.

Specific technical aspects of operational, engineering and administrative support that must be put in place by the Support Services Provider are illustrated below.
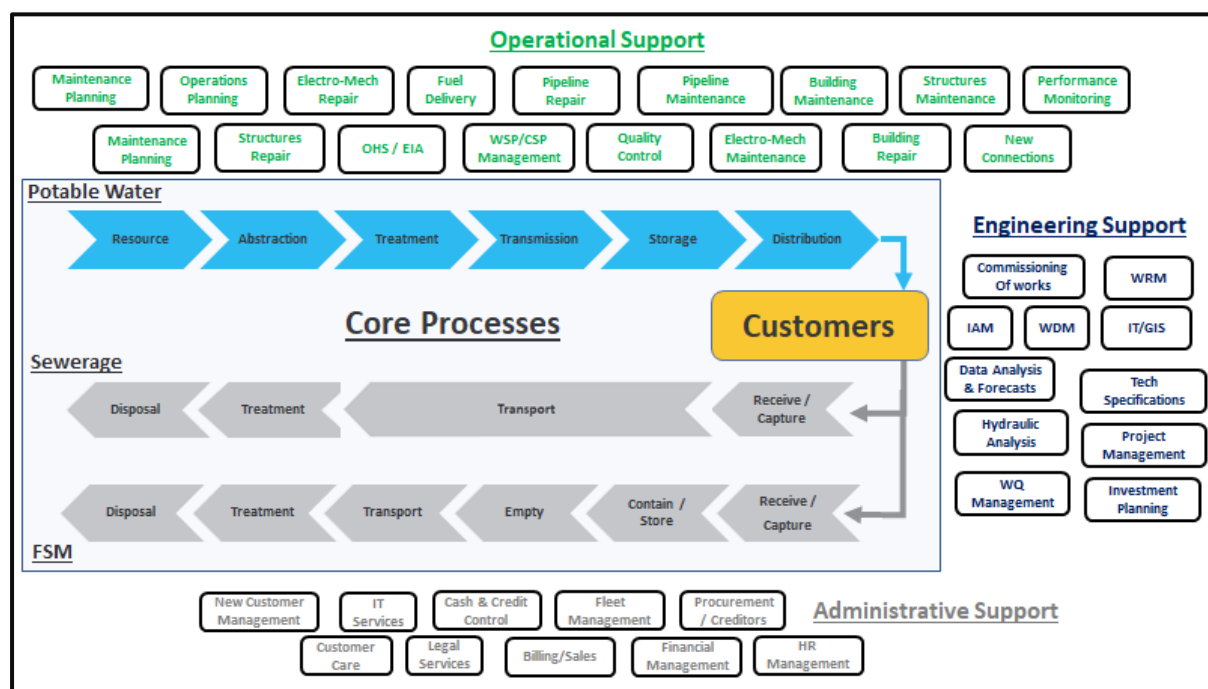
Figure 6: Technical systems that must be put in place by Support Service Providers

Many of the business processes and technical systems noted in figure 6 above may not be immediately relevant or important for RWPS, but it is expected that Support Service Providers review this set of activities and describe their approach to addressing each of them in their business plans, which are a requirement of the MoUs.

As with the Rural Water Supply Support Unit, it will be necessary that the necessary that Support Service Providers, whether it be LpWSSC or a third party, make available the office and technical equipment, as well as resources to enable travel to the various schemes for routine inspections and for ad-hoc repairs.

A guideline to the selection of a suitable Support Service Provider can be found as attachment H. These document details the competence required from a Service Provider as well as an approach to assessing the abilities of any organisation that may apply or be considered for such a role.

7   AN IMPLEMENTATION ROADMAP

In order to implement the requirements of the new regulations, it will be necessary for a number of arrangements to be put in place. A roadmap for regularising the institutional arrangements and relationships is illustrated in figure 7 below.
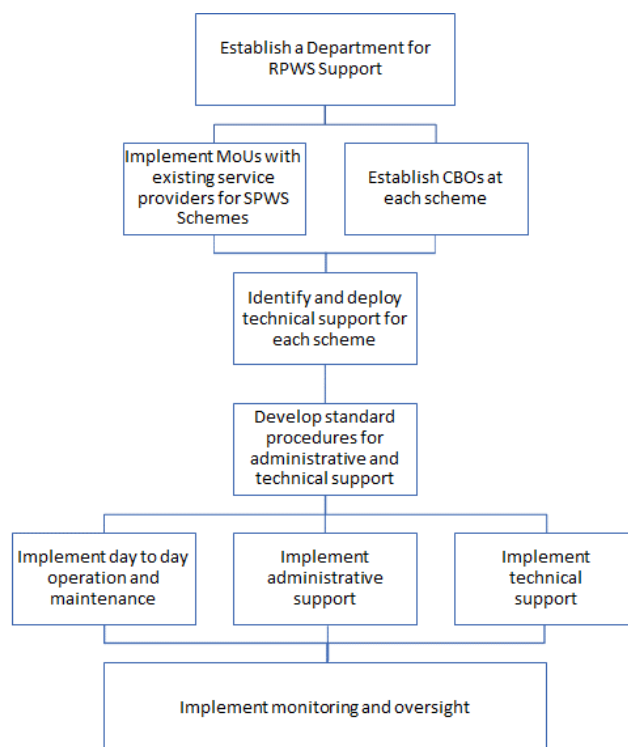
Figure 7:   Roadmap for implementation of LpWSC responsibilities for rural water supply operation and maintenance

To execute the roadmap described above a committed effort on the part of dedicated team within LpWSC will be required. It is essential that such a team, or unit, be adequately resourced for the task at hand, especially in respect of suitably qualified people, transport arrangement and adequately provisioned office facilities.

To assist the Commercial Utilities in implementing their new role for Rural Water Supply Schemes (RPWS) NWASCO has published a guideline that describes an "ideal" organogram.
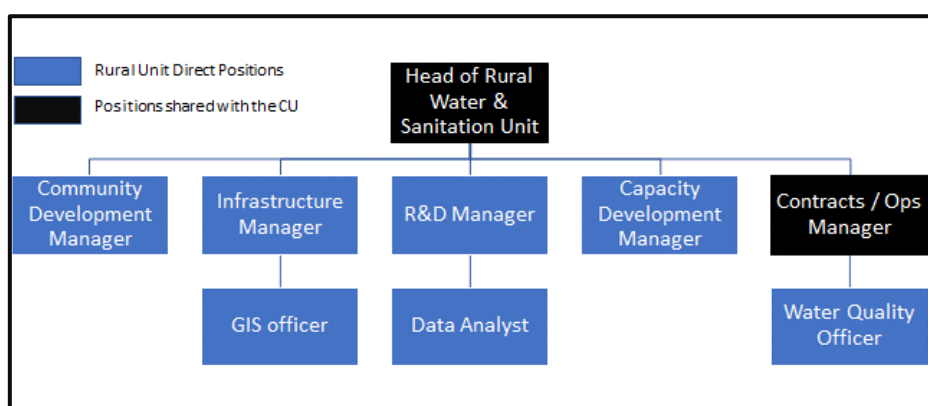
Figure 8: **Suggested organogram to accommodate rural schemes** *(NWASCO)*

The document from NWASCO does highlight that the suggested organisational structure is tentative, and that each Commercial Utility should design their organogram to suit their own circumstances. Figure 8 illustrates the suggested need for a dedicated unit for Rural Water Schemes as well as the need for specially assigned staff for the management of Rural Water Supply Schemes. This is especially true for the management of contracts or MoUs that may be set up with Rural Water Supply Committees and third-party Support Service Providers.

In the case of LpWSC consideration of what tasks are performed by which officials will include:

- The geographic location of schemes.
- Proximity to existing Regional Offices.
- Anticipated roll-out of new infrastructure.
- Anticipated hand-over of schemes from other Support Service Providers.

Consideration of the short-term scope and scale of work related to existing schemes will dictate the staffing and other resources that must be deployed. In the medium to long-term fully fledged departments at each regional office with staff dedicated to support of RPWS will be required. Given the settlement patterns throughout the province the management of Rural piped Water schemes will indeed become predominant within the organisation.

However, in the short term the resource requirements (particularly staff) will be limited, and some roles may not even justify a full-time staff member. Another consideration in determining resource requirements is the spatial distribution of schemes, and indeed how that may develop in time. The size of Luapula Province (and others) necessitates long travel distance from existing service centres.

A further consideration is that a mix of service delivery and support modalities is envisaged and is certainly the reality in the short-term. The implication of this being that LpWSC will be called on to assimilate schemes that represent most, if not all of the scenarios outlined in figure 4 above, while at the same time implementing measures to realise the vision of the "Hybrid Model" being applied consistently across the province. The tasks required of LpWSC to realise the vision of a "Hybrid Model" at all schemes are outlined in the table below

Table 5: Tasks required of LpWSC to align all current service delivery arrangements with the envisaged "Hybrid Model"

Service Delivery Scenario / Option	Tasks of LpWSSC
Option /Scenario 1 • Commercial Utility implements all O&M tasks	• Establish representative RWSCs. • Implement Scheme level staffing. • Establish scheme level operating procedures. • Implement local tariff collection systems.
Option / Scenario 2 • Community Based Organisation engaged to perform on-site O&M. • Commercial Utility provides support.	• No such arrangement currently in place
Option / Scenario 3 • Community Based Organisation engaged to perform on-site O&M. • External Organisation provides support to scheme level operators (RWSCs). • Commercial Utility provides monitoring and oversight.	• Engage with service providers to put MoUs in place. • Require service providers to establish RWSCs as per the standard procedure of the utility. • Establish and implement systems for monitoring performance of service providers and RWSCs.
Option / Scenario 4 • Service Provider performs all day-to-day operational activities. • Commercial Utility provides monitoring and oversight.	• Engage with service providers to put MoUs in place. • Require service providers to establish RWSCs as per the standard procedure of the utility. • Establish and implement systems for monitoring performance of service providers and RWSCs.

The immediate workload for the soon to be formed Rural Water and Sanitation Unit is likely to be made up of the following:

- Approximately 30 schemes in Samfya that are operated by a private sector service provider
- A total of 29 piped schemes that have pumping systems.
- A small number (3) of gravity flow piped schemes.

What can be clearly discerned from figure 9 below is that no single district, or anticipated area of operational responsibility (see figure 2) to justify the establishment of stand-alone Rural Water and Sanitation units.
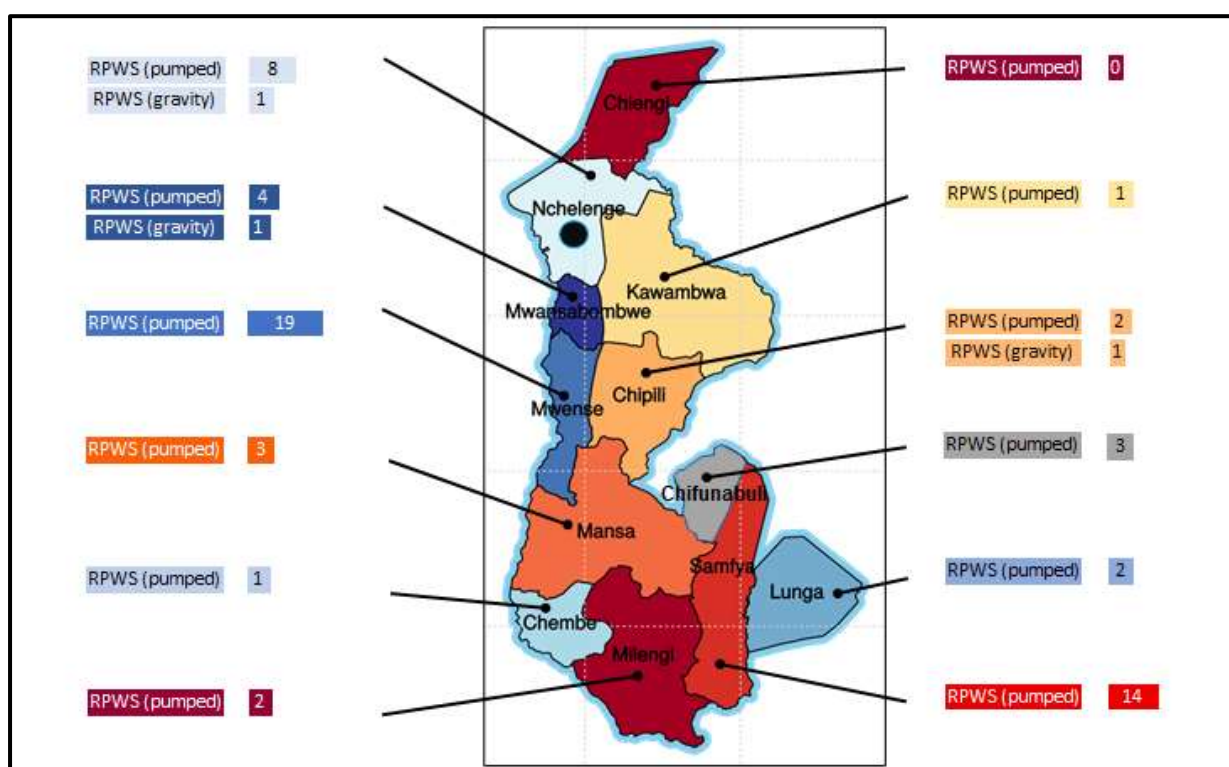
Figure 9: Illustration of the geographic location of existing piped water schemes

Given the geographic spread of responsibility it is suggested that the initial responsibility be as detailed below.

Table 6: Allocation of O&M responsibility to Regional Offices

Regional Office	Districts Responsible For	Number of Schemes
Mansa	• Mansa • Milengi • Chembe	• 3 pumped schemes • 2 pumped schemes • 1 pumped scheme
Mwense	• Mwense • Chipili	• 19 pumped schemes • 2 pumped schemes • 1 gravity scheme
Kawambwa	• Kawambwa • Mwansabombwe	• 1 pumped scheme • 4 pumped schemes • 1 gravity schemes
Nchelenge	• Nchelenge • Chiengi	• 8 pumped schemes • 1 gravity scheme
Samfya	• Samfya • Lunga • Chifanabuli	• 19* pumped schemes (all operated by a single private operator)

* Numbers must be reconciled with other reports of approximately 30 schemes under management

Due to the limited workload and the lack of scale to justify full-time appointment of a number of officials in each Regional Office it is anticipated that the initial staffing of the Rural Water and Sanitation unit will be limited to the following:

- A unit manager
- Two community workers (fieldworkers)
- One contract administrator
- One technical coordinator.
- One administrative assistant.

Initially, the staff in the unit will liaise with counterparts in the Regional Office to carry out the tasks of inter alia, setting up Rural Water Supply Committees and providing ongoing administrative and financial report. These arrangements will have to be approved by the senior management of the Company and communicated to Regional Heads. The primary role of the fulltime staff of the unity will be to direct and coordinate the work done from the Regional Offices to ensure that the "Hybrid Model" is correctly implemented. Analysis and reporting based on the data received from RWSCs and SSPs will also be a key function of the fulltime staff of the unit. As the workload grows there will be a need to appoint more staff and set up line management functions.

Technical Plumbing and civil works, as well as electro-mechanical support will initially be provided by existing staff in the Regional Offices and coordinated by an appointee within the unit at Head Office. In time this will also grow as a function and managers and supervisors will need to be appointed.

The intermediate steps of organisational development that will be required are difficult to predict as it is dependent on the programme of rolling out infrastructure to currently underserved areas. It is however possible to make some estimates of what will be required when all settlements do have installed infrastructure and associated services.

8   FINANCES

Recent research on household income in the Mwansa and Mwense districts indicates that only only 65% (approx) of rural households would be able to afford more than 2m3 of water per month at a tariff of ZMW 8-00. This estimate of affordability is based on the common international practice of assuming that a water bill equivalent to 3% of household income is what is affordable.

When these recently collected data are disaggregated into rural and urban areas, we see that household incomes are substantially lower in the rural areas.
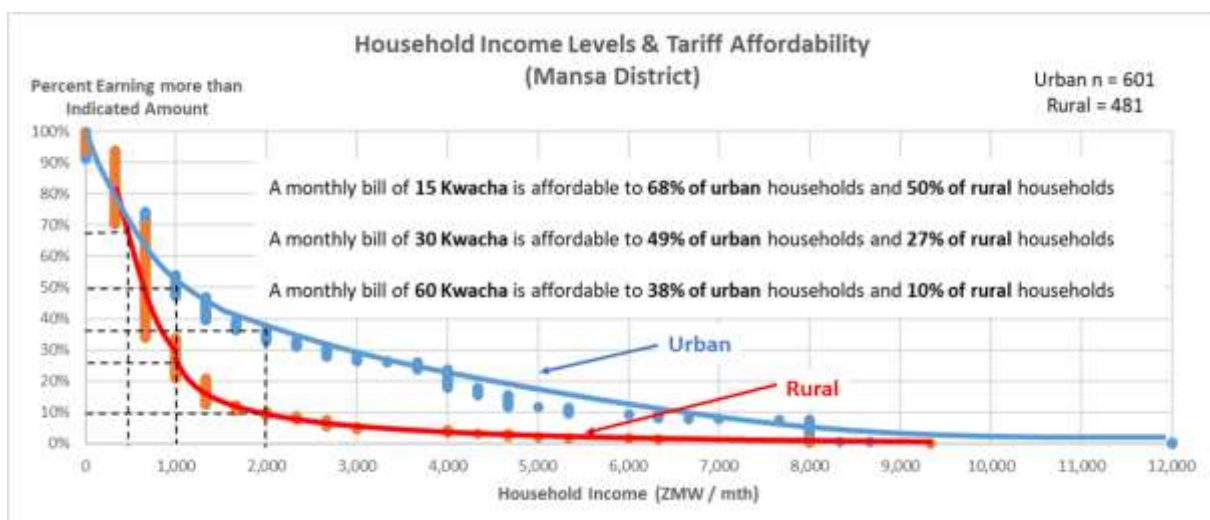
Figure 10: Household income levels and tariff affordabilit in Mansa *(data from household survey undertaken by GFA in 2021 as part of RWS II project)*

Other research by the Zambia Statistics Office indicates that Luapula is amongst the poorest provinces in the country. Many years of performance reports from NWASCO also illustrate that LpWSC struggles to meet their own operating costs. Interviews with staff from both the utility and the ministry confirmed that LpWSC is given financial support on an annual basis. It is of course not surprising that it is difficult to run the utility as a financially viable concern when such a substantial portion of the customer base has limited financial means.

It is largely for the affordability concerns outlined above that the decision to adopt a "Hybrid Model" for rural water supply services was made. Such a model results in the following:

- Local O&M activities are carried out by people resident at the scheme.

- Local employees are employed by the community through a representative organisation (RWSC).

- The largest cost components in any utility are usually salaries and energy. The use of a "Hybrid Model" allows for local salaries to be set by communities at a level that is affordable to them.

- The salaries of local employees will be discussed and agreed on within the community and implemented through the RWSC. The recent technological advances in the use of solar power will be exploited to reduce energy costs. It is recognised that fuel powered engines may need to be installed as backup for times of low irradiation from the sun.

- Local user fees will be implemented at a tariff discussed and agreed within the community and the RWSC. Special arrangements for those households that are very poor

- Local user charges are collected by the RWSC, and all local costs are paid from these funds. These will include salaries of board members and caretakers, energy (limited), and spare parts and tools for minor maintenance. No funds are paid to the Support Service Provider or LpWSC. Will be considered at the same time as the discussions on tariff setting and user fee collection.

- Costs for major maintenance are provided for by LpWSC, and if necessary, the Ministry of Water Development and Environmental Protection.

- The costs of monitoring water quality and scheme performance, as well as support to the RWSC will be carried by LpWSC.

This model recognises that the provision of services when there is no "inherently viable trading proposition" is always going to be difficult. A model that shares that risk between the community and the utility at least allows each to focus on what they are best placed to provide without placing undue financial burdens and risk on one another.

9 ROLE OF THE MINISTRY OF WATER DEVELOPMENT AND SANITATION, NWASCO, AND OTHER SUPPORTING ORGANISATIONS

The enlargement of the mandate of Luapula Water and Sanitation Company to include operational responsibilities for infrastructure and water services in rural areas within their areas of jurisdiction will require significant changes and adaptation in the way they go about their business. The difference in context of service provision in rural areas will have profound implications for the resources required. Additional Staff with different skills will be needed, the wide geographical area to be serviced will require a significant increase in the transport

facilities, existing business systems will have to be improved, and new methods will have to be developed to accommodate aspects such as engaging with Community-Based Service Providers.

These, and many more, adaptations will be novel challenges for the Commercial Utility. It is implicit that substantial support will be required for such a transition to be as effective as possible. A number of possible areas of support are identified below, but this list should be seen as tentative, as new areas of support needs will emerge as the roll-out of services to rural areas unfolds:

- Development of management systems to support new business processes.

- Technical support on engineering and infrastructure management matters.

- Conciliation, mediation and arbitration of disputes between Communities, Service Providers and LpWSC

- Training (ongoing)

- Contract management

- Performance monitoring

- Reporting systems, KPIs, and Benchmarks

- Setting of norms and standards for the content of MoUs

Primarily, there is an immediate need for a system that monitors the progress made Luapula Water and Sanitation Company as they engage in the process of taking on responsibility for water services in rural areas. Such a system of monitoring must consider all aspects of the business from inter alia, fundamental issues such as adequate financing and staffing through to the effectiveness of management systems such as water quality monitoring and administration of contracts with third party Service Providers. Such a system of monitoring will serve a dual purpose of informing the nature of support required, as well as providing early warning of problems that may harm the organisation and impact negatively on service delivery.

10 SUMMARY OF THE APPROACH TO IMPLEMENTING RURAL WATER SUPPLY O&M

There have been recent changes to the regulatory arrangements of the water sector in Zambia. These changes necessitate that all Commercial Utilities (CUs) begin to put in place policies, procedures and practices that operationalise their broader mandate that includes rural areas. The

changes provide that NWASCO will issue operating licences only to the Commercial Utilities for all water supply and sanitation services. The implication is that all other organisations providing such services must operate under the licence of the CU, and hence must enter into service provision agreements with the relevant CU.
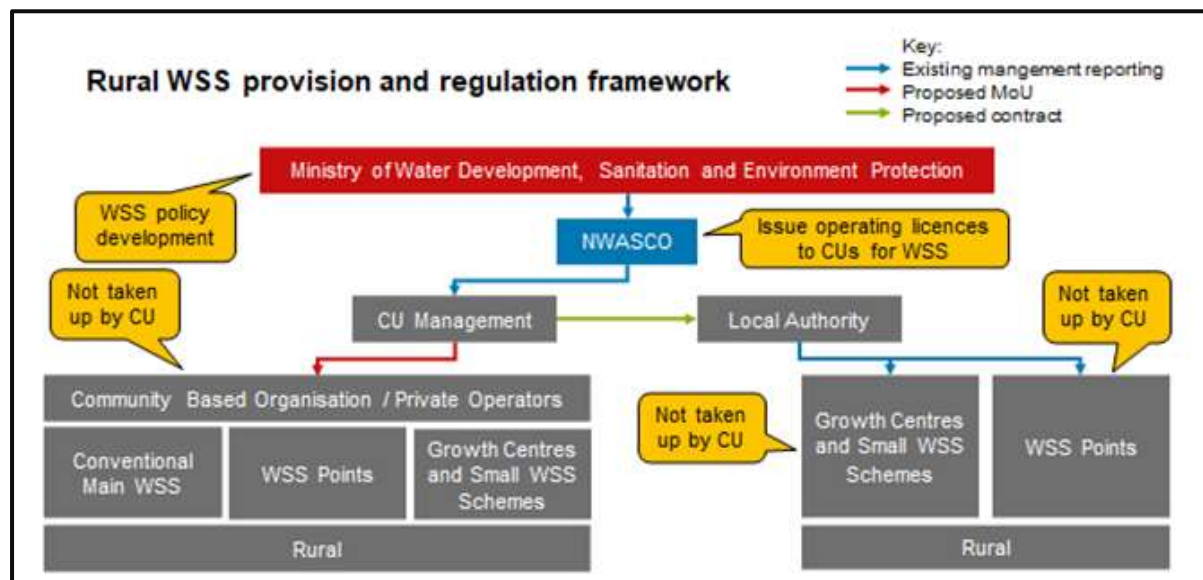
Figure 11: New regulatory framework *(adapted from NWASCO Sector Report 2020)*

The inclusion of rural areas within the jurisdiction of Commercial Utilities means an increasing scope of responsibility both in the short and long-term. In particular, ensuring safe services from piped water schemes will now fall directly within the mandate of the Commercial Utilities. For the moment, supply from point sources (boreholes with handpumps) remains within the mandate of Local Authorities (LAs) and the Ministry of Water Development and Environmental Protection.

Initially, the number of schemes that must be accommodated within the operational mandate may be limited, as there are few Rural Piped Water Schemes (RPWS) that must be absorbed into the CU operational arrangements. However, due to the settlement patterns across the country this 'rural mandate' may indeed become the predominant operational responsibility of the Commercial Utilities. In the case of Luapula Water Supply and Sanitation Company, there are currently 6 Towns under management and approximately 50 Rural Piped Water Schemes currently supplying services. The Utility carries out all operational activities at the 6 Towns and provides direct support to a 4 Rural Piped Water Schemes. The majority of RPWSs are operated and supported through various arrangements that include Community Based Organisations, Non-Governmental Organisations and Private Operators.

Responsible Organisation	Luapula Water Supply and Sanitation Company					
Infrastructure (Drinking Water)	H-Pumps (x 3351)	Small Piped Water Schemes (x 62)				Towns (x 5)
Support Agent	Local Authority	Local Authority	WV (MoU - Govt Dept)	Access Water 4 Zambia (draft MoU - LpWSSC)	FBO & Others (no MoUs) / LpWSSC (Direct Ops and Maintenance)	LpWSSC (Direct Ops and Maintenance)
Day to Day Ops (MOUs for Day to Day Activities)	Community Based Organisation	Community Based Organisation	Community Based Organisation	Scheme Attendant	Community / LpWSSC	LpWSSC
Financing Arrangements (Tariffs – Transfers – Taxes)	User Fees -Equal Fund -LA Taxes	User Fees -Equal Fund -LA Taxes	-- UNICEF & WV --	User Fees (PPM) AW4Z Subsidy --	User Fees Subsidy -- / User Fees Min of WDSEP	User Fees (m3) -Min of WDSEP --

Figure 12: Operating responsibility for water supply infrastructure in Luapula Province

It must however also be considered that Luapula province has around 950 discrete rural settlements. As infrastructure is created in these villages the operational challenges for LpWSC will grow, and change. The organisation will have to adapt their structures and business methods to accommodate the growth and the alternative technologies that will almost certainly be deployed in this large number of rural settlements.

The rate at which infrastructure and services are rolled out to these rural areas is not known and difficult to predict, but the future growth and the ultimate "end game" do deserve consideration as plans are made and implemented for putting in place short-term arrangements to accommodate the existing Rural Piped Water Schemes.

A study was conducted in 2020 to inform decision making on an operational model for LpWSC that included RPWSs. Importantly this work highlighted difficulties in realising a financial surplus from Rural Piped Water Schemes. Reports from many International and Zambian service providers in this regard were captured in the report. To mitigate the financial risks of taking on responsibilities that may become a cash drain on the organisation LpWSC opted for a "Hybrid Model" for water supply services in rural areas.

This will result in the following arrangements:

- Allocation of local tasks and activities to local community-based organisations.
- Ensures that a professional organisation is available to provide support when required.

Such "Support Service Providers" (SSP) could any one of the following:

- LpWSC themselves.
- A Local Authority.
- NGOs and faith-based organisations.
- Private organisations.

In this model the local costs are borne at the local level, and support costs are funded from the resources of the supporting organisation.

As the new mandates have now been put in place by NWASCO, it is incumbent on LpWSC to immediately begin working on implementation of the arrangements discussed in detail in this document, and summarised below:

- **Step 1 - Establishment of a department / section with LpWSC dedicated to the management of Rural Piped Water Schemes:** Due to the limited nature of the immediate work load this department/ section will initially only require staff at the Head Office in Mansa. However, the geographic spread of existing schemes will necessitate that some tasks be delegated to individuals in the regional office. The Rural Piped Water Scheme Department/ Section will deploy or hire staff at the various Regional Offices as the number of schemes increases and workload dictates. The roles and responsibilities of this department will include:
    - o Establishing Rural Water Supply Committees (RWSC) at each scheme.
    - o Ensuring that each scheme has an assigned a Support Services Provider (SSP)
    - o Putting in place agreements (MoUs) with RWSCs and SSPs.
    - o Providing training to RWSCs at the time of commencement of operations. A tentative training programme can be found in attachment I.
    - o Providing support and follow-up training to RWSCs and SSPs.
    - o Monitoring of the performance or RWSCs and SSPs.
    - o Coordinating regular sampling and analysis of the water supply from the pipe water supply schemes.
- **Step 2 - Putting in place service agreements with all Rural Water Scheme Committees (RWSC):** A standard agreement that indicates the role of Rural Water Scheme Committees will be developed and introduced to all beneficiary communities. The community will be required to form a committee and appoint a Caretaker / Operator. The Committee will provide oversite to the functioning and use of the scheme. The day-to-day operation tasks of the scheme will be carried out by the technical caretaker while revenue collection, billing and reconciliation of finances will be undertaken by the schemes cashier. The committee will also play an important role in facilitating effective communication with other role-players, especially the Support Services Provider, whether this be LpWSC themselves or an appointed external organisation.
- **Step 3 - Identify and appoint Support Service Providers:** Selection, or confirmation, of Support Service Providers will be undertaken against a checklist of attributes and competencies. Support Service Providers will also be required to comply with a series of service delivery norms and standards as stipulated by the National Regulator (NWASCO)

- **Step 4 – Implementing MoUs with external Support Service Providers:** After selection or confirmation each Support Service Provider will be required to enter into a Memorandum of Understanding with LpWSC. These MoUs will detail the roles and responsibilities of all parties concerned with rural water supply. Importantly the Ministry and the Local Authority will also be signatories to such MoUs, even if they have no direct role in service provision. Since this approach is exploratory, the MoUs will initially be non-binding and will depend on good faith negotiations to resolve challenges and disputes. After a period of 3 years, when some experience has been developed, MoUs that are binding will be negotiated and put in place.

- **Step 5 – Development of In-house institutional support service capacit**y: Even if much of the actual operational activity is outsourced, it will still be necessary for LpWSC to create internal capacity to support Rural Water Scheme Committees and Support Service Providers. There will need to be allocation of staff, provision of transport facilities and the creation of systems and operating procedures for RWSC and SSP support and monitoring. Monthly visits will be undertaken to each scheme for purposes of collecting written reports, hearing feedback from Committee members, Caretakers, Cashiers and community members, as well addressing operational and water use challenges and disputes. Along with providing support to RWSCs, an important part of this department's function will be developing capacity in contract administration for the management of both RWSC and SPS agreements/contracts.

- **Step 6 – Development of in-house Technical Support Service capacity:** The deployment of staff and equipment as well as the development of operational business systems and methods will be necessary in cases where LpWSC takes on the role of SSP and provides technical support as an internal function. The technical staff of LpWSC will undertake a monthly technical inspection of each scheme during which the condition and performance of infrastructure will be assessed, and water quality sampling and testing undertaken. Over and above this, the technical support team will respond to calls for assistance in times of emergency or equipment failure within 24 hours of receiving a report and call for assistance. Initially this task will be undertaken by the existing technical staff working at the 6 town schemes as the number of rural piped water schemes and the workload does not yet justify dedicated staff.

- **Step 7 - Develop reporting systems for RWSCs and SSPs –** Effective monitoring of RWSCs and SSPs will require that appropriate reporting systems be put in place by the Rural Piped Water Scheme department/section of LpWSC. Effective measurement and reporting of operational performance and challenges will be a critical element of ensuring the "Hybrid O&M Model" is effective. Such systems will be developed by LpWSSC, with due reference to international good practice and the regulatory reporting requirements as stipulated by NWASCO.

- **Step 8 - Develop minimum standards for technical activities:** To ensure effective and sustainable service delivery it will be necessary to put in place standard operating procedures

and performance targets. Some of these are already specified by NWASCO, but these generally relate only to levels of service and financial matters. There will also be a need to specify the approach to frequency of inspection and adjustment of equipment as well as the metrics stipulated by NWASCO.

- **Step 9 – Management of the agreements, MoUs and contracts:** Monitoring of the performance of external organisations involved in the provision of water service is a crucial aspect of the recent adjustment to the regulatory mechanisms of the water sector in Zambia. In that all service providers (RWSCs and SSPs) will operate under the licence granted to LpWSC; the CU will have to develop capacity to effectively carryout this function.

- **Step 10 – Consideration of O&M requirements when planning new infrastructure:** The operating challenges and future viability of LpWSC will be shaped by two forces, 1) the growth of urban and peri-urban areas and   2) The rate at which infrastructure is provided in rural areas. To ensure that O&M is considered as investment decisions are made, LpWSC will implement an investment planning committee to oversee and approve all new projects, thereby ensuring that a Sector Wide Approach (SWaP) is put in place to ensure that all new infrastructure is implemented in such a way that it is aligned with the operating procedures of the Utility and ensures the most effective use of resources.

The important aspects of implementing the "Hybrid Model" approach to rural water services are illustrated below. Details on each of these items are dealt with in the remainder of this document and the attachments hereto.
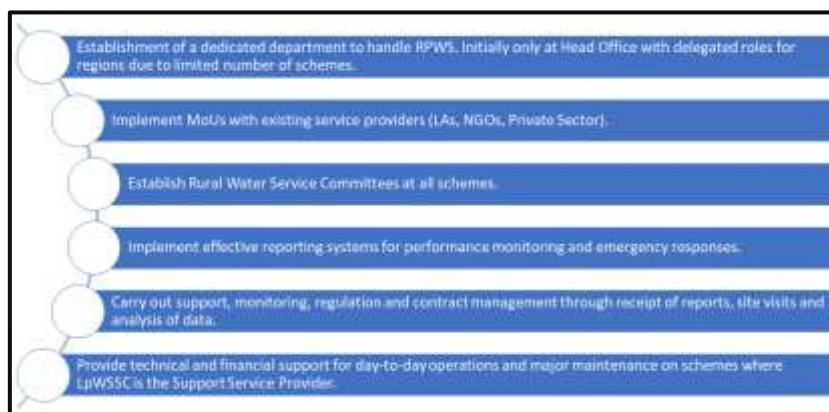
Fig 13: Summary of actions required for implementation of Rural Piped Water Services operation and maintenance arrangements

11   BIBLIOGRAPHY

1. Water Supply and Wastewater Management Handbook for District and Urban Councils (Botswana)

2. Handbook for Village Water Supply Operators (Botswana)

3. Mattcom Training Materials

4. Maluti GSM Operational Tools

5. Guidelines for Involvement of CBOs in Water Supply (DWS RSA)

6. Village Level Action Plan (Alfred Nzo District Municipality)

1 2   S C H E D U L E   O F   A T T A C H M E N T S

A. NWASCO Infrastructure Asset Management Guideline

B. Permitting Requirements for Engaging of Third-Party Service Providers in Rural Water Supply and Urban On-site Sanitation and Faecal Sludge Management by Commercial Utilities (NWASCO)

C. Template Memorandum of Understanding for Support Service Providers

D. Template Rural Water Service Committee Constitution

E. Rural Water Service Committee Reporting Templates

F. Rural Water Committee Day to Day Tasks and Responsibilities

G. Support Service Provider Report Templates

H. Rural Water Supply Committee Training Programme Example

I. Water Service Provider and Support Service Agent Selection

13   ATTACHMENTS

A. NWASCO GUIDELINES.

The National Water Supply and Sanitation Council

Permitting Requirements for Engaging of Third Party Service Providers in Rural Water Supply and Sanitation and Urban onsite sanitation and Feacal Sludge Management by Commercial Utilities

The National Water Supply and Sanitation Council issues licences to Water Supply and Sanitation Utilities (also called Commercial Utilities) and other Service Providers in accordance with section 11 of the Water Supply and Sanitation Act No. 28 of 1997.

The Licenced Commercial Utilities (CUs) are allowed to engage third parties for the provision of water supply and sanitation services and urban onsite sanitation and faecal sludge management in accordance with the license conditions and regulatory frameworks developed by NWASCO.

The CU shall ensure that no third party provides water supply and sanitation services within its area of the licence without a valid permit or contract with them. Commercial Utilities can, however, engage third party to provide services on their behalf who comply with regulatory requirements provided herein. All contracts entered into between the License Holder and Third parties shall not be executed without the prior consent of NWASCO as per License conditions. The CU shall remain responsible for the acts and omissions of the operator (including their agents and employees) for provision of such services. NWASCO shall not be a party or be liable for any contracts entered into between the Holder and Third Parties, unless otherwise expressly agreed in line with the license conditions.

1. GENERAL CONDITIONS

These conditions shall apply to providers of both urban onsite sanitation and Faecal Sludge Management and Rural Water Supply and Sanitation.

1.1 Identification Requirements

The CU shall ensure that the provider of rural water supply and urban Onsite sanitation is identified by obtaining the following information:

    (i)   Name of the company,

    (ii)   Name(s) and identification number(s) of the Director(s)

    (iii)   Physical address of the company

    (iv)   Contact Details

    (v)   Certificate of incorporation (if applicable)

    (vi)   Proof of registration in Zambia (if applicable)

1.2 Licensing Requirements

The CU shall ensure that the operator has the following:

    (i)   Business or Enterprise Licence

(ii)   ZEMA Waste Transport Licence

(iii)   Hygiene and Operational Licence from Public Health Office

(iv)   Road Traffic Licence and other required regulations

1.3 Employee Safety and Protection Requirements

The CU shall ensure that the operator has put in place measure to guarantee the safety and health of its employee. The CU shall ensure the employees for the operator have:

(i)   Valid immunization for disease for Cholera, Typhoid, Hepatitis B and any other

(ii)   Are Registered with the National Health Insurance Authority

(iii)   Individual PPE which shall on minimum consist of:

- Thick neoprene gloves
- Think latex gloves (to be worn under thick gloves)
- Impermeable overalls offering full coverage of clothing
- Gumboots (free from holes)
- Socks
- Dust mask (minimum standard) or gas mask (optimum)
- Helmet

2. SPECIFIC CONDITIONS

2.1   Faecal Sludge Emptying and Transportation

The CU shall ensure that the operator to be issued a permit complies with the following conditions:

a) Prior to issuing a permit to an operator to engage in the business of transporting faecal sludge, the CU shall ensure that the exhauster truck:

(i)   has a containment mechanism to conceal the contents except during loading and offloading;

(ii)   is water and air tight manufactured to prevent leakage and facilitate thorough cleaning;

(iii)   has self-sucking and offloading mechanisms;

(iv)   has safety devices including devices to detect leaks of liquid waste from the tank;

(v)   has been visibly marked as strictly carrying and transporting wastewater and faecal sludge only;

(vi)   has a vehicle inspection certificate;

(vii)   has a vehicle insurance;

(viii)   Possess hazard warning signs including multilingual signs together with appropriate information regarding remedial action;

(ix)   Has adequate personal protective and safety equipment for workers involved in liquid waste collection and transportation.

b) Prior to issuing a permit to an operator for manual emptying and transporting faecal sludge, the CU shall ensure that the operator:

(i)   Containers used to load the waste are water tight and manufactured to prevent any leakage

(ii)   Has the correct tools for manual emptying as determined by the CU

(iii)   Has a vehicle inspection certificate

(iv)   Has vehicle insurance

(v)   Possess hazard warning signs including multilingual signs together with appropriate information regarding remedial action;

(vi)   Has adequate personal protective and safety equipment for workers involved in liquid waste collection and transportation.

(vii)   Has public health Certificate

2.2   Rural Water Supply

Prior to issuing a permit to a rural water supply operator, the CU shall ensure that the operator:

(i)   State the type of scheme to be operated, that is, point source or piped water scheme

(ii)   States the source of water

(iii)   States the anticipated number of people to be served at the commencement of operations

(iv)   State the number of employees

(v)   States the management structure

B. DRAFT MEMORANDUM OF UNDERSTANDING FOR OPERATION AND MAINTENANCE OF RURAL WATER SUPPLY SCHEMES

Memorandum of Understanding for Water Supply Services

between

Luapula Water Supply and Sanitation Company

and

"*Insert Name*" Service Provider

1 3 . 1   P r e a m b l e

The *Insert Name* Service Provider has historically supported the provision of water supply services in the *Insert Name* area. The provision of this service was undertaken as part of the mandate of Local Government as described in XYZ statutes and Laws of Zambia.

Licences are issued to Water Supply and Sanitation Companies (Commercial Utilities) by the National Water Supply and Sanitation Council. This is in accordance with section 11 of the Water Supply and Sanitation Act number 28 of 1997. Commercial Utilities that are licenced can engage third parties to undertake the actual provision of services and they must ensure that all such companies or individuals adhere to all regulatory requirements. It is also a regulatory requirement that agreements between Licenced Commercial Utilities must include information as required NWASCO (attachment A).

1 3 . 2   P a r t i e s   t o   t h i s   a g r e e m e n t

The parties to this agreement and their respective details are described below:

Table 1:   Details of the Commercial Utility

Item	Detail
Name	
Names and ID of directors and chairperson	
Authorised representative and position	
Address	
Contact details	
Certificate of registration (number)[1]	
Proof of registration in Zambia	
Business licence (number)[2]	
Business licence (document)	
Hygiene operating licence (Dept of Health)	
Road traffic licences[3]	

Table 2:   Details of the Service Provider

Item	Detail
Name	
Names and ID of directors and chairperson	
Authorised representative and position	
Address	
Contact details	
Type of organisation: CBO / NGO / Company by Registration / Registered Society / Local Authority / Etc	

Constitution of organisation	
Certificate of registration (number)[1]	
Proof of registration in Zambia	(see attachments B)
Business licence (number)[2]	
Business licence (document)	(see attachments B)
Hygiene operating licence (Dept of Health)	(see attachments B)
Road traffic licences[3]	(see attachments B)

Table 3:   Details of the Local Authority

Item	Detail
Name: Constituency: Ward:	
Names and ID of elected representatives	
Authorised representative and position	
Address	
Contact details	
Certificate of registration (number)[1]	
Proof of registration in Zambia	
Business licence (number)[2]	
Business licence (document)	
Hygiene operating licence (Dept of Health)	
Road traffic licences[3]	

Table 4:   Details of the Ministry of Water Development and Environmental Protection (as witness to the MoU)

Item	Detail
Name	
Names and ID of directors	
Authorised representative	
Address	
Contact details	
Certificate of registration (number)[1]	
Proof of registration in Zambia	
Business licence (number)[2]	

Business licence (document)	
Hygiene operating licence (Dept of Health)	
Road traffic licences[3]	

Table 5: Details of the Communities Receiving Water Supply Services

Item	Detail
Name of community/s: Constituency: Ward:	
Names and ID of leaders / water committee	
Authorised representative and position	
Address	
Contact details	
Certificate of registration (number)[1]	
Constitution of Community Based Organisation	(see attachment C)

13.3   Background and Purpose

This Memorandum of Understanding MoU) describes the relationship between the Commercial Utility (Luapula Water Supply and Sanitation Company), the provider of Water Supply Services in *Insert Name/s* districts and other stakeholders that have an interest in ensuring safe water supply service to the residents of Luapula Province.

Water Supply and Sanitation Commercial Utilities are the designated as the licence holder for all domestic water supply and sanitation services across the respective areas of jurisdiction of all Provinces of the Republic of Zambia. Therefore the Commercial Utilities have ultimate responsibility for the supply of water supply and sanitation services to all citizens within their geographical area of jurisdiction. It is a regulatory requirement that all organisations, or individuals, providing water supply and sanitation services within the geographical area of jurisdiction of the Commercial Utility operate under the licence of the designated Commercial Utility, and that the roles and responsibilities and points of cooperation in the provision of services be described in an agreement between the parties.

Luapula Water and Sanitation Company has deeloped a new strategy toward the provision of rural water services. The adopted strategy is a hybrid of community-based responsibility for day-to-day operations, with the Commercial Utility or a willing and adequately resourced third party providing technical support as a Water Services Operator. The Water Service Operator will provide the services in line with the and O&M hybrid operator concept, that includes:

1.   Day to day O&M operation aspects being solely a CBO responsibility.
2.   Minor O&M repair aspects being solely a CBO responsibility.
3.   Major O&M repair aspects being solely a CU/ NGO responsibility.
4.   Billing and credit control O&M aspects being solely a CBO responsibility.
5.   New connections O&M aspects being solely a CBO responsibility.
6.   Spare parts provision O&M aspects being solely a CU/ NGOO responsibility.
7.   Technical support O&M aspects being solely a CU/ NGOO responsibility.
8.   Provision of fuel O&M aspects being solely a CBO responsibility.

9.   Payment for electricity O&M aspects being solely a CBO responsibility.

Services will be provided in compliance with the Service Level Guarantee (SLG) and Service Level Agreement (SLA) between LpWSC with NWASCO.

At the core of the hybrid model is the principle of 'local cost borne at a local level'.

This Memorandum of Understanding also describes the roles and responsibilities of other organisations and government departments that have an interest in the provision of water supply and sanitation services.

At this initial stage of formalisation of the ongoing cooperation between the parties, the provisions and statements in this Memorandum of Understanding **are binding** on signatories. An initial *insert number* year period is, however, considered as a 'trial and learning' period only, and no litigation or any associated legal action shall be entered into by any party to this Memorandum of Understanding during this 'trial and learning' period. The purpose of this 'trial and learning period' is to demonstrate and test the commitment of all parties to this agreement in creating and realising an enabling environment for the development of infrastructure and support to operation and maintenance activities for safe water supply services that comply with national guidelines, standards, and regulations.

All parties to this agreement also acknowledge that this Memorandum of Understanding will be amended from time to time. Such amendments will be in accordance with experiences and lessons learnt during the first *insert number* years of its tenure. After the initial *insert number* year "trial and learning period" legal action based on the provisions of this Memorandum of Understanding may be pursued.

13.4   Scope of work

The provisions of this Memorandum of Understanding apply to water supply services and associated infrastructure within the *insert name* District of the Luapula Province, and in specific the schemes and villages mentioned in Table 6 below.

It is estimated that the population served by the schemes provided for within this Memorandum of Understanding are as follows:

Table 6:   List of Villages Served

Name of Scheme	Villages Served	Location (Long – Lat)	Population Served	Ward / Constituency	Infrastructure Type
A					
B					
C					
D					
Etc					
Etc					
Etc					
Etc					

The scope of work, whether geographic or infrastructural in nature may be extended subject to mutual agreement of all parties that are signatory to this agreement. Any operational responsibility or infrastructure creation projects within the geographic area of responsibility of the Service Provider that may be added to the scope of work will be offered to the Service Provider on a "first refusal basis". If the Service Provider does not wish to take on the additional scope of work the commercial utility will consider other modes of implementation and/or operation.

In the supply of water services the Service provider may undertake any or all of the following:

1. **Design** - The design of all infrastructure and equipment associated with either new areas of service, or upgrades and extension in areas where services already exist.
   - All design and component sizing will be undertaken in compliance with the provisions of the Domestic Water Supply Design Guidelines of Zambia. Design reports will be prepared by the Service Provider and submitted to all signatories to this agreement for evaluation and approval, which will not be unreasonably withheld.

2. **Construction and Refurbishment** - Construction and refurbishment work associated with either new areas of service, or upgrades and extension in areas where services already exist.
   - Work undertaken by the Service Provider will comply with the norms and standards and good practise of the construction industry in Zambia. The approval of the Commercial Utility must be secured in writing prior to the commencement of any construction work. The Service Provider will adhere to all laws of Zambia that are relevant to construction activities, especially law on Occupational Health and Safety, Environmental Protection and the engagement of Labour. Upon completion of any construction work the Service Provider will submit a full set of As-Built drawings in a digital format compatible with the GIS system of the Commercial Utility. After the completion of any works the Infrastructure Asset Register of the Service Provider must also be updated and submitted to the Commercial Utility.

3. **Operations** – Activities associated with the operation and maintenance of infrastructure to ensure water supply to beneficiary communities. This will include both day to day activities and major maintenance as outlined and agreed in this Memorandum of Understanding. .
   - All operations will be undertaken in compliance with the laws, guidelines and provisions of the Ministry of Water Development and Sanitation (MWDS)t, NWASCO, Luapula Water Supply and Sanitation Company and the District Council.

4. **Training** – The development of capacity of skills of own staff as well as officials and staff of the Commercial Utility, Local Authorities and Community Based Organisations.
   - All parties to this agreement will provide support and training to other parties wherever they may have expertise or are running programmes that may be useful to the realisation of safe water supply services.

5. **Transfer** - At the termination of this agreement the Service Provider will hand back to Luapula Water Supply and Sanitation Company the infrastructure assets used to provide services.
   - These assets will be returned in the condition in which they were received, with allowance for fair wear and tear.

1 3 . 5   S t a r t   d a t e   a n d   d u r a t i o n

This Contract shall become effective on the date of signature of this document by all parties, and shall remain in full force for *insert number* years unless prematurely terminated for reasons justified in law and with due consideration of the beneficiaries of the service.

If any of the parties wishes to terminate the agreement for reasons other than breach of any provision of this agreement, they must approach all other parties to the agreement and attempt to agree on a practical exit plan that will not comprise services to consumers.

In all cases both parties shall give 90 days notice of intention to terminate the agreement. Such a notice will:

- State the reason for the desire to terminate the agreement, and the relevant clause of the agreement which has been breached.
- Specify the steps that have to be taken to remedy the breach.
- Specify the effective date of the notice and the time limit within which the steps described above have to be taken.

The penalty for early withdrawal will be *insert number* Zambian Kwacha

It is noted that the duration of this Memorandum of Understanding may be extended upon terms agreed to by all parties on condition that:

- At least 90 days notice before the expiry of this Memorandum of Understanding is given of the intention to extend the duration.
- All parties that are signatory to this Memorandum of Understanding sign the agreement of extension

1 3 . 6   R o l e   o f   t h e   C o m m e r c i a l   U t i l i t y

In the implementation of the terms and provisions of this Memorandum of Understanding, the Commercial Utility will:

1. Provide permission to the Water Service Operator to operate under the licence of Luapula Water and Sanitation Company.
2. Oversee,monitor and evaluate the operations of the Service Provider with a view to ensuring the provision of safe Water Supply Services. A reporting template will be developed together with the Service provider. The Commercial Utility will have the right, after giving of fair notice, to visit and inspect any of the schemes where water is supplied, and/or the infrastructure under the custodianship of the Service Provider.
3. Provide technical assistance to the Service Provider and the Community as and when required.
4. Finance and carry out major repair and maintenance work when required. Such major maintenance work will be identified and motivated for by the service provider. Action to be taken and work to be done will be negotiated between the parties that are signatory to this agreement. In the event of any emergency that requires major maintenance or repairs the commercial utility will support the Service Provider in raising funds for undertaking any work that is required, or equipment that must be purchased. As far as is required the Commercial Utility will also assist the Service Provider in the implementation of any procurement or work that may be required.
5. Monitor the quality, availability and sustainability of surface and ground water sources within the area.

6. Monitor the quality of water produced and distributed by the Service Provider and advise their management on remedial action to be taken.
7. The Commercial Utility will develop tariff proposals for the supply of water supply services and submit them to NWASCO for consideration. The Service Provider will be invited to have input to the process of cost analysis and tariff setting. The process of tariff setting will be carried out in compliance with the provisions and requirements of NWASCO.
8. Inform the Service Provider of the tariffs to be applied.
9. Provide capacity building to the Service Provider and beneficiary communities, as far as is possible within existing programmes and available funding.
10. Assist in carrying out community water supply sensitization workshops for both new projects and where services are already being provided.
11. Nominate a senior manager from the Commercial Utility to be part of the recruitment process of any person considered for a management role within the Service Provider.
12. Participate in all the Board meetings of the Service Provider.
13. Secure abstraction permits for all sources utilised by the Service Provider.
14. Facilitate the availability of land for operational activities of the Service Provider.
15. Where required, facilitate the carrying out of Environmental Impact Assessments.

The Commercial Utility undertakes to not interfere in the day- to- day operations of the Service Provider. However, the Commercial Utility reserves the right to intervene if and when:

- Water supply services are not deemed to be safe.
- There are misunderstanding or disputes between the Service Provider and the Community.
- Failure of the Service Provider to provide services at satisfactory level.

13.7   Role of the Service Provider.

In terms of the provisions of this Memorandum of Understanding, the Service Provider will:

19. Provide Water Services that are efficient, affordable and sustainable to residents within the geographic service area that forms the jurisdiction of the Service Provider.
20. Provide a Water Supply Service that complies with the standards of the World Health Organisation and the guidelines of NWASCO.
21. Ensure that the Water Supply Service complies with any other regulatory requirements or guidelines of the license conditions that apply to the Commercial Utility.
22. At all times strive to provide a safe water supply service and implement good customer care practices.
23. Design and implement systems for the collection of user fees from customers on a regular basis. These user fees from customers will be utilised for the payment of operational costs, including but not limited to, energy, staff costs, chemicals and spare parts for minor maintenance.
24. Apply the tariff prescribed for the Commercial Utility by NWASCO from time to time.
25. Ensure that customer agreements with all customers are put in place recorded in writing. These agreements will describe the service that will be provide, including the right of the Service Provider to cut off supply to customers that do not pay their user fees.
26. Operate in accordance with existing standards, laws and regulations related to water supply services.
27. Comply with general directives issued by NWASCO and/or the Ministry of Water Development and Environment from time to time. Such directives will be communicated through the Commercial Utility.

28. Adhere to any Standard Operating Procedures developed by the commercial utility.
29. Adopt and implement the standard institutional arrangements (Hybrid Model) between Service Providers and beneficiary communities as described in the O&M Plan of the commercial utility . At all schemes the Service Provider must establish a representative Community Based Organisation (CBO) for the management and governance of the water supply services which are the subject of this Memorandum of Understanding. A Water Supply Charter between the Service Provider and the beneficiary communities must be developed and implemented. This Charter will describe the roles and responsibilities of the Service Provider and "The Community", as represented by the afore-mentioned CBO.
30. The Service Provider will employ qualified, experienced and competent staff.
31. Indemnify consumers against any claims in any proceedings arising from any breach or failing on the part of the licensee.
32. Implement suitable performance monitoring systems and submit monthly reports on Financial, Technical and Administrative matters to the commercial utility by the end of the second week of the following month. Such reports should contain details on:
    a. Quality of water supplied at all schemes (sampling to be undertaken by suitably trained staff).
    b. Quantity of water supplied and analysis of consumption at all schemes.
    c. Continuity of the service provided (hours per day).
    d. Reliability of Infrastructure.
    e. Reliability of Water Sources.
    f. Costs incurred.
    g. Income received.
    h. Community Information (performance of CBO, Population changes, health related issues (clinic reports)
    i. Customer complaints and/or reports received.
    j. Injuries on duty and other occupational health and safety issues.
    k. Levels of Non-Revenue Water in a format, recommended by the International Water Association Water Balance methodology and in alignment with the guidelines of the Ministry of Water Development and Environmental Protection.
    l. Incidents where the quality, quantity and continuity of supply have been compromised
33. The Service Provider will keep financial records that adhere to internationally accepted accounting practice. External audits must be undertaken annually and submitted to the commercial utility upon request.
34. Develop Standard Operating Procedures for all business processes and include these in the business plan that will be prepared.
35. Ensure that all staff are immunised against Cholera, Typhoid, Hepatitis B and other relevant infections.
36. Ensure that good practise is adhered to in all matters of Occupational Health and Safety, and in particular that all staff (including scheme level operatives) are issued with appropriate personal protective equipment.

13.8   Role of the Ministry

In support of the roles and responsibilities of the licence holder (Commercial Utility) and the Service Provider under this agreement, the Ministry of Water Development and Sanitation will:

1. Monitor the performance of the Commercial Utility, the Service Provider and Community Based Organisations.

2. Monitor the compliance with this Memorandum of Understanding of both the Commercial Utility and the Service Provider.
3. Raise funding for the ongoing roll-out of water services infrastructure.
4. Manage the implementation of infrastructure creation projects.
5. Provide technical, administrative and financial support to both the commercial utility and the Service Provider on an as and when required basis.
6. Assist with liaison and communication with government departments, authorities and other organisations.
7. Coordinate and facilitate communication and engagement with development partners and funding organisations.

13.9 Role of the Community and Community Based Organisations

Community Organisations / Structures at each scheme will:

17. Establish an organisation/committee that will be responsible for Liaison and communication with all stakeholders that have an interest in the provision of water supply services in the community.
18. Cooperate with the Service Provider in all aspects of operation and maintenance of installed infrastructure at the scheme.
19. Sign a Community Water Supply Charter with the Service Provider.
20. Perform all day-to-day operations and maintenance of the infrastructure and equipment that is utilised to supply water to consumers within the community. A detailed programme of work will be established between the Community Based Organisation and the Service Provider
21. Give advice to consumers on the use of water in relation to the quantity, quality and continuity of service.
22. Keep records and provides reports on the water supply infrastructure and service at the scheme. The content of these reports will be identified and agreed to with the Service Provider.
23. Implement the tariff and billing for water supply that are agreed from time to time between the commercial utility and NWASCO
24. Collect user fees from consumers of water within the community. The collected funds will be kept in a dedicated water account held with the Service Provider or a Commercial Bank.
25. Ensure that consumers adhere to the rules and regulations as detailed in the Community Water Supply Charter.
26. Ensure that day-to-day operations and maintenance work is carried out in a safe manner and that there is due care given to protection of the environment.

13.10 Asset Management

All infrastructure assets associated with the provision of water supply services will remain the property of the Service Provider until lawful termination of this agreement. At that time the Commercial Utility will be required to pay fair compensation to the Service Provider, after which the assets will become the property of the Commercial Utility. Fair compensation will be determined through negotiation between the parties to this agreement, and fair depreciation as calculated through accepted accounting practice.

Luapula Water Supply and Sanitation and The Service Provider undertake to implement Infrastructure Asset Management practices as described in the guidelines provided by NWASCO (attachment D).

Within one month of signing this agreement the Service Provider is required to draw up a register of all infrastructure assets used in the provision of water supply services. This register will be attached to this Memorandum of Understanding and will form an important part of what is agreed between the parties.

The Infrastructure Asset Register (attachment E) must include information on the infrastructure and equipment associated with:

1. Water sources.
2. Abstraction.
3. Transmission (pipelines, pump stations, energy sources).
4. Water treatment.
5. Storage tanks.
6. Distribution networks.

The following information (attributes) on each item (asset) will be included:

1. Name.
2. Position (latitude and longitude).
3. Rated capacity.
4. Make, type, model, serial number
5. Supplier or service agent
6. Current performance
7. Current condition
8. Current depreciated value
9. Replacement value
10. Expected life from new
11. Remaining useful life.

The Service Provider may not pledge or otherwise encumber any of the Infrastructure Assets described in this Memorandum of Understanding, or any other items that that may be created during the term of this agreement. The service provider will ensure that all infrastructure assets acquired during the term of the agreement are placed on an amended version of the official infrastructure asset register and reported to Luapula Water Supply and Sanitation Company. The amended infrastructure asset register will be attached as an amendment to this agreement.

All operational assets, such as vehicles, tools, equipment, buildings, offices, furniture, software and computers will remain the property of the service provider upon termination of this agreement. Luapula Water Supply and Sanitation Company will be given first refusal to acquire such operational assets from the service provider if offered for sale at a reasonable market price.

13.11 Business Plan

Within the first year of the term of this agreement the Service Provider will develop a 5-year business plan for the services they are providing. The business plan will be updated annually and submitted for review by the signatories to this agreement. The topics to be covered in the business plan must include:

1. Information on the Service Provider – form of organisation, registration, history.
2. Services offered – location, population, level of service.
3. Operations – strategies, business processes, performance indicators, health and safety.
4. Investments required - plans for new areas of service, new connections.

5. Finance – financial targets, financial strategies (including tariffs, fees, charges), sources of funding, forecast revenue.
6. Resources required – staff and organogram, vehicles, equipment, offices, stores, workshops, supply chains.
7. Asset Management – asset management plans, infrastructure asset registers, data management.

If required, the Commercial Utility will assist the Service Provider and Community Based Organisations in the preparation of their business plans.

1 3 . 1 2   F i n a n c e

External funding (NGOs and LA) (mapping of resource flows required)

All tariffs collected by the Community Based Organisation will be used for the payment of operational costs at a local scheme level. In the event that a surplus is generated through the collection of tariffs, the Service Provider together with the community structures (CBOs) will have authority to suggest how these funds should be used. Such proposals will be submitted to the signatories to this agreement for their review and approval, which will not be unreasonably withheld.

Costs associated with major maintenance and repairs will be provided for through budget allocations of either the Service Provider or Luapula Water Supply and Sanitation Company (responsibility to be confirmed here in this agreement).

All funding received over-and-above tariffs collected, and the work undertaken with such funds, will be reported on in monthly reports. Where there is prior knowledge of such funds becoming available, this must be included in the annual update of the Business Plan of the Service Provider.

Any funds from development partners or other donors offered to any of the signatories to this agreement must be communicated to all other signatories. Such transparent communication of available resources will facilitate equitable and rational planning, leading to a Sector Wide Approach being in place for Luapula Water Supply and Sanitation Company.

Sourcing of the external funds for any project relating to water and sewerage services in the area shall be in line with the Government policy which entails that all resources for the improvement of water and sanitation shall be channelled through the mandated service provider – in this case the License holder.

If debt financing for the creation of any infrastructure is considered this must be presented to the signatories of this agreement for their consideration and approval. No such debt should be secured, and no project may begin until the approval of the terms and conditions of such debt are agreed to by all of the signatories.

1 3 . 1 3   G e n e r a l

It is noted that all parties have entered into this agreement in good faith. In any instance of disagreement the parties agree to convene, discuss and negotiate amicable solutions in the best interests of ensuring continued safe water supply to customers. Circumstance that give rise to a need for such discussion and agreement include:

- Any changes of relevant law
- Circumstance arising that impact on the ability of the Service Provider to continue to provide Water Supply Service (Force majeure).

In the event that no agreement can be reached through negotiation matters will be resolved by means of arbitration. in accordance with the Arbitration Act, Cap 40 of the Laws of Zambia.

It is further recorded that:

- The language of correspondence will be English
- Laws and statutes of Zambia will apply.
- Confidentiality between parties will be respects, including documents and communications, proprietary information and financial records.
- All variations/amendments of this agreement will be in writing and signed by all parties.
- This Agreement shall not be deemed as a form of financial commitment on the part of any party, unless as expressly agreed by the parties from time to time.

Attachments B

Documents Required from the Service Provider

Attachments C

Constitution of Community Based Organisations.

Attachments E

Infrastructure Asset Register

C. MODEL RURAL WATER SUPPLY COMMITTEE CONSTITUTION

CONSTITUTION OF A RURAL WATER SUPPLY COMMITTEE

At a meeting held on _____ at _____ the community of _____ agreed the following:

To establish a Rural Water Supply Committee (RWSC). The name of the RWSC will be

……………………………..

List of the elected officers of the CBO:

FULL NAME	SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

The purpose of this constitution is to form a representative structure for the undertaking of activities associated with water supply to the community. The RWSC will also serve as a mechanism for engagement with Luapula Water Supply and Sanitation Company and any Support Service Agent appointed by them.

The RWSC will be a not-for-profit organisation.

The RWSC will only undertake activities in the community it represents.

This constitution is subject to the rules, regulations and operating procedures of the LpWSSC.

The community will elect the staff of the RWSC. All residents within the community may participate in the election of staff of the RWSC.

The staff of the RWSC will consist of 3 board members and 1 technical caretaker that will employed for a period of 3 years from the date of signing of this document. At the end of this period new elections will take place.

Members of the Community may call on the RWSC, with the assistance of LpWSSC and the SSP, to cancel the membership of any staff member who breaks the rules of this Constitution. Likewise the replacement of staff members may take place if the staff member resigns, becomes of unsound mind, or they are removed by a decision of the members of the Community in a General Meeting.

The RWSC will hold monthly meetings with the RWSCC and the SSP, as well as regular meetings with the members of the Community.

At these meeting reports will be presented on the performance and condition of the water scheme, any technical work that is required, challenges related to the functioning of the RWSC, and the finances of the RWSC. Minutes will be kept of all meetings.

A quorum to constitute any meeting of the RWSC will be at least 25% of the community.

The RWSC will be entitled to collect user fees from households receiving water from the scheme. The tariff to be applied will take into account the operating costs (salaries, energy, spare parts for minor maintenance, etc) as well as the income levels of households in the community. The determination of the tariff to be applied will be done in consultation with LpWSSC and the appointed SSP. In these discussions special consideration will be given to how user fees from very poor households will be dealt with.

The RWSC will be entitled to open an account with the Local Authority for the safe keeping of funds they may have received.

It is noted that all infrastructure and equipment of the scheme will be the property of LpWSSC, but that the community and the RWSC will be expected to exercise good care and responsible usage of the scheme.

A two thirds decision of the members of the Community in a General Meeting may call on the CBO to dissolve the RWSC and re-elect the staff members. This same two thirds majority is required for amending the terms of this Constitution.

Any dispute arising out of any of the provisions of this Constitution will be resolved through negotiations that will include the participation of LpWSSC and the appointed SSP. ,

The roles and responsibilities of the RWSC will be:

1. Establish an organisation/committee that will be responsible for Liaison and communication with all stakeholders that have an interest in the provision of water supply services in the community.

2. Hold annual elections for the various posts of employment within the organisation.

3. Cooperate with the Support Service Provider in all aspects of operation and maintenance of installed infrastructure at the scheme.

4. Sign a Community Water Supply Charter with the Service Provide and the Commercial Utility.

5. Perform all day-to-day operations and maintenance of the infrastructure and equipment that is utilised to supply water to consumers within the community. A detailed programme of work will be established between the Community Based Organisation and the Support Service Provider.

6. Give advice to consumers on the use of water in relation to the quantity, quality and continuity of service.

7. Keep records and provides reports on the water supply infrastructure and service at the scheme. The content of these reports will be identified and agreed to with the Service Provider.

8. Implement the tariff and billing for water supply that are agreed from time to time between the commercial utility and NWASCO

9. Collect user fees from consumers of water within the community. The collected funds will be kept in a dedicated water account held with the Service Provider or a Commercial Bank.

10. Pay all salaries of employees of the CBO.

11. Purchase all equipment and materials for minor maintenance.

12. Pay all energy accounts associated with the supply of water.

13. Keep records of all income and expenditure of the CBO.

14. Ensure that consumers adhere to the rules and regulations as detailed in the Community Water Supply Charter.

15. Ensure that day-to-day operations and maintenance work is carried out in a safe manner and that there is due care given to protection of the environment.

SCREENING OF APPLICANTS

Interview and Test:

Called for interview (date & time): _____

Applicant's confirmation: _____

Venue for interview: _____

Results from test and comments: ....

....

....

Interview Evaluation

Rate on following (1 is low, 5 is high)	1	2	3	4	5
Physical: appearance, dress, manner, health					
Competence: combine education/training, skills, experience, attitudes					
Personality: emotional maturity, initiative, reliability, responsibility					
Motivation & expectations					
Match with others in department					
Overall impression					

General Comments: ....

....

....

....

Final Recommendation: ....

....

....

SCREENING OF APPLICANTS

Job & applicants:

Advertised vacancy: _____

Name of applicant: _____

Sex: _____   Age: _____   Application No: _____

Present occupation and employer: _____

Screening of Application Form:

	Very weak (1)	Weak (2)	Good (3)	Very good (4)	Excellent (5)
Skills					
Experience					
Education and training					
Availability (5 = can start immediately, 1 = long notice)					
References					
Total score					

Grand total score:.............. Applicants with a minimum of 15 score to be callde for interview.

Summary of Reference Checking and/or Other Comments: ....

....

....

....

....

....

....

....

D. TEMPLATES FOR RURAL WATER SUPPLY COMMITTEE DAY-TO-DAY TASKS

TASKS AND OPERATIONS
(Rural Water Service Committees - Caretakers)

TASK 1:	THE CARETAKER WORKS WITH THE RWSC AND GIVES THE COMMUNITY ADVISE ON ALL MATTERS RELATED TO WATER
1	The caretaker monitors water consumption in the village and gives advise on the use of water. He also prevents the misuse of water.
2	The caretaker monitors the level of water in the borehole
3	The caretaker monitors the quality of water
4	The caretaker trains and monitors standby caretakers

TASK 2:	THE CARETAKER MAKES ALL WATER SUPPLY REPORTS WITHIN THEIR VILLAGE
1	The caretaker records information in the log books.
2	The caretaker reports break-downs to the support service agent and takes action according to emergency procedures.
3	The caretaker monitors and carries out any repairs that may be necessary or assists the Support Services Agent with these repairs
4	The caretaker assists with any extensions or modifications to the scheme.
5	The caretaker monitors and requests spares and tools as and when they may be required.
6	The caretaker keeps tools and spares stored according to the requirements.
7	The caretaker does a technical assessment of the scheme every three months and completes the necessary report.

TASK 3:	THE CARETAKER MAINTAINS THE PROTECTED AREA AROUND THE BOREHOLE AND ALL ITS INSTALLATIONS
1	The caretaker keeps the protected area clean and neat.
2	The caretaker keeps the pump house clean and in good condition

TASK 4:	THE CARETAKER OPERATES THE POWER SUPPLY (SOLAR, ENGINE, ETC) AND PUMP
1	The caretaker checks the gland packing every time the pump is used, adjusts it and replaces it when necessary.
2	The caretaker checks the vee belts every time the pump is used and adjusts or replaces them when necessary.
3	The caretaker checks the foundation bolts, nuts and screws on the engine and pump every time it is used, and tightens them if necessary.
4	The caretaker records all meter readings within the pumpstation.
5	The caretaker monitors the electrical system and reports any faults.
6	The caretaker services the exhaust system.
7	The caretaker keeps the engine and pump clean.

TASK 5:	THE CARETAKER MAINTAINS ALL PIPELINES
1	The caretaker maintains water pipeline marker poles.
2	The caretaker detects and repairs leakages on all pipelines.
3	The caretaker records all meter readings on the main pipelines.

TASK 6:	THE CARETAKER MAINTAINS ALL STANDPIPES
1	The caretaker keeps standpipes and soakaways clean and in good repair.
2	The caretaker repairs and replaces taps when required.
3	The caretaker records all meter readings at the taps.

TASK 7:	THE CARETAKER MAINTAINS ALL VALVES AND OTHER FITTINGS OF THE RETICULATION SYSTEM
1	The caretaker keeps all valve chambers clean and in good condition.
2	The caretaker checks all private connections and ensures that they are operating correctly.
3	The caretaker receives applications for private connections and reports them to the WSP.
4	The caretaker checks all valves and repairs or replaces them when necessary.

TASK 8:	THE CARETAKER MAINTAINS THE RESERVOIR OF THE VILLAGE WATER SUPPLY SYSTEM
1	The caretaker reports any leakages.
2	The caretaker ensures that the reservoir has sufficient water in it.
3	The caretaker checks and replaces the chlorine tablets within the reservoir.
4	The caretaker cleans the inside of the reservoir.
5	The caretaker checks and repairs all valves at the reservoir.
6	The caretaker keeps the area around the reservoir clean and tidy.
7	The caretaker ensures that the reservoir manhole is closed.

TASK 9:	THE CARETAKER MONITORS AND REPORTS ON THE STATUS OF SANITATION FACILITIES AND SANITATION PRACTISES WITIN THE VILLAGE
1	The caretaker observes and reports on any private latrines that may be a potential health hazard to the community
2	The caretaker observes and reports on any latrines at public facilities that may be in disrepair or that pose a potential health hazard to the community
3	The caretaker observes and reports on any bad sanitation practise taking place within the village

Reference: Adapted from United Local Govt Service Botswana

RECORD KEEPING

DESCRIPTION OF O&M ACTIVITIES

		TIME REQUIRED (hrs)		
		PER JOB	PER MONTH	PER YEAR
DAILY		0.5	4	48
1	Incident and fault reports are recorded in duplicate			
2	The pumpstation logbook is filled in when the pump is used			
MONTHLY				
1	Operators timesheets are completed	2	2	24
2	Copies of all fault reports are submitted to the maintenance supervisor	2	2	24
3	Minutes of all WSP meetings are kept and copies are submitted to the maintenance supervisor	5	5	60
4	Submit monthly report and collect payments	5	5	60
AVERAGE HOURS REQUIRED PER MONTH				18.0
Payment per month (Example: ZK 7-61 /hr)				137.0

Reference: Adapted from Chris Hani District Municipality SSA

BOREHOLE WITH SOLAR OR DIESEL POWERED PUMP

DESCRIPTION OF O&M ACTIVITIES

		TIME REQUIRED (hrs)		
		PER JOB	PER MONTH	PER YEAR
DAILY (When the pump is being operated ie. 2X per week) (diesel power)		2.5	40	480
1	check condition and level of oil - top up oil if required check fuel level - top up if required visual check for oil or fuel leaks check tension in vee belts (tighten if necessary) check nuts, bolts and screws (tighten if necessary)			
2	check isolation valve is open and waste valve is open check water level in borehole start engine check that water is flowing through waste valve, if not stop engine. slowly close waste valve check that water is flowing through the water meter, if not stop engine.			
3	check that pump is running and water is being delivered during the day check the gland packing for excessive leaks	.		
4	open waste valve slowly stop engine close waste valve check water level in borehole record in log book (hours run, flow meter, water level)			
DAILY (When the pump is being operated ie. 2X per week) (solar power)				
1	check all electrical connections check condition of solar panels			
2	check isolation valve is open and waste valve is open check water level in borehole start electrical motor record in log book (hours run, flow meter, voltage, current water pressure, water level) check that water is flowing through waste valve, if not stop motor. slowly close waste valve check that water is flowing through the water meter, if not stop engine.			
DAILY (When the pump is being operated on automatic (solar power)				
1	check all electrical connections check condition of solar panels			
2	check isolation valve is open and waste valve is open check water level in borehole record in log book (hours run, flow meter, voltage, current water pressure, water level)			

DAILY (During operation) 1 periodically check that pump is running and water is being delivered during the day. 2 check that all gauges and meters are giving "normal" readings, if not stop the motor and investigate the cause.			
WEEKLY 1 remove and clean air filter (diesel power) 2 clean engine (diesel power) 3 clean solar panels (solar power) 4 clean inside and outside of pump station	2	8	96

MONTHLY (or every 250 hours of service) (diesel power)
    drain and replace oil
    clean sump strainer
    renew oil filter
    check exhaust system and repair if necessary
    record service in log book
	3	3	36

EVERY 4 MONTH (or every 1000 hours of service) (diesel power)
    renew fuel filter element
    remove injectors and test spray (reinstall or service as necessary)
    check valve clearance and adjust as necessary
    record service in log book
	5	1.25	15

YEARLY (or every 3000 hours of service on the pump)
    remove pump and rising main from well and inspect
    check pipe threads and recut corroded or damaged threads
    replace corroded pipes
    decarbonise piston inlet and exhaust valves
    regrind valves in valve seating and check wear.
    record service in log book
	9	0.75	9

WHEN REQUIRED (approx. every six months)
    periodically clean fuel tank (diesel power)
    drain water from fuel filter (diesel power)
    check that pressure cut out is operating
    check engine bearings for signs of wear (diesel power)
    repair leaks and replace faulty valves on the rising main
    scour the rising main
	1
	0.5
	1
	5
	4
	5
		0.17
		0.08
		0.17
		0.83
		0.67
		0.83
			2
			1
			2
			10
			8
			10

AVERAGE HOURS REQUIRED PER MONTH			55.8
Payment per month (Example: ZK 7.61-00/hr)			424.48

Reference: Adapted from Chris Hani District Municipality SSA

PIPED DISTRIBUTION SYSTEM

DESCRIPTION OF O&M ACTIVITIES

	TIME REQUIRED (hrs)		
	PER JOB	PER MONTH	PER YEAR
FORTNIGHTLY <u>at the reservoir check that</u>: - there are no leaks - the overflow is working - valves are open or closed (as required) - the inlet control valve is working correctly - the flow meter is working - the flow into the reservoir is adequate (if not check and clean strainer or flow meter) - the roof of the reservoir is not damaged and that the manhole cover is in place. - there are chlorine tablets in the chlorination system and replace if necessary - the chlorine content of the water is correct	2	4	48
<u>distribution pipelines</u>: - walk the pipeline routes and check for leaks - take meter readings at taps - check that taps are working (unblock strainers and meters as required) - attend to dripping or leaking taps - attend to minor damage on taps - clean around tap - check that all valves are correctly set - attend to any leaking valves	6	12	144
YEARLY - drain reservoir, clean and inspect - repair any damage to reservoir - check and repair all valves - check and reinstate all markings on reservoirs - check air release valves - open wash out valves and scour pipelines	8	0.7	8
WHEN REQUIRED (2 day per month allowed for repairs)			
- repair pipeline leaks	8	8	96
- repair erosion on pipelines, at reservoirs and standpipes	8	8	96
AVERAGE HOURS REQUIRED PER MONTH			32.7
Payment per month (Example: ZMW 7.61/hr)			248.75

Reference: Adapted from Chris Hani District Municipality SSA

E. TEMPLATES FOR RURAL WATER SUPPLY COMMITTEE REPORTING

Luapula Water RWSC Programme

MONTHLY RWSC REPORT

Scheme: …………………………………... **Water Supply Project**

Month and Year:_____

1. Quality Of Water

Visual quality of water		Muddy	Murky	Clear
Taste of water		Bad	O.K.	Good
Smell of water		Bad	O.K.	Good

2. Supply of Water /

Availability of water from source		always	part of day	part of month

No. of street taps installed	
% Tap Days Operational	
Total Number of Higher Levels of Service Connections	
Total Number of NEW unauthorised connections this month	
Total Number of disconnected unauthorised connections this month	
Total Number of unauthorised connections	

Details of any water shortages or interruptions experienced

Date occurred	Duration	Description

3. Faults And Repairs

		Problem	**Date of Action**	**Action taken**
Spring protection / Weir				
Main Pipeline				
Reservoir				
Reticulation				
Taps				

4. Health And Sanitation Report

4.1 Use of traditional source

Drinking	Washing	Comments

4.2 Incidence of WATSAN Disease in the last month

Diarrhoea	Cholera	Typhoid	Comments

4.3 Sanitation Situation Report

Total No of HH in village	
Total No of HH with NO sanitation facilities	
Total No of HH with Sub-RDP Sanitation facilities	
Total No of HH with RDP sanitation facilities	

5. Customer Relations and Communication
5.1 Monthly WSP Meeting

Date	**Key issues**	**Action to be taken**

Minutes attached	YES	NO
Attendance Sheet attached	YES	NO

5.2 Community Report Back

Date	Key issues	Action to be taken

6. Occupational Health and Safety Report

Date	Description of Accident	Action Taken

7. Spares and Tools Required

Area	Stock Required	Quantity
Pump station		
Spring protection / Weir		
Main pipeline		
Reservoir		

Distribution Network		
Taps		

8. Committee Members, Operators and Administrators

		Name	Name	Name
Committee Members				
Caretaker				

Meters And Taps Operational Report

Water Supply Project

Scheme: _____
Village: _____
Sub - Section: _____
Caretaker _____

METER READINGS   Tank: Inlet   Date   Reading

Month End		
Mid Month		
Previous Month		
Total Water Consumed		

f the Month .... (is the tap working on thi

October

No.	TAP NAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Sub Total (number of days the tap worked in the month)
1																																	
2																																	
3																																	
4																																	
5																																	
6																																	
7																																	
8																																	
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29																																	
30																																	

Sub Total (1)

Total Number of Taps (2)
Total Number of days (3)

No. of taps X No. of days (2x 3)

(Divided By)   Sub Total (1)

79

Taps and Meters Summary Report:

Individual Villages

	Area 1	Area 2	Area 3	TOTAL
No. of street taps installed				
% Taps Days Operational				
No. of yard taps				
Total Number of Higher Levels of Service Connections				
Total Number of NEW unauthorised connections this month				
Total Number of disconnected unauthorised connections this month				
Total Number of unauthorised connections				

Higher Level of Service Connection is a connection to a school or clinic or any other community facility that has been authorised by LpWSSC

F. TEMPLATES FOR SUPPORT SERVICE PROVIDER REPORTING

Support Service Provider Visit Record

Scheme: **Village:**

Location: **Name of installation:**

Date of this visit:

1. Work Done: (Meeting, Payments, etc)

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

2. Observations of CBO:

Committee	
Administrator	
Operator	
CBO reports	

3. Work done by:

Name:

Organisation:

Sign:

Support Service Provider Pipeline and Structures Service Record

Scheme: _____   **Village:** _____

Location: _____   **Name of installation:** _____

Date of this visit: _____   _____

_____   _____

1. Work Done: (leaks, scouring, etc)

1 _____

2 _____

3 _____

4 _____

5 _____

2. Observations/Condition of Equipment:

Weir	
Pump	
Bulk pipe	
WTW	
Reservoir	
Meters	

3. Work done by:

Name: _____

Organisation: _____

Sign: _____

Support Service Provider Equipment Service Record

Scheme: _____   **Village:** _____

Location: _____   **Name of installation:** _____

Date of this service: _____   Hours run since last service: _____

Date of last service: _____   Flow since last service: _____

1. Work Done: (filters, belts, oil, fuel, mech etc)

1 _____
2 _____
3 _____
4 _____
5 _____

2. Observations/Condition of Equipment:

Solar System / Motor		Pressure gauges	
Pump		Controls	
Belts		Bolts and fittings	
Valves		Buildings	
Fuel store		Pressure reading (at full duty):	
Exhaust		Flow meter reading:	
Meters		Bulk and retic piping etc.	

3. Description:

Solar System / Motor:		Pump:	
make & model		make & model	
size		pulley	
serial number		running speed	
pulley			
belts			
running speed			

Borehole:	
depth	
depth of pump	
static water level	
max yield	

4. Work done by:

Name: _____

Organisation: _____

Sign: _____

G. EXAMPLE RURAL WATER SUPPLY COMMITTEE START-UP TRAINING PROGRAMME (ADAPTED FROM MATTCOM)

Reform of the Water Sector Programme Phase II in Zambia (RWS II)
A Guide to Implementing Operation and Maintenance for Rural Water Supply Schemes - LpWSC

Training Modules for Rural Water Services Committees

MODULE	OBJECTIVES	CONTENT/TOPICS COVERED	KPI'S	TIME FRAME
1 Introduction	To ensure that the RWSC: Understands that there is both National and Local Legislation that provide a framework for the provision of services. Understands who is accountable to whom. Understands the purpose and implications of LpWSSC's water policies and by-laws	Water Services Legislation; Roles and Responsibilities of Stakeholders in water services in Luapula Province (ie. RWSC/ staff of RWSC / LpWSSC staff / Loacal Authorities councillors) Contractual relationships between stakeholders Communication channels between stakeholders RWSC's policies (e.g. Tariffs, Private connections, water service policy etc)	RWSC's able to explain LpWSSC-RWSC organogram and differentiate between the responsibilities of LpWSSC and the RWSC LpWSSC has contact details of RWSC; RWSC has contact details of key people in LpWSSC RWSC has copies of LpWSSC policies and procedures	2 days
2 Roles and Responsibilities: RWSC-LpWSSC Water Services Provision Contract	To ensure that the RWSC: Understands the content and implications of its contract with LpWSSC Understands the nature of the services and the specific activities that need to be provided in order to meet the requirements of the contract. Draw up a constitution	Contractual arrangements of the LpWSSC -RWSC contract Constitution	Signed contract Constitution adopted by community	2 days
3 Operation and Maintenance - how to operate and maintain the water infrastructure	To ensure that the RWSC: Understands the nature of the scheme Understands the operational and preventive maintenance requirements of the scheme Has the necessary communication channels in place to deal with customer complaints and to report to LpWSSC Understands the LpWSSC's policies and procedures pertaining to water services Puts the necessary systems in place to implement the LpWSSC's policies and procedures. For example, to develop a procedure for dealing with illegal private connections	Operational requirements of each scheme Specific tasks and activities for each staff member ie.development of an operations schedule Identification channels to report and deal with incidences Develop procedures for addressing illegal private connections, theft and vandalism	A scheme specific O&M Operational Plan prepared by the RWSC in which the operational requirements of the RWSC as per the signed contract are detailed: Description of the scheme with schematic layout; Daily operations; Maintenance; Customer Relations and Communication; Health and hygiene promotion; Financial management; Staff organogramm; Job Descriptions; Functions and responsibilities of board members; Constitution; etc	2 days
4 Management and Administration	To ensure that the RWSC: Understands its responsibilities as an employer Has the necessary Financial Management systems and controls in place for revenue collection, banking, payment of staff and financial reporting Has basic record keeping systems in place	Job discription for each position; Recruitment of Staff; Employment of Staff Financial Management Training; Opening of account with LA and basic bookkeeping Basic record keeping and filing	HR Policy in which the following are addressed: Job descriptions, recruitment policy and procedured. Signed employment contracts between RWSC and staff RWSC opened up a an account with the LA; Financial Record keeping systems in place Up-date records which include: Staff timesheets; monthly RWSC reports; montly RWSC meeting minutes; incident reports, etc Stock Control	2 days
5 Sanitation, healt and hygiene - what are the links, why are they important and how to get the maximum health benefits out of improved water and sanitation	To ensure that the RWSC understands the importance of improved health and hygiene practices To ensure that the RWSC is able to raise customer awareness of health and hygiene, water and sanitation issues, and the links between them	Proper health & hygiene practice Contamination routes and barriers Proper health & hygiene practice Contamination routes and barriers Appropriate sanitation options Develop plan to create awareness on basic health, hygiene and sanitation practices	RWSC to be able to recognise hazardous health situations and to be able to report them to LpWSSC	1 day
6 Customer Relations, communication and conflict resolution	To assist the RWSC to put the necessary communication channels in place to keep customers informed of the status of the scheme and to address customer needs and complaints	Develop a communication systems to report back and keep community informed on the status of project ie.g Finances, planned interruptions, water restrictions, LpWSSC policies	RWSC to come up schedule of community meeting; minutes of these meetings; File containing customer care complaints and records of steps taken to address complaints	1 day
7 Looking after water - the why and how to look after water	To ensure that RWSC understands the: Water cycle and why look after water importance of water conservation and monitoring How to put systems in place to ensure that water is used efficiently and conserved	Water resources and the water cycle Monitoring water quality (Caretaker) Monitoring water quantity (Operator) Systems for ensuring water is used efficiently	RWSC to develop policy to address situations where there is unsafe water available for consumption Water consumption levels monitored Policy to deal with consumption above the allocation	1 day
8 How to get customers to participate - the why and how of community / consumer participation	To ensure that the RWSC understands: The importance of consumer participation How to get consumers involved in decision making How to facilitate participatory methods	What is 'participation'? What sorts of issues and decisions should consumers participate in ? How to ensure consumers are involved in decisions - participatory methods	C/W agenda; minutes of meetings; attendance sheets; involvement of local stakeholders at meetings	1 day
9 Monitoring and Reporting	To assist the RWSC to meet the reporting requirements of the LpWSSC-RWSC contract To assist the RWSC to identify key performance indicators to monitor its performance	Monitoring water consumption and type of use. Monthly RWSC reports Incident reports	Successfully and timeously completed reports as required by the signed contract	1 day
			Total	15 days

H. WATER SERVICE PROVIDER AND SUPPORT SERVICE PROVIDER SELECTION CHECKLIST

ZAMBIA

Reform of the Water Sector Programme Phase II in Zambia (RWS II)

Checklist for Determining Operation and Maintenance Arrangements, Roles and Responsibilities for Rural Water Supply and Sanitation in Zambia

Users Guideline

April 2021

Executive Summary

Background

The sustainable operation and maintenance of water supply and sanitation systems is a challenge throughout the world; and this is certainly true in Luapula Province and elsewhere in Zambia. The long-term sustainability of these services is clearly at risk unless effective models of operation and maintenance can be identified and implemented.

In 2018, the mandate of Commercial Utilities (CUs) was expanded to include service provision in rural areas, in addition to their existing responsibilities for water and sanitation services in urban and peri-urban areas. The national sector regulator is currently putting in place measures to regulate rural water supply and sanitation services. CUs are now assessing options for institutional arrangements to ensure adequate provision of rural water and sanitation services.

Aim

The overall aim of this Assignment was to investigate and make recommendations on models and/or approaches for the management and resourcing of the operation and maintenance function for piped water supplies in Luapula Province.

Arising from this, a Checklist was developed to guide consideration of options for managing and resourcing the operation and maintenance function for piped water supplies in Zambia's rural water supply sector.

Approach

This document outlines a checklist of issues to consider when assessing how best to assign roles and allocate resources to meet rural water supply needs in particular contexts and locations.

The checklist covers the following topics:

- Business offering
- The external context
- Customer analysis
- Infrastructure
- Operations activities
- Resource requirements
- Partners
- Institutional arrangements
- O&M model and arrangements

The checklist approach aims to encourage a comprehensive review of a range of issues that will assist in assessing the trade-offs between different approaches, and the need to consider incremental improvements and development.

Its purpose is to support informed decision making through providing a checklist of issues to be considered. It is not a manual, and it does not provide detailed guidance on how to undertake an

assessment. It assumes that users are sufficiently familiar with the issues to undertake the necessary assessment and develop an integrated analysis.

Targeted users

This checklist has been compiled to assist senior officials in commercial utilities, local and national government and their development partners in determining how best to satisfy the requirements of effective water service provision in the short, medium and long term.

1. Introduction

1.1 Purpose of this document

This document aims to guide consideration of options for managing and resourcing the operation and maintenance function for piped water supplies in Zambia's rural water supply sector. It does this by providing a checklist of issues to consider when assessing how best to assign roles and allocate resources to meet rural water supply and sanitation needs in particular contexts and locations.

This is not a manual, and it does not provide detailed guidance on how to undertake an assessment. It assumes that users are sufficiently familiar with the issues to undertake the necessary assessment and develop an integrated analysis. Its purpose is to support well-informed decision making through providing a comprehensive reminder of issues to take into account so as to assist in identifying and anlysing the risks associated with making poor decisions around selection of service providers.

This checklist has been compiled to assist senior officials in commercial utilities, local and national government and their development partners in determining how best to satisfy the requirements of effective water service provision in the short, medium and long term. The checklist approach aims to encourage a comprehensive review of a range of issues that will assist in weighing the trade-offs between different approaches, and the need to consider incremental improvement development.

1.2 The Zambian context

Until recently, water and sanitation services in Zambia's urban and peri-urban areas were largely the responsibility of Commercial Utilities (CUs), while in rural areas, the operation and maintenance of water supplies has historically been carried out by various actors, including Local Authorities, Non-Governmental Organisations (NGOs) and Community-based Organisations (CBOs). In 2018, the mandate of CUs was expanded to cover service provision in all areas – rural, peri-urban and urban – and NWASCO is now putting in place measures to regulate rural water supply and sanitation services.

CUs are now assessing different arrangements for ensuring adequate provision of rural water and sanitation services. Three broad options exist:

- The CU takes full responsibility for O&M and employs all staff.

- Community-based management, with all O&M matters dealt with at community level. Support is provided by other agencies (CUs, NGOs, etc) on an ad-hoc or emergency basis.

- A hybrid of community-based responsibility for day-to-day operations, and technical support from either the CU or a willing and adequately resourced NGO.

This checklist aims to assist assessment of the relative merits of the different options and the trade-offs between them based on a rigorous and comprehensive review of the unique features of a particular locality and its service needs.

1.3 How this checklist works

The checklist -

- Identifies a broad area for consideration and explains why it is relevant.

- Lists the key issues to review, with some commentary on factors to consider.

- Suggests where the necessary supporting information might be found and adds any relevant comments.
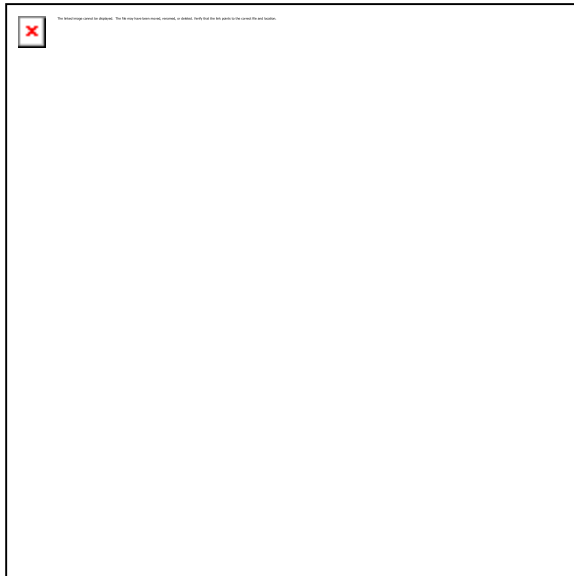
The checklist covers the following topics:

- Service offered
- The external context
- Customer analysis
- Infrastructure
- Operations activities
- Resource requirements
- Partners
- Institutional arrangements
- O&M model and arrangements

The checklist is structured around three core premises:

- There is no <u>single best</u> institutional model for rural water services delivery. What is likely to be the best arrangement is highly context-specific, and can only be determined on the basis of detailed consideration of factors influencing local service provision outcomes.
- Water services are 'asset-heavy'. The nature of the water and sanitation infrastructure and associated equipment largely determines the activities required to provide the service, and in turn these activities determine what resources are required. This informs assessment of how best to mobilise, organise and manage the required resources, and what type of institutional arrangements need to be put in place.

- Effective institutional arrangements are necessary but not sufficient to ensure acceptable service delivery outcomes. Importantly, eensuring sustainable provision of reliable, good quality services requires adequate funding. If the revenue that can be collected is less than the ongoing cost of providing the service, there will not be a viable commercial proposition. Under such circumstances necessary O&M activities will not be undertaken and the service will deteriorate rapidly. In such cases supplementary funding will need to be secured to support ongoing service provision. The evidence from a recent review of water services delivery models in a range of countries suggests that effective water services delivery is more a function of the financial arrangements than it is of the institutional arrangements.[1]

Consequently, this checklist put strong emphasis on the need to understand the nature of the infrastructure and the associated ongoing resource requirements as a basis for quantifying and mobilising the funds and resources needed. What institutional arrangements are put in place only satisfies part of the requirements for sustainable service delivery.

2.   What are the Services Offered?

2.1 Purpose of this section
To define the required service in each specific location from the perspective of a Services offered.

2.2 Elements to consider

- Retail sales of piped water.

- Retail sales of water delivered by tanker.

- Collection and treatment / disposal of wastewater and sludge from pit latrines, septic tanks, etc

- Collection and treatment of sewered wastewater.

2.3 Comments
The assessment must consider the market and demand for each service (water supply and sanitation), as well as the infrastructure, activities and resources requirements associated with each. The checklist aims to structure and guide a comprehensive review of these elements to determine a good-fit model for each service offered. Cafeful attention must be paid to the different contexts that may apply, for example urban water and rural water schemes may require different skills and resources for effective operation and maintenance. Likewise, sanitation service offered through sewered infrastructure is has qualitatively different operational requirements to Faecal Sludge Management.

Each service has its own distinct infrastructure and equipment requirements and associated activities and resource requirements. In addition, the nature of the institutional and funding arrangements required to support each service and business process offering may differ.

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[1] Manuel Schiffler, 2015, *Water, Politics and Money: A reality check on privatization.*

Periodic collection and transport of highly variable quantities of sludge from non-standardized pit latrines and septic tanks. This illustrates how fundamentally this service may be to providing a consistent and continuous supply of piped water.

The provision of water and sanitation services is a business that is subject to economies of scale. It is essential that the unit of analysis under consideration – the service area - be clearly defined. Gaps and duplication when reviewing the different elements should be avoided through clear definition of the area of investigation, as operational areas may need to be clustered under a single management structure, with possible interconnection of infrastructure.

2.4 Sources of information
Information on the nature of services to be delivered can be sourced from

- Current service providers and service authorities.

- Local Government.

- Community members.

3. The External Context

3.1 Purpose of this section
To understand the macro-environment that the business operates in, so that it can plan and align its operations and activities in line with broader trends.

3.2 Elements to consider
A simple PESTLE analysis (Political, Economic, Social, Technology, Legal and Environment) provides a useful framework for identifying the various external factors that affect the performance of an enterprise or organisation.

- **Political:** trends and dynamics, impact on social cohesion, effect on the economy, resource allocations to Water Services.

- **Economic:** conomic circumstances and likely developments, locally, regionally and nationally? How do these affect budgeting, the cost of goods and services, living standards and ability of households to afford service charges?

- **Social:** tion and settlement growth, migration, seasonal dynamics, socio-political environment, community participation and buy-in.

- **Technology:** and developments that may affect water and sanitation services, including telecoms costs, internet access, energy considerations, including availability of grid electricity and fuel, increasing use of solar energy. Also, consideration of developing technologies, for example for pit desludging.

- **Legal:** licy and legislative environment, governance, implications of increasing regulation of RWSS.

- Environmental: es regarding the physical environment, including changing weather patterns, especially drought and flood, and their impacts on energy supply; seasonal cash-flows; rainfall patterns and the availability of alternative water sources. Also, considerations of pollution due to inappropriate disposal of faecal sludge and wastewater.

3.3 Comment

This analysis is essential to understand the organization's market and business position, plan strategically, and identify trends and possible changes that could affect both supply of, and demand for services.

This should not be limited to these categories. For example, the economic impacts of COVID on donor funding, and changing priorities among development partners, could have significant implications for local service provision and support.

3.4. Information sources

Information can be gathered readily online and through speaking to relevant specialists. National and local government officials and politicians can also provide insights on developing trends.

4. Customer analysis

4.1 Purpose of this section

Customer analysis enables assessment of relative demand for different service offerings, supports strategic planning to ensure that the resources allocated are aligned with where service demand is greatest, and provides a basis for estimating whether likely sales and potential income are adequate to provide for sustainable delivery.

4.2 Elements to Consider

- Businesses   Both formal and informal.

  Fresh produce and goods markets might not be connected to water supply, despite demand.

- Government departments   Includes hospitals, clinics, schools, boarding schools, colleges, and other government offices and facilities.

- Domestic users   Households from different income levels with varying service needs and aspirations. Also, private connections versus kiosks versus no service access

- Affordability   Nature of predominant local economic activities

  Average household incomes

Seasonal differences

Identifying ultra-poor households for whom special measures may be required

•	Sales estimates	Use available data to quantify volumes supplied monthly across different service options. If not metered, estimate current population x average daily consumption; or estimate number of households x average monthly consumption, for different piped water, tankered water, kiosk sales and communal tap options.
•	Revenue estimates	Use sales estimates x average price per m^3 for different service options to calculate total likely monthly revenue.
•	Payment mechanism and credit control	Identify what proportion of customers are paying, and how they are paying. Identify what credit control measures are being used, and how effective they are. Identify who is not paying and why they are not paying.
•	Trading break-even analysis	Compare sales and revenue data against cost data to assess whether the cash flow is likely to be positive or negative

4.3 Comment

An essential part of the Customer Analysis is to quantify who is currently served and not served, as a basis for assessing the nature and extent of service gaps. Covering costs adequately while leaving a significant number of people inadequately served is obviously not desirable.

Note that where the existing cash flows are positive, the current service provider may be reluctant to transfer control to another party, even though a transfer of responsibility might support overall service improvements. Equally, where cash flows are negative, service providers will be reluctant to step in without other measures to supplement revenue income.   A non-viable trading proposition is a burden to any service provider and will result in deteriorating service quality unless supplementary funding support is made available.

4.4 Sources of information

Start with the records and perspectives of current service providers. The data required is seldom available, accurate or update-to-date, and so well-informed estimates should be used to improve on the available data. Use census data as a base line for population data (household numbers, average number of people per household) and update it using the perspectives of local and traditional authorities to reflect population and settlement growth.   Use property valuation data, tax and licencing records and organisational records to inform estimates of income levels and consumption levels. Source all available records relevant to assessing water consumption, sales, income and expenditure, and demand for each type of service.

Guidance on how to conduct cost analyses and assess the break-even point can be found in numerous text books, and an online search will provide ample pointers.

5. Infrastructure

5.1 Purpose of this section

Provision of services requires infrastructure, and this infrastructure determines the nature of the work to be done, the activities involved and the resources required.

5.2 Elements to consider

The following infrastructure should be described in as much detail as is necessary to support assessment of the activities, resources and personnel required to operate and maintain them sustainably:

- Water source / sources
- Intake works
- Pumps and pump stations
- Drinking water treatment works - treatment process and its associated infrastructure elements, including ancillary equipment for dosing pumps, laboratory work
- Transmission pipelines
- Storage tanks
- Drinking water distribution network
- Private connections - number and type, and whether they are metered
- Kiosks
- Public standpipes
- Alternative supplies (e.g. handpumps)
- Waste water collection sewers
- Wastewater treatment works, including sludge treatment and disposal
- Outfall sewers
- Energy systems including solar energy systems, back-up generators, fuel tanks, and so on
- Process and machine control systems

5.3 Comment

Faults, deficiencies and vulnerabilities that impact on performance and operating and maintenance costs should be noted. For example: how resilient are the water sources in times of drought? What measures are in place to safeguard the source from environmental contamination if, for example, it is downstream from particular mining, agricultural or industrial activities, or dense settlements with inadequate sanitation? Equally, evidence of neglected maintenance should be flagged to inform assessment of the real costs of running a functional system.

5.4 Sources of information

Information on each element can be obtained by going to site and observing what is in place, speaking with the relevant design engineers and operational personnel, and reviewing the available documentation.

6. Operations Activities

6.1 Purpose of this section

Identification of core and supporting business processes informs what resources will be required and enables the development of work and job descriptions.

6.2 Elements to consider

Figure 1 below outlines the core operations activities in water and sanitation service provision, and their associated operational, engineering and administrative support processes. Consider in detail what each and every activity entails.
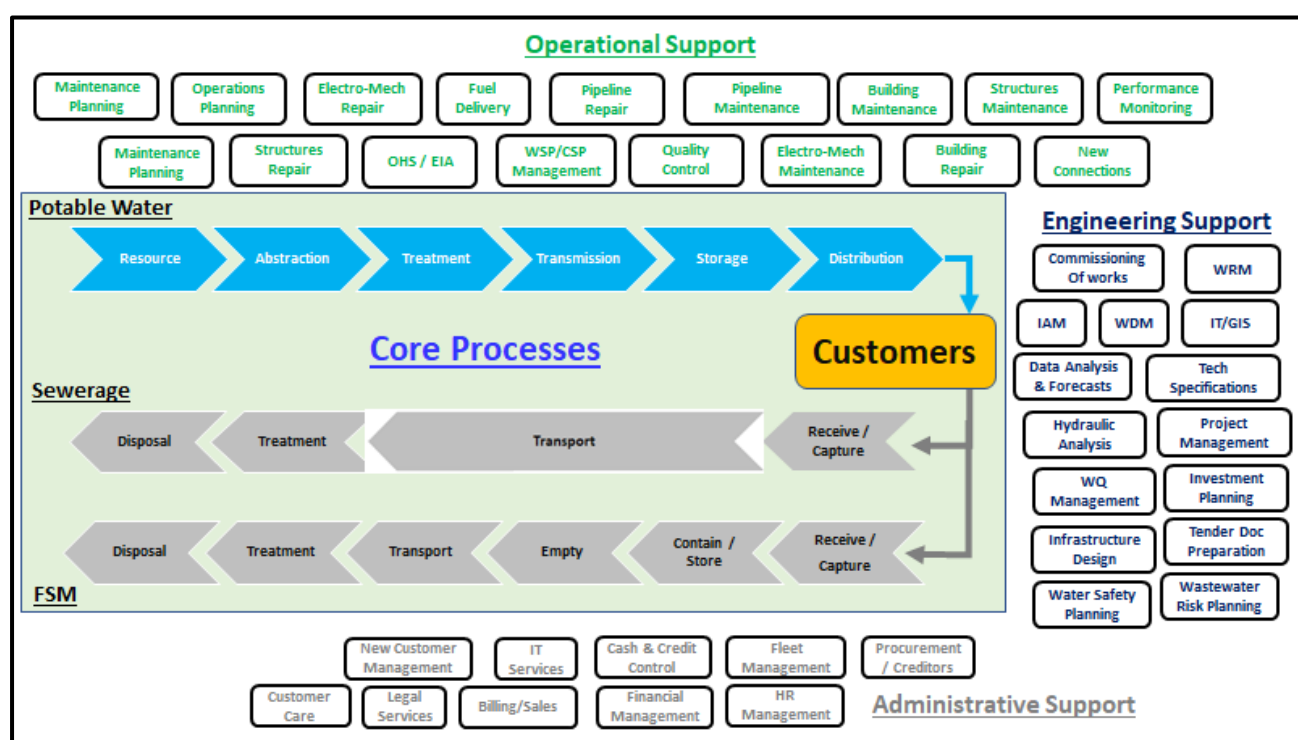

Figure 1. Business processes in water and sanitation service delivery

6.2.1 The core processes

- Raw water abstraction
- Treatment of raw water
- Transmission of drinking water
- Storage of drinking water
- Distribution of drinking water

- Collection / transport of wastewater and faecal sludge
- Treatment of wastewater and sludge
- Return of treated wastewater
- Re-use or safe disposal of sludge

6.2.2 Operational Support Processes

- Pipeline repair and maintenance
- Electro-mechanical repair and maintenance
- Tech-structure repair and maintenance
- Building repair and maintenance
- New connections
- Meter reading and management
- Fuel delivery
- Occupational health and safety
- Community support
- Performance Monitoring

6.2.3 Engineering Support Processes

- Water Resource Management
- Water Quality Management
- Water Demand Management (what is metered and what is not?)
- Engineering Analysis (hydrology, hydraulics, pumping, treatment process, specifications, etc.)
- Information Management (GIS, Integrated Asset Management)
- Forecasting and Planning

6.2.4 Administrative Support Processes

- Customer Management (new connections, metering and billing, customer care)
- Billing
- Receiving Payment
- Credit Control
- Communication
- Budgeting
- Procurement
- Financial management
- Fleet management
- Human resources (HR) management

6.3 Comment

The assessment should take note of what is *actually* happening, rather than what *should* be happening. Process gaps and deficiencies should be noted, to avoid under- or over-estimating what is required to provide effective services efficiently.

6.4 Sources of information

Information on each element can be obtained by visiting and observing each site of activity, speaking with the relevant personnel and reviewing relevant documentation.

7. Resource requirements

7.1   Purpose of this section: Identification of the resources required to carry out the operations and maintenance activities involved in ensuring effective service provision.
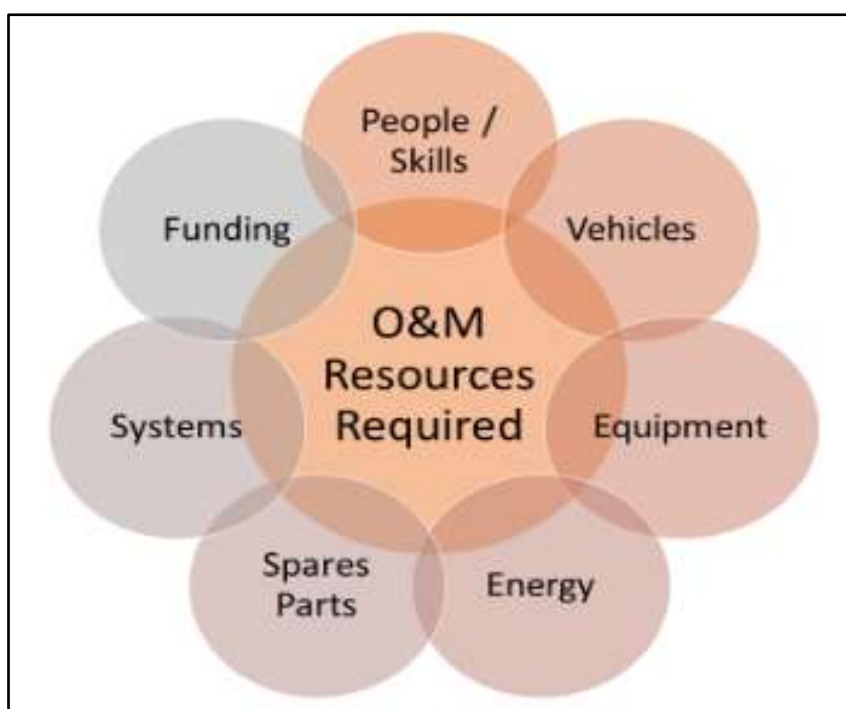
Figure 3. Some of the resources required for O&M

7.2. Elements to consider

- **H u m a n   R e s o u r c e s   (P e o p l e   /   s k i l l s)**
    - Professionals (technical and admin)
    - Technicians
    - Skilled artisans (and Administrators)
    - Labourers

- **T r a n s p o r t   (V e h i c l e s)**
    - Trucks
    - Light delivery vehicles (LDVs)

- Motorbikes.

- **Equipment (Plant and tools / machinery)**
    - Excavation equipment
    - Lifting equipment
    - Construction plant
    - Tools.

- **Energy (Fuel/electricity)**
    - Manpower (provided for handpumps)
    - Fuel for motors to drive generator sets and pumps
    - Electricity from the grid to power motors
    - Solar power

- **Spare Parts**
    - Replacement pipes
    - Pipe fittings
    - Pump parts
    - Electrical parts (i.e. switches and control parts)
    - Meters and gauges.

- **Systems (Schedules / procedures / plans)**
    - Billing
    - Monitoring
    - Infrastructure Asset Management (IAM)
    - Plans /schedules / procedures).

- **Funding (grants / loans / tariffs)**
    - Tariffs - These should take account of customers' ability and willingness to pay. Note that customers may use traditional sources in the rainy season to avoid payment.
    - Transfers - Development partners and government may provide support from time to time
    - Taxes - These are not typically available for water or sanitation.

7.3. Comments

This is the crux of the assessment and can only be undertaken once all the preceding sections have been completed in detail. Detailed consideration is necessary to take account of each infrastructure component, all plant, equipment and vehicles, all associated activities and inputs, and the personnel and skills required to operate and maintain the systems.

By way of illustration, some of the resource requirements for a water treatment plant would include -

- Infrastructure, including pumps

- Energy for core and ancillary plant and equipment

- Goods and materials such as spare parts and chemicals for flocculation, stabilisation and disinfection

- Vehicles and equipment for transporting heavily loads of chemicals and spare parts, and associated fuel requirements

- Personnel. This should be assessed in detail to quantify the number of process controllers, general assistants and security guards needed to support 24/7 operations, in addition to and Office Support staff. The inputs of millwrights, electricians and mechanics, and laboratory personnel for water quality testing are likely to be shared across a number of sites and installations. The training and formal qualifications of personnel required to undertake the various activities required for operation and maintenance should be specified.

- Capital maintenance costs for large scale repair, overhaul, augmentation or replacement of infrastructure and equipment, calculated on the basis of the size and nature of the plant

- Etc.

Personnel: Figure 4 below illustrates how the number of staff required on the ground at *scheme* level informs the resources required at higher levels for supervision and management.
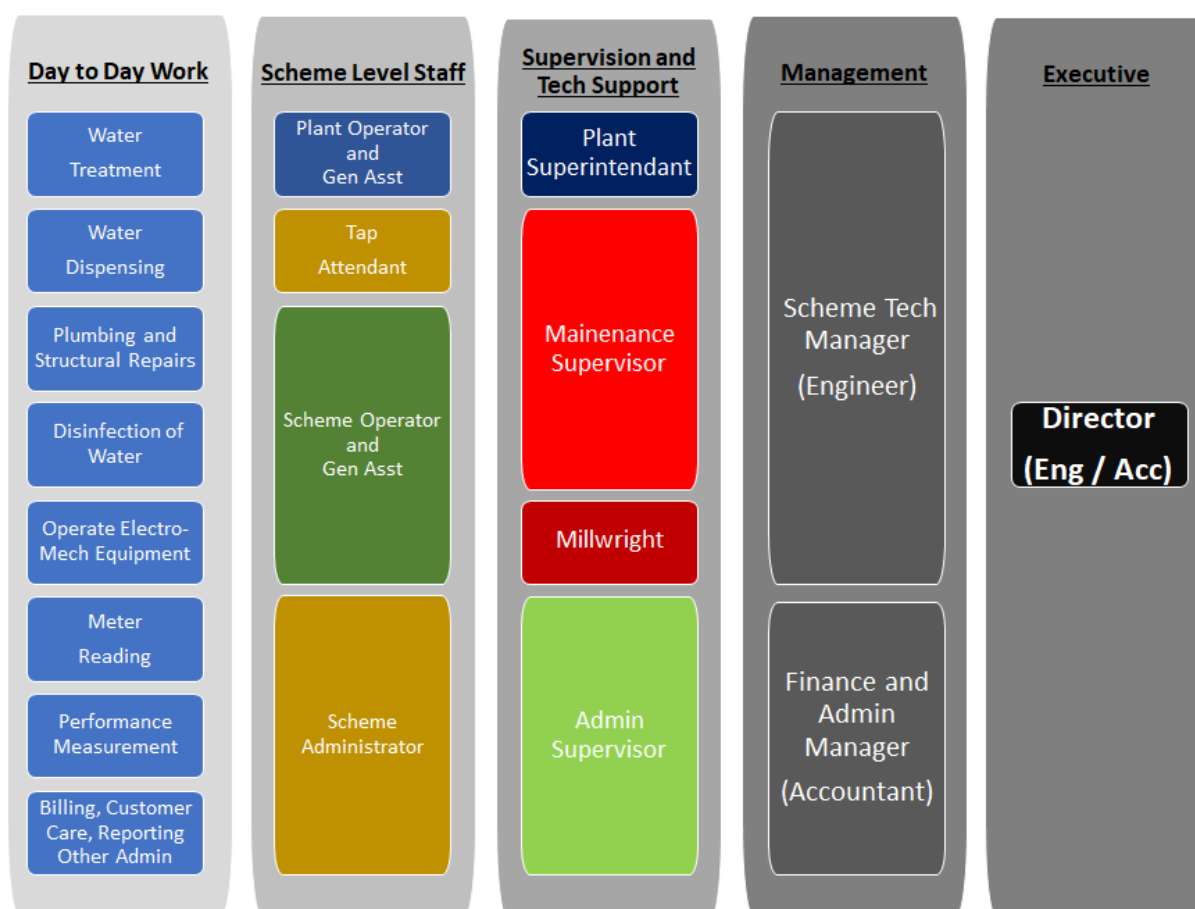
Figure 4. Typical activities on the ground and their implications for staffing

This is not a comprehensive outline of staff resources, and the diagram does not show care-takers, security guards and office support staff, or specialised technical and professional personnel.

Transport: Inadequate arrangements for transport are common, and can seriously compromise the performance of any system or scheme as personnel, equipment and goods cannot be transported timeously to where they are needed.

7.4. Sources of information
Information on the resources available and required for each element can be obtained by going to site and observing the systems in place, speaking with relevant operational personnel and reviewing the available documentation. Useful supporting resources can be found online, for example through the Rural Water Supply Network - https://www.rural-water-supply.net/en/ and https://www.rural-water-supply.net/_ressources/documents/default/1-944-2-1616590899.pdf.

8. Partners

8.1. Purpose of this section
Identify possible sources of support and assistance in providing water and sanitation services.

8.2. Entities to consider

- Local Government

- NGOs

- Private sector (including small scale contractors such as handpump mechanics and kiosk agents).

- Community-based organisations

- Other

8.3 Comments

CUs may not necessarily have the resources to recruit and deploy the resources required for effective service provision and may need to rely on partnerships with organisations willing and able to collaborate with them.

Local authorities are currently playing a role in service provision to some extent, but with very limited resources. Consequently much of the day-to-day work of water supply is undertaken by structures representing the users themselves, namely community-based organisations. Their resources are extremely limited, and many are not equipped to undertake even simple repairs and maintenance, let alone capital maintenance work. Small-scale contractors such as handpump mechanics and kiosk agents play a valuable role where funds can be mobilised to pay for their services. Non-government organisations may be able to mobilise both funding and skilled personnel, but their resources and reach is finite and falls far short of demand.

Nonetheless it is important to identify all possible partners, the resources and skills they may be able to offer and explore ways of formalising their support.

Where piped water schemes are supplied from boreholes, it is essential that any organisation providing O&M support should have a geo-hydrologist on their staff. It is also proposed that an engineer should be recruited to take responsibility for management aspects such as water demand management, asset management, scheme development and extension, reporting and GIS and, together with the geo-hydrologist, water resource management.

8.4. Sources of information

Zambia's water sector is well networked, and most role-players are already well known to each other. The process of identifying potential partners is likely to focus more on mapping the specific attributes and spatial focus of the known entities than on seeking out unknown role-players who could provide support.

9. Institutional arrangements

9.1 Purpose of this section

Consider the merits, disadvantages and trade-offs in pursuing partnerships to achieve optimisation and sustainability of service delivery outcomes.

9.2 Options to consider

- CU in-house service delivery, with CU undertaking full responsibility for O&M, and all staff employed by the CU

- CU, with specific functions out-sourced

- Community-based management (CBM), with Village Level Operation and Maintenance (VLOM)

- CU-Local Government partnership, with a contract or Memorandum of Understanding (MoU)

- CU-CMB partnership with an MoU

- CU-NGO partnership with a management contract

- CU-Private company partnership with a management contract

9.3 Comments

Current arrangements tend to be *ad hoc*, without clearly set-out agreements on how the arrangements will work. Consequently the review of options should consider in detail what role each entity would play in relation to the following areas of responsibility:

- Day to day operations

- Minor repairs

- Major repairs

- Billing and credit control

- New connections

- Spare part provision

- Technical support for water demand management, water resource management and asset management

- Provision of fuel

- Payment for electricity

Optimal deployment of the resources required will need to consider availability of skills, travel distances, and the facilities in each area office. The CU may lack the resources to take on all functions in-house, and scheme attendants, handpump mechanics and kiosk vendors might be employed at a local level and not become staff of the Commercial Utility. Supplementary support could be provided by the CU, local authority, NGOs or contracted service providers. Alternatively, a CU might consider establishing a dedicated unit to support community-based management.

Consideration of the different options must be informed by the financial resources that are actually available, including grants from central government and development partners. The scope for wealthier domestic and business consumers to cross-subsidise commercially unviable services may be limited.

10. The O&M Model and Arrangements

10.1. Purpose of this section

Identification of roles and responsibilities, levels of performance and the form of agreement between the parties.

10.2. Elements to consider

- Long-term vision

- Preparation for phased transitions

- Profit and loss analysis

- Cash flow analysis

- Preparing for emergencies

- Effectiveness of current arrangements

- Communication of the outcomes

10.3. Comment

A flow diagram that maps the process of decision-making and the options for consideration may prove useful in structuring discussion and communicating the process and its outcomes.

11. The Checklist

Section and Purpose	Elements to Consider	Observations and Comments
Services Offered		
Define the required service in each specific location from the perspective of service offered.	Retail sales of piped water	
	Retail sales of water delivered by tanker	
	Collection and treatment / disposal of wastewater and sludge from pit latrines, septic tanks, etc	
	Collection and treatment of sewered wastewater	
	Other	
External Context		
Understand the broader macro-environment in which business will operate.	Politics	
	Economics	
	Social	
	Technology	
	Legal	
	Environmental	
	Other	
Customer Analysis		

Customer segmentation enables estimate of sales, potential income.	Businesses	
	Government departments	
	Domestic users	
	Affordability	
	Sales estimates	
	Revenue estimates	
	Payment mechanism and credit control	
	Trading break-even analysis	
	Other	
Infrastructure		
The nature of infrastructure determines operations	Water sources	
	Intake works	

activities, which underpin resource requirements	Pumps	
	Drinking water treatment works	
	Transmission pipelines	
	Storage tanks	
	Drinking water distribution network	
	Private connections	
	Kiosks	
	Public standpipes	
	Alternative supplies (e.g. hand-pumps)	
	Waste water collection sewers	
	Wastewater treatment works, including sludge treatment and disposal	
	Outfall sewers	
	Energy systems	
	Process and machine control systems	
	Other	
Operations Activities		
Identification of core and supporting business processes informs what resources will be required	*Core Processes*	
	Raw water abstraction	
	Treatment of raw water	
	Transmission of drinking water	

and enables development of work and job descriptions.	Storage of drinking water	
	Distribution of drinking water	
	Collection / transport of wastewater and sludge	
	Treatment of wastewater	
	Return of treated wastewater	
	Operational Support Processes	
	Pipeline repair and maintenance	
	Electro-mechanical repair and maintenance	
	Tech- structure repair and maintenance	
	Building repair and maintenance	
	New connections	
	Meter reading and management	
	Fuel delivery	
	Occupational health and safety	
	Community support	
	Performance monitoring	
	Engineering Support Processes	
	Water Resource Management	
	Water Quality Management	
	Water Demand Management	
	Engineering Analysis	

	Information Management (GIS / IAM)	
	Forecasting and Planning	
	Administrative Support Processes	
	Customer Management	
	Billing and Receiving Payment	
	Credit Control	
	Communication	
	Budgeting	
	Procurement	
	Financial Management	
	Fleet Management	
	HR Management	
Resource Requirements		
Identification of what is actually required to carry out the operational activities	Infrastructure (see above)	
	Facilities	
	People and skills	
	Plant and machinery	
	Vehicles	
	Tools	
	Energy	
	Spare parts	

	Business systems and methods	
	Finance	
	Other	

Partners		
Identify possible sources of support and assistance in providing water and sanitation services	Local Government	
	NGOs	
	Private Sector, including small scale contractors and kiosk agents	
	Community-based organisations	
	Other	

Institutional Arrangements		
Consider Pros and Cons of partnerships to achieve optimisation and sustainability of service delivery outcomes.	In-house service delivery	
	Out-source specific functions	
	CBM / VLOM	
	CU - LG partnership (Contract / MoU)	
	CU - CBM partnership (MoU)	
	CU - NGO (management contract)	
	CU - Private Company (management contract)	
	Other	

O&M Model/Arrangements		
Identify roles and responsibilities, levels of performance and form of agreement between parties.	Long-term vision	
	Prepare for transitions	
	Profit and loss analysis	
	Cash flow analysis	
	Preparing for emergencies	
	Effectiveness of current arrangement	
	Other	

I. NWASCO GUIDELINES OF INFRASTRUCTURE ASSET MANAGEMENT

GUIDELINES ON INFRASTRUCTURE ASSET MANAGEMENT

AUGUST, 2019

Table of Contents

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List of abbreviations

AM	Asset Management
AMB	Asset Management Basics (IPWEA publication)
AMP	Asset Management Plan
AM/RM	Asset Management Road Map
AR	Asset Register (financial)
AR/AM	Asset Register for Asset Management
BP	Business Plan
CU	Commercial Utility
CuPPS	Check up Program for Small Systems (EPA AM software)
EPA	(US) Environmental Protection Agency
GIS	Geographic Information System
GRZ	**Government of the Republic of Zambia**
IIMM	International Infrastructure Management Manual (IPWEA publication)
IPWEA	Institute for Public Works Engineering Australasia
ISO	International Standards Organisation (ref 55000/1/2 for AM)
KISS	Keep it Small and Simple
LoS	Level of Service
MMS	Maintenance Management System
MWDSEP	Ministry of Water Development, Sanitation & Environmental Protection
NWASCO	National Water Supply and Sanitation Council
O&M	Operation & Maintenance
TEVETA	Technical, Entrepreneurial, Vocational Education and Training Authority
UWSS	Urban Water Supply and Sanitation
WSP	Water and Sanitation Programme
WSS	Water Supply and Sanitation
ZMW	Zambian Kwacha

CONSULTING GROUP

Asset Management Guidelines
For Public Service Infrastructure

Introduction

Asset Management (AM) is a comprehensive way of managing the most important items of investment in an asset intensive industry, like water and sanitation services.

 Water utility assets are massively expensive investments for every community and must be looked after, carefully. If they are looked after carefully, they will last a long time. If they are not looked after, they will fail much earlier than expected, much earlier than they needed to fail. At the beginning, when a new installation is commissioned, like a new water treatment plant, or a line of pipe, it is expected that this item will last for ever. Unfortunately, this is never the case. All assets lose functionality over time and then fail.

Asset Management (AM) is a way of consistently acting on each critical asset, and eventually all capital assets, that the utility owns as something that has a limited life span, something that will decline in its functionality over time, until eventually it fails and must be replaced. It is a way of life, and not a project with duration, for the utility.

Some assets will have been inherited by the utility when it was first formed, and other assets will have been created to serve expanding community demand through government loans or international donors. But the time will come when the utility must finance and provide its own new assets. This will have a significant effect on the water tariff that will be needed to ensure the utility survives financially. This surely should emphasize the level of responsibility that the water utility's management has as the steward of these valuable investments.

Useful as it is as a process to manage and perhaps extend the life of the assets, getting from a conventional beginning using ad hoc maintenance interventions to a fully fledged form of asset management (AM) takes a lot of time, cost and effort. It is recognised world wide that the biggest mistake for any organisation is making this effort too complicated, too soon.

So, these Guidelines are prepared and written as a Road Map of how to implement Asset Management (AM) in a step by step way. By structuring the document in this way, the reader can follow the path that should be taken at the pace (and associated cost) that is appropriate to the capacity of commercial utility, its equipment and its skills.

Although Asset Management (AM) has become the standard approach to managing a water utility, there are many levels of complexity that can be achieved with associated costs and benefits. But there is no benefit to starting at a complicated level and then abandoning the development because funds run out or because there are not sufficient staff or skills to bring it to a useful status. A failed project should never have been started.

Through this Guideline NWASCO intends to follow a KISS (keep it small and simple) approach to introducing Asset Management to all CUs. Indicators to monitor progress will be created, to which CUs will be required to make reports in due course.

1   Definitions for Infrastructure Asset Management

There are formal and there are narrative definitions to describe Asset Management (AM). For the purposes of this Guideline, only the narrative and explanatory definitions will be used. This Guideline cannot be a definitive technical document on this topic. If the reader becomes more closely involved in this specialist area, then s/he should refer to the formal technical documentation, such as International Infrastructure Management Manual (IIMM).

"Asset management is about knowing what assets you have, where they are, how they should be maintained and how much it will cost to maintain them usefully until they are no longer useful to provide the service for which they were intended".

"Useful" should be defined as achieving the mandated level of customer service (LoS) at the most appropriate cost. The most appropriate cost refers to the whole of "life cycle cost", which includes the cost of installation and regular maintenance or refit activities.

The minimum level of service (LOS) is usually set by the Board and agreed by NWASCO, but it might be upgraded by local customers if they can afford the resulting tariffs.

2   Objectives of These Guidelines

The objectives of the Guidelines are twofold:
- To describe Asset Management; and
- To describe a Road Map of how to implement this management system.

Through doing that, the reader will come to understand the costs and benefits and will be able to gradually implement the most appropriate form of this management process that suits his/her community or water utility.

However, it must be pointed out that NAWSCO, in its role as national water utility regulator will be expecting CUs to move along the path of developing the ethos of Asset Management thinking amongst its regulated members, over a period of time. The initial Road Map and the progress reported annually as the CU moves along that road map will be monitored.

Indicators will be set by NWASCO progressively, and this guideline will be a tool that is provided for the CU to make gradual progress to achieve the indicators over time.

Asset Management can be seen as a complex approach to managing the water and sanitation system if this guideline was only based on a list of the basic principles.

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So, after a short description of the asset management framework in the section below, the Road Map for developing an Asset Management capability step-by-step will be used to apply the principles (in the final chapter of this Guideline) in the order of development that makes sense. If the reader then follows this Road Map it will be much easier to make progress than trying to apply some seemingly abstract principles.
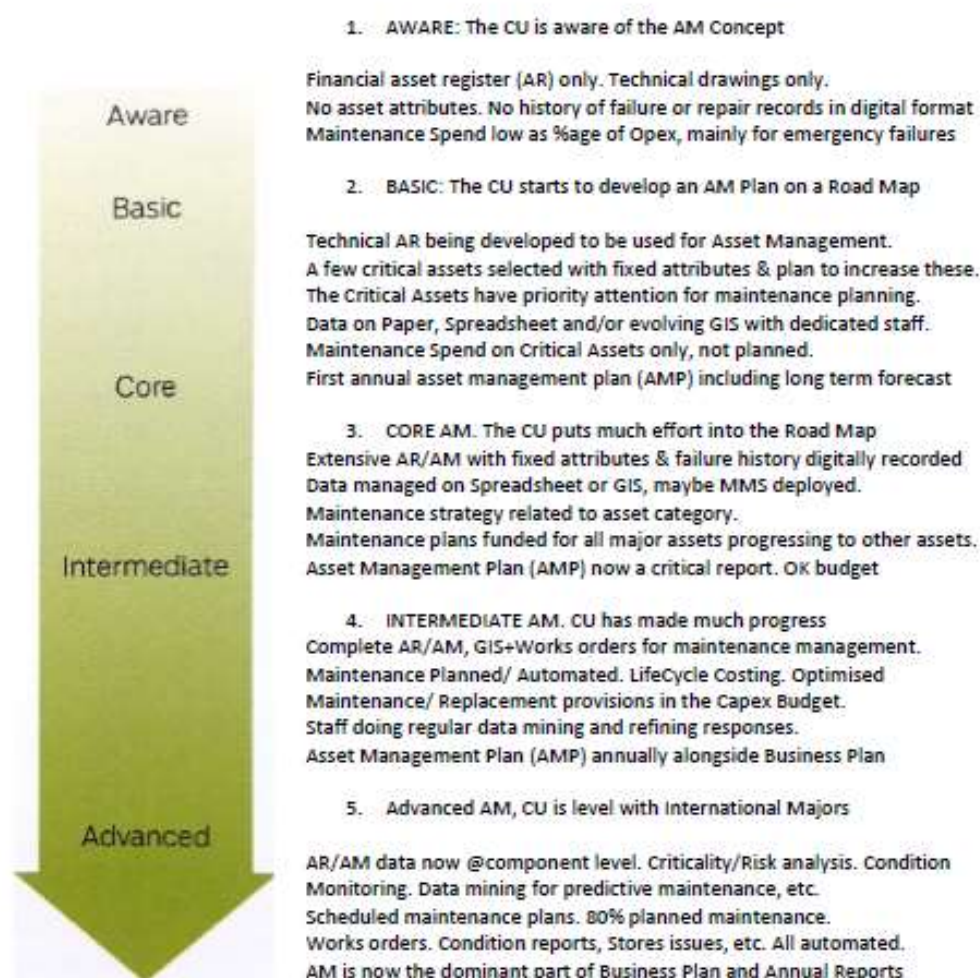
3   Determining Starting Point for Implementing Asset Management

The conceptual description below can be applied in all component stages of the Road Map.

It is very important that each CU should create a realistic Road Map relevant to its circumstances. This Guideline assumes that an organisation is starting from the Basic level of maturity, as described above very briefly and intends to reach CORE AM in 5 years.

For example, a chosen Road Map will be too complex for the resident CU staff if the design starts at "Core AM" and yet there is no trained and dedicated staffer to operate the GIS.

Even if an external resource is used to implement AM, the CU must have dedicated staff to take over after the end of the TA (technical assistance). Indeed, the TA cannot do this on their own, but must develop AM with the full involvement of the CU staff, led from the top.

1. AWARE: The CU is aware of the AM Concept

Financial asset register (AR) only. Technical drawings only.
No asset attributes. No history of failure or repair records in digital format
Maintenance Spend low as %age of Opex, mainly for emergency failures

2. BASIC: The CU starts to develop an AM Plan on a Road Map

Technical AR being developed to be used for Asset Management.
A few critical assets selected with fixed attributes & plan to increase these.
The Critical Assets have priority attention for maintenance planning.
Data on Paper, Spreadsheet and/or evolving GIS with dedicated staff.
Maintenance Spend on Critical Assets only, not planned.
First annual asset management plan (AMP) including long term forecast

3. CORE AM. The CU puts much effort into the Road Map
Extensive AR/AM with fixed attributes & failure history digitally recorded
Data managed on Spreadsheet or GIS, maybe MMS deployed.
Maintenance strategy related to asset category.
Maintenance plans funded for all major assets progressing to other assets.
Asset Management Plan (AMP) now a critical report. OK budget

4. INTERMEDIATE AM. CU has made much progress
Complete AR/AM, GIS+Works orders for maintenance management.
Maintenance Planned/ Automated. LifeCycle Costing. Optimised
Maintenance/ Replacement provisions in the Capex Budget.
Staff doing regular data mining and refining responses.
Asset Management Plan (AMP) annually alongside Business Plan

5. Advanced AM, CU is level with International Majors

AR/AM data now @component level. Criticality/Risk analysis. Condition
Monitoring. Data mining for predictive maintenance, etc.
Scheduled maintenance plans. 80% planned maintenance.
Works orders. Condition reports, Stores issues, etc. All automated.
AM is now the dominant part of Business Plan and Annual Reports

Aware

Basic

Core

Intermediate

Advanced

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4   Introducing the Asset Management Framework (IIMM)

Since its first inception as a coherent system of management, Asset Management has been developed using some frameworks and tools, which will be described in these guidelines where appropriate. The most important reference is the IPWEA (Institute of Public Works Engineering, Australasia) Framework published in the International Infrastructure Management Manual (IIMM). It was developed in New Zealand then applied in Australia and elsewhere, where public sector services dominate. Another system is ISO 55000/1/2, published by the International Standards Organisation.

This Guideline will focus on the IPWEA Framework shown below. This refers to the parts of the IIMM as numbered sections. This numbering system is used throughout this Guideline, but the reader should note that IMM sometimes varies the section numbering as new editions are published. More detail can be obtained from NWASCO library.
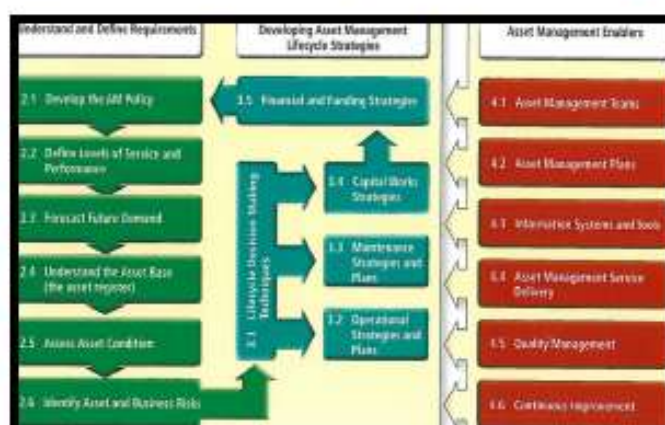
This framework is very useful and the reader can go back to the source documents for further information, although some versions of IIMM use a different arrangement. This does not matter, as the actions remain the same. However, the numbers do not represent a sequence of events or actions themselves. The recommended series of actions will be described in logical sequence in the Road Map chapter to follow.

IIMM can be purchased: www.ipwea.org/communities/assetmanagement/publications

ISO 55 000/1/2 was developed more recently (2014) and reflects the structured approach to recording and managing activities that is typical of other international standards. This is an important system, but it is better to be applied later in a process of development, when a standardised system can be identified and applied based on experience within the organisation. So, it is not mentioned any further in these Guidelines.

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5   A Road Map for Developing Asset Management

5.1   Setting Strategic Direction & Levels of Service

The first two steps shown in the Framework as 2.1 (Asset Management Policy) and 2.2 (levels of service and performance) are part of the normal work of management of any commercial utility (CU). Every year the executive management will prepare a business plan (BP), but they will also refer to a strategic plan that is prepared perhaps every 5 years. In Asset Management, the decisions set out in the BP and adopted by the Board are the starting point. It is quite possible that the future demand has also been forecast (2.3) and is mentioned in the BP. The Asset Management Road Map is built on this foundation.

The first step for the Asset Management Road Map (AM/RM) is for the executive management to decide to implement Asset Management, to identify leadership of the Asset Management development program and to establish a Team with resources (4.1).

Although AM must eventually become part of the management culture of the CU, this could take years and will need an incubating period. A dedicated team must be tasked to lead the process. Then AM can progressively expand and finally settle as THE enterprise management system for the CU.

5.2   The Asset Management Leadership and Team (IIMM 4.1)

The team should have a clear leadership, with dedicated roles and resources, and a direct link to top executives with regular reports and presentations. It should also be multidisciplinary, that is, it does not only rest on the engineering, technical or maintenance staff, but must also incorporate at least financial and customer services staff. Human resources staff should at least be aware of the initiative, as further training and perhaps specialised recruitment might be required as the development proceeds.

The role of the AM Team is fundamentally to design, drive and manage the process of introducing AM. Initially, the leader should give a lot of time to the role, starting by understanding and then disseminating information about AM to the other team members, as well as directing their actions along a scheduled plan. Members should be aware of their commitment, in terms of time allocation when they will not be available for other work and this should be agreed with the functional manager (direct supervisor) of each team member. As a guide, the Leader could provide perhaps 2 days per week in the first year, while team members should be available for 1 day per week. As the Road Map evolves these times can be increased or decreased according to need and pace of work.

Representation from all sectors of technical departments will be needed, that is mechanical, electrical and civil, as each category of equipment will respond to its use and benefit or suffer from maintenance or neglect in different ways. The overall integration and synergies of the systems must also be understood, probably by a senior operating supervisor. This role

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should understand how the different parts of the system depend on each other, either in supporting synergy, or in the consequences of poor operational behaviour and failure.

The first actions will be to understand the context of the AM initiative, the first elements of the Business Plan and how members personally contribute to achieving these. These steps are defined in 2.1; 2.2 and 2.3 of the Framework. Having reviewed that, the work begins on understanding the asset base.

5.3   Understanding the Asset Base and Business Risks (IIMM 2.4 & 2.6)

In a CU with much experience in asset management history there will be data on each asset and its performance history to guide decisions. But this information will be available only because of some years of work spent gathering the data. NWASCO has started the initiative of capturing all the asset data for a GIS in support of all the Zambian CUs. This will be very useful in the future when CU staff can easily access this data to run queries and when there is a track record of failures and repairs associated with the information captured in the GIS. However, this will take some time to be useful to practitioners, as described in the chapter below on the topic of Information Systems and Tools (Framework 4.3).

This section covers how to prioritise data gathering to ensure action for these critical assets.

In a developmental road map a parallel and repeating approach to understanding the system is needed, rather than a linear approach, with one step followed by another.
What we mean is that gathering a full register of all of the assets first (2.4), with their technical attributes, then reviewing their condition (2.5) will take many years. Often this approach can be seen where all the assets are recorded on the GIS, then all the attributes are recorded and then all the conditions of the assets are recorded, then the failure history.

These actions are all eventually necessary, but it will take a very long time to arrive at a point where the data gathered in this way is of any use. This means that people involved could become discouraged because there is no apparent benefit for a long time.

Instead, what we advocate is a "triage" approach, similar to how a hospital manages emergency patients according to a priority system to maximise the number of survivors. It relates to the impact of intervention on each patient and the capability of the system to provide the required attention to make sure that as many as possible survive.

The risk management approach (2.6) relies on the memory of experienced long service CU staff (at any level of qualification) to point out which assets are most important within the system, which are the most fragile or likely to fail, which are the most expensive or difficult to repair, and which will have the worst effect on the rest of the system if they fail.

The focus for action - detailed data gathering, condition analysis, maintenance planning, spare part provision, repair interventions, etc. - will naturally start on those at most risk - and that means most risk to the core CU business of water supply.

The following chart describes how this can be done, first on a basis of QUALITATIVE information. This means it is based on the opinion and experience of the staff who know their assets and how they perform, comparing them with each other and ranking them on a scale of 1 (very small) to 5 (very high). The detailed costs etc. do not matter at this stage.

The Asset Management Team Leader should assemble a committee (4.1) to identify the most critical assets in the system or town on a repeating cycle basis. Each member will allocate a value (1- 5) to each asset in terms of the likelihood of that assets failing and likewise the consequence of that asset failing. There could be considerable debate because this depends on the memory and judgement of staff. Each item and priority should be motivated until there is agreement. Large components or assemblies of assets should be considered first, like a pump station, a wellfield, treatment plant filters, a rising main, a reservoir, etc.

Ultimately, the committee should reach a consensus, which will indicate the ranking or criticality of any particular asset compared to the other assets considered. The process is then repeated until perhaps 20 or 30 most critical asset are identified in the first cycle.

The assets that score in the bottom right corner of the table, highlighted by the ellipse will be the most critical to the system and the CU business objectives.

MULTIPLY VALUES COLUMN X ROW			CONSEQUENCE OF FAILURE				
			1	2	3	4	5
CHANCE or LIKELIHOOD of FAILURE	Pump Sta G	1	1	2	3	4	5
	Make	2	2	4	6	8	10
	Age	3	3	6	9	12	15
	Capacity	4	4	8	12	16	20
	Components	5	5	10	15	20	25

In the above example, pump station G has been identified as a high ranking critical asset. As shown in the table the asset management team has agreed that the chance of failure of this pump station is at level 4 of likelihood, while the consequence to the water supply system is very high, at 5. These assessments are based on the judgement of experienced staff and are comparable to other assets considered by this team.

After the qualitative analysis cycle that considered and evaluated many assets, a criticality priority list is established for further attention. Then a QUANTITATIVE analysis can be done, but only on these most critical assets, to reduce the work effort and the lead time to getting some value out of this work being done.

The next step would certainly need more detailed information to be gathered such as the actual condition of assets and eventually the actual costs and benefits. Later, in a further cycle of analysis, the next level of priority of another group of assets can be reviewed.

The same approach would be applied to the level of detail WITHIN the identified critical asset. For instance, there might be a particularly troublesome pump station where some components fail frequently, interrupting supply. That would be the first level of criticality

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requiring analytical attention and data gathering. Other pump stations could be ignored until a later date when more time or resources are available for analysis.

Within the critical pump station, further data gathering and analysis would identify specific components that might cause the failure, such as the transformer, control panel, pump set, etc., which appear to be the main problem and a maintenance plan can be developed.

As time goes by and as resources are made available the CU can cover all the assets that it has, but this can take many years. In situations where new assets are created, the provider of the assets (consultants and contractors) must be clearly guided and contractually obliged to input the information to the growing asset register and AM database in the format that is compliant with the established database that has been developed over these years.

It should be noted here that while repair cost or lost sales may be a very important aspect of the consequence of failure, there may be other issues, such as consequential damages to other parts of the system caused by a failure that results e.g. in a pressure surge. There could also be public health consequences caused by a failure of the dosing equipment.

5.4 Operational and Maintenance Strategies (IIMM 3.2 and 3.3)
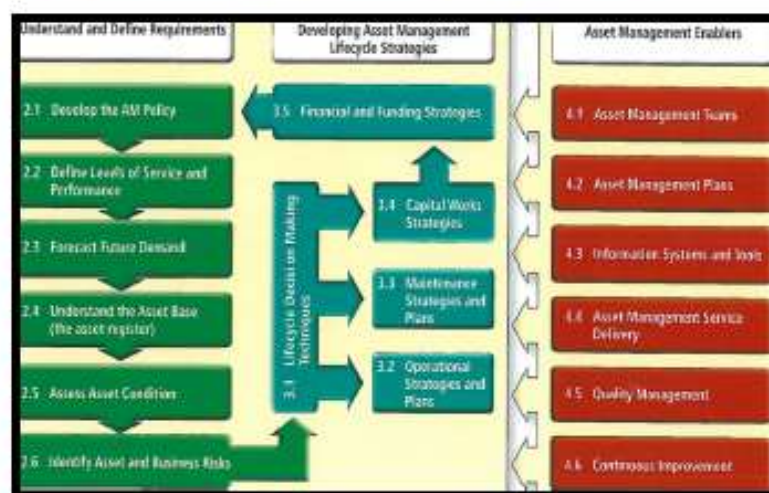
Many CUs already have MMS in place and might have a structured or general approach to maintenance and operation decisions. This section discusses the development and application of these strategies, or the establishment of new strategies in the context of Asset Management, using the step by step approach advocated in this Guideline.

Having identified the most critical assets the AM Team (4.1) can start to consider how to tailor the generic O&M strategies to each one of these critical items. This section cannot elaborate all the details and motivations for these strategies, but will attempt to highlight the key features. The reader will have to apply their own training and skill to expand on the concepts, perhaps referring to technical and manufacturers manuals and IIMM or AMB.

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### 5.4.1 Operational Strategies (IIMM Framework 3.2)

This merely refers to ensuring that staff correctly operate the equipment within standardised guidelines, sometime referred to as SOPs (standardised operating procedures). This is not unimportant or trivial. Sometimes staff will be assigned to certain tasks without having complete knowledge or experience in that specific task and should be provided with guidance to ensure the equipment is operated according to best practices.

Before the fact of maintaining plant or equipment is considered, such items can be operated well to achieve a long life, or operated badly leading to rapid loss of performance and failure through mere ignorance. Managers and supervisors must not assume that the operator knows which is which, particularly where there are complications, such as load shedding and supply rationing that can influence operator behaviour.

Starting with the most critical assets simple written instructions – the SOPs – should be prepared and provided to the relevant staff. For example, a pump operator should know about pump starts after load shedding or supply rationing, or how to be sensitive to vibrations that might point to impending bearing failures. Pipe line repair teams should make repairs in a particular line during supply rationing and should operate all valves in the vicinity of their repair work to ensure that these do not freeze; meter readers should always be on the lookout and report for further investigation unlikely wet and green areas where there might be leaks, or where consumers are using water when there is no record of a registered customer connection.

5.4.2 Maintenance Strategies (IIMM 3.3)

These can be more complex and will have significant cost implications. This Guideline cannot give a comprehensive coverage for all maintenance issues. The overall view of maintenance can be shown in the classic graphic below, called the Bathtub, named because of its typical descriptive shape for the combination of all types of observed failures. (Note, this is not a true scale graphic, it is indicative or characteristic)
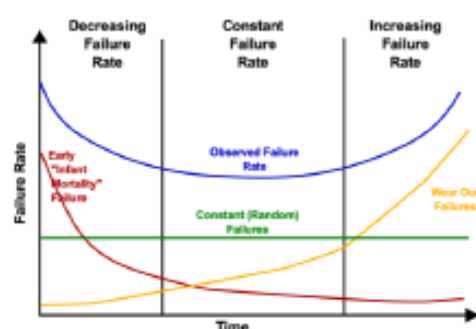
The first aspect of this is the Infant Mortality Failure rate line. This category relates to the construction and commissioning period of any asset's life cycle and is mainly not in the province of O&M staff. The construction supervision staff must ensure that all available

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actions are taken during construction and commissioning, as well as the defects liability period, to ensure that failures are observed and noted, reported in good time and repairs are done by the construction units responsible before final handover and acceptance. This is partly covered under the topic 3.4 in the asset management framework. There are many other features to this component, but the focus here is on the impact on future maintenance.

Another important feature is consideration of the whole of life cycle cost. Rather than accepting the cheapest price for an asset at purchase or construction time, regard for the potentially shorter life span or more expensive maintenance and refit interventions that might be necessary during the life of the asset should be taken into consideration if the data is available to support such decisions.

After that the asset is handed over and accepted by the Operational staff. Failures of this kind might still happen, but usually fall into the other categories and will remain the responsibility of the operational staff.

Random failures cannot be forecast or prevented but can be mitigated through correct operational procedures. This is where the consequences of failure (described in the section above) can sometimes come to bear. In other words, if a pump is started too often in a short time after load shedding, or the voltage often falls too low below specification, then the pump will seem to fail randomly, although this is in fact due to loss of insulation.

The most useful attention (other than providing SOP guidance) should instead be given to managing the Wear Out failures, as shown in the classic graphic. These failures will increase progressively as the equipment (pumps, pipes, tanks, meters, etc.) get older and start to decline in their functional performance. Understanding this depends on management and operators understanding that ALL assets have a limited life. NO asset can provide services indefinitely, for ever, nor will the functional performance always be the same.

Determining this life span will be a matter of experience with the type of asset and sometimes with the brand of supplier. To start with, Management must use the experience of others, or of the supplier to determine this life span. But gradually experience will be gained in setting the most likely life span that can be accepted. The objective of a balanced maintenance and operational strategy is to optimise the life span of the asset within this ultimate limitation.

To sustain the agreed levels of service (LoS) in the face of naturally declining functional performance as the life of the assets gradually expire depends on decisions as follows:

- Planned, Periodic, or Failure Maintenance
- Repair Interventions (after a failure or declining performance)
- Periodic Refit (according to supplier information or after decline in performance)
- Upgrade (when the demand grows beyond design capacity, causing strain)
- Replacement (when the cost of the above actions exceed replacement cost)

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All assets behave differently so no single strategy can be applied across the board. In most situations, where a CU does not yet have a solid basis of experience with its assets, typical strategies should be applied.

For example, for short life cycle assets (5 – 15 years), such as mechanical equipment (above ground pumps etc.) the supplier will often provide information on likely periodic attention that should be given. These can be planned according to recorded running hours and the replacement parts can be kept in hand in a store. But they should still be monitored for the deviations from plan to expect when other refits will be needed, such as overheating or vibration being observed by the operator.

For underground assets, the "run to failure" strategy can often apply, where direct access for repairing minor failures is costly. Leaks will appear, but the cost to fix each leak will be hard to justify when compared to the saving on loss of supply. Instead, as the leaks get progressively worse on a particular length of pipe, then a decision will be made to intervene after the cause of the worsening leaks has been analysed and determined and action has been taken to prevent a reoccurrence. This could be through repairs or replacement, but perhaps there is a pressure problem, or poor bedding, or heavy traffic, that caused the problem and this must first be solved or it will repeat the consequential damage.

The same might apply to borehole pumps, where lifting a working pump to inspect it periodically or apply some planned maintenance might be difficult or even cause more trouble to the pump or the borehole casing.

The second classical graphic is used to describe the choices to be made between reactive maintenance (run to failure) or planned maintenance (proactive). Although proactive or planned maintenance sounds like a good practice, this can be difficult or expensive to implement. Where a supplier does not provide a maintenance and refit guide as described above, significant experience and history of the type and manufacturer of assets is needed. This cannot be relied upon in a start-up Asset Management situation, so this option should be ignored until such data is available after some years. (Note: This is not a true scale graphic, it is indicative or characteristic)

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But eventually, an asset will give more and more trouble and the cost of maintenance will rise to a point where it must be replaced. This is described in the classic graphic shown below. (Note, this is not a true scale graphic, it is indicative or characteristic).
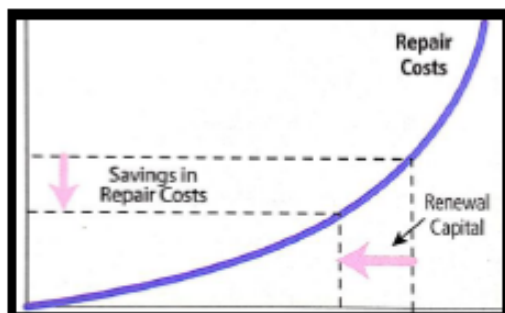
As the record of the interventions to maintain, repair or refit this asset start to show a significant rise in costs over the years of operation, then a decision will eventually become clear: It is time to renew (or replace) the asset.

5.4.3   Data Capture, Records and Information Management (IIMM 4.3)

So far, reference to gathering information has been made often to create records of the assets, their technical (static, or unchanging) attributes and their history of failures, maintenance and refits (dynamic, or changing attributes). This is essential as part of the tasks of "Understanding the Assets". Planning for this is the next step along the Road Map and should be considered as thoughtfully as all the other steps.

The mainstream CU tool used for this is considered to be the GIS (geographic information system), and indeed this is the industry standard and the ultimate goal at the end of a successful road map. The CU starting at Basic should aspire to having a solid basis of data in a GIS by the time it achieves this status, in five years, as previously suggested. In fact, CUs at Intermediate and higher levels of AM Maturity also have other added-on software that can support decision making and these are often displayed in an attractive way by European utilities. But getting to that level of achievement is expensive and time consuming. It depends on experience and having the skills to design and operate responsive systems.

NWASCO has started to gather a national data base in GIS format and this support for CUs will continue. But there will be some time before this database can be of practical use.

Instead there are intermediate steps that can be taken with a quicker payoff. This Guideline urges the leader of the asset management team to consider these steps as first options.

A GIS can be costly to operate and maintain. Gathering the data is important, but it can take many years for this to become useful. Meanwhile the description of this Road Map is to enable a CU to get some use out of the AM system as soon as possible, not after many years. The main problem is that the GIS really needs to have a dedicated operator. This person should access the system on a regular basis to be able to keep the skills to do so. The

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CU will become dependent on this operator as few others on the staff will be able to easily access the system when needed. The loss or absence of the operator will freeze the information in the system, so the choice of information system is not unimportant or trivial.

If there is no permanent member of staff allocated to operate the GIS, then there are other options including paper records, spreadsheets and the EPA CuPSS freeware as progressively more sophisticated data and information management tools. The exercises mentioned above for prioritising critical assets for attention are done on paper, based on verbal reports from staff in the first instances and they arrive at a priority ranking based on values and judgement that is practical. There is no software suggested to bypass this step.

However, as time goes by and the critical assets have been identified, then the capture of data can be managed using a spreadsheet to set out a regular maintenance or refit cycle, which every engineer and technician can operate. Further, the CuPSS freeware is based on the spreadsheet as its internal engine and should be examined for applicability.

CuPSS is an acronym for Check up Program for Small Systems, is published by the Environmental Protection Agency (EPA) and used in the US. This can be explored easily and cheaply as it uses the same approach of prioritising selected critical assets to be monitored for which individual maintenance plans are made. It serves the needs of the smaller system that cannot afford to have dedicated staff to capture all the data as in a larger system.

Refer to https://www.epa.gov/dwcapacity/software-check-program-small-systems-cupss

Another problem with establishing a GIS database, and even the spreadsheet based systems, is the design of the data base itself. Setting up the data fields at the beginning will be a commitment that is difficult to change later. So, a simple and exploratory approach is needed at first and this is best done on paper and then in a spreadsheet. Doing this in the step by step manner promoted in this Guideline will provide time for trial and error in establishing this data structure so that it is locally applicable.

If there are funds to employ a GIS specialist for utility management, then establishing the dbase can depend on this experience. NWASCO has provided such a specialist in the past and this might still be available in the future. A standardised dbase could be used and a similar approach employed with the "short cut" methods described in this section. But there should always be inputs from CU staff to ensure local knowledge is gained and local experiences are applied to feed information to the specialist.

5.5 Financial and Funding Strategies (IIMM 3.5)

This guideline can only cover a limited aspect of this topic as it has a very large scope. The emphasis in this Guideline is on bringing the funding needs identified in the work so far to the attention of the Executive management and financial director, with suitable motivation to support requests for maintenance funding provision. There are far wider implications and avenues to explore, but those would be outside the scope of this simple Road Map.

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The primary objective of Asset Management is to convince management that there is a valid case for funding provision. This would be based on the logical planning and analysis work done to date, where forecasts of maintenance, repair and refit costs are submitted in good time for the preparation of the financial plan. But these are also supported by evidence of previous failure events and associated spending. In fact, where planned maintenance or refits cannot be done due to lack of funds, leading to a failure, this fact must be reported.

Returning to the earlier point that an asset has a limited life span and the length of that life is determined by correct operation and timely maintenance interventions, if these are not done, then the life span of the asset will be shortened. Each year that maintenance spending is deferred should be recorded and the accumulating deficit should be reported. The short term saving of the deferred maintenance etc. will eventually result in total failure and the need for complete replacement of the asset. Any consequential failure should also be highlighted. After some of these events, the reality of this result might have an influence on future funding provisions, including applications for additional tariff.

Eventually it will become useful to introduce the concept of the progressive loss of life span and functionality of assets, similar to depreciation reflected in the balance sheet. Without mandatory financial reporting in this regard, the purpose of this will be to highlight the declining nature and limited life span of all assets. However, this is probably too complex a topic for the first 5 years of asset management and could be deferred until a later date.

5.6 Continuous Improvement (IIMM 4.6)

The KISS approach using the Road Map is a way of getting a progressive development of AM over a period of time when resources might be limited. But it is not the final stage of AM. All CUs should aspire at least to achieve the Basic AM status within 5 years, and then perhaps to progress onwards to the Intermediate Stage as depicted in Section 3 above.

Thus, each year an AMP should be prepared and submitted where in there should be plans for the year ahead to improve the standing of AM and functions within the organisation.
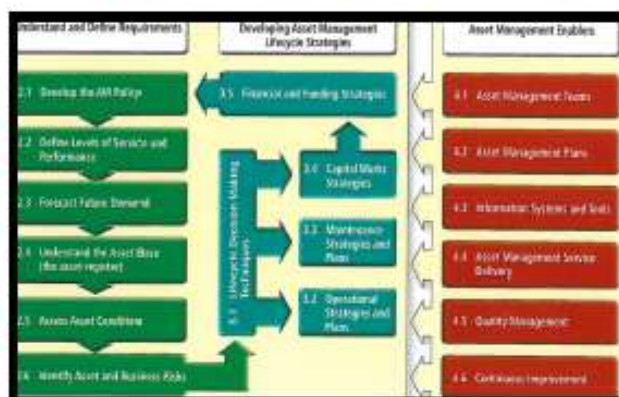
6 The Asset Management Plan (IIMM 4.2) - AMP

The ultimate objective for asset management is to have a clear plan of action and to be able to communicate this to executive management and in some instances to the customers.

The preparation and publishing of an annual business plan is an established best practice and NWASCO has published a Guideline for this. As the attention shifts to emphasising the assets as the key element in the business, the use of another reporting method has tended to take over with by the Asset Management Plan (4.2) in some developed CUs. With well-established CUs this report has tended to cover longer periods of time. But in the case of CUs embarking on AM from a low base, it is recommended that this be done annually.

This chapter offers a general approach to the first few annual AMPs to plan and report on progress along the Road Map of development of AM within the CU. In many ways, this

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follows the path set out in this Guideline. For each of the chapters headlined some examples of the content are provided. These are only examples. The CU must provide its own relevant content and it will develop its own approach after some time and experience.

6.1 Executive Summary

The Asset Management Plan (AMP) is a planning and progress reporting document focused on the assets and how they will be managed. The AMP has a really important role as a communication between the Asset Management Team, the executive management and the Board of the CU. To provide clear communication there must be a realistic recognition of the limited amount of detail that can be absorbed by the executive and the board.

So, this report should limit the amount of technical detail and yet be able to communicate the essential facts of what asset management is about and how it can benefit the CU. The expected benefits should be highlighted together with what has been achieved according to plan so far and what is intended for the next year, as well as the longer term view of how the AMP will evolve in the next five years.

The Summary should always refer to the commitment of the Board and Management to their role as steward or caretaker of the infrastructure assets that have been provided at great expense to serve the communities in the area of supply. This could be introduced by restating the AM Policy to keep it front of mind at all times. A main theme throughout should be about emphasising the limited life of assets in all cases and the influence of maintenance on extending this life span as far as financially feasible.

There should also be some recognition of the unfortunate result of not providing funds to ensure that the assets have a reasonable chance of achieving their potential life span. It is worth emphasising that in the event of the failure of these assets, the services to the customers will suffer and the level of these services will fall below the agreed LoS stated in the business plan. If there are some specific concerns these should be mentioned even in the summary. Obviously, to keep it short, there can only be a few items mentioned. But the general approach of the Road Map is to identify and highlight exactly these assets, the ones that have been selected for their criticality to the CU business.

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6.2   Statement of Asset Management Policy

When the CU starts on the journey described by the Road Map, there should be a statement proposed by Management and adopted by the Board that this activity is important to the CU as a policy statement. This chapter could also refer to the business plan (BP) where the specific levels of service (LoS) are described. Referring back to the LoS is a way of linking the Policy with the LoS and the proposed maintenance and repair planning set out in the AMP.

The Asset Management Policy Statement could be something like:

"XYZ CU recognises its role as the caretaker of the valuable assets and equipment that are needed to supply the water and sanitation services to our customers our area of supply.

This means we understand that all our assets have a limited life that can be made longer or shorter by the way that our staff look after them. We will therefore make sure that these assets are managed sustainably by providing adequate funds from our tariffs for repair, refit maintenance, or replacement to ensure as long a service life as makes financial sense.

We will make sure that our staff have the necessary plans, skills, tools and equipment to carry out daily operations and maintenance in keeping with industry best practices and as planned in annual business planning while being controlled through regular monitoring.

XYZ CU will strive to achieve these objectives within 5 years, by progressively building our knowledge and understanding of the assets under our ownership and we will improve our management capabilities and technical skills to support these objectives."

IIMM sets out some typical aspects and content that could be used to develop a tailor made Policy for any CU in Zambia.

The AMP can elaborate on operation and maintenance strategies that are being developed to be able to achieve the objectives of the Policy if they have been defined. If they have not yet been defined, this would be an objective to be achieved in the year ahead.

6.3   The Asset Management Team

This chapter should give details of which staff positions and specifically who has been seconded to the Asset Management Team, their skills and intended contributions. The members of the team are only on a part time secondment and still retain their core function in a specialist department. But their direct supervisor must be aware of how much time is required to be spent on this work and agree to release. This additional work might amount to 20% (1 day per week), with the leader providing 40% (2 days per week, on average).

The Asset Management Team must then draw up a plan of action with specific topics and dates for achievement and this can be reported in this chapter.

The first actions include outlining any challenges to the LoS that were experienced in the previous year and those that are anticipated in the year ahead. This will have implications

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for their work and planning how the Road Map will be followed in the year ahead. There will be a schedule of planned committee events at which the members of the team start to build their understanding of the asset base (2.4, 2.5, 2.6), with quarterly progress reports.

The AMP will report how this plan was established, how progress was achieved against plan and what the Team plans to do next year and in subsequent years in a rolling 5 year AMP.

Recruitment or training needs and actions should be highlighted, as well as introducing new ideas for how the Team will carry out its work. Eventually, AM should become part of the method and approach to work by all staff. But this will be a distinct stage of development after some years of experience and when the skills of the Team have evolved.

6.4   Understanding the Asset Base (IIMM 2.4 – 2.6)

The AMP will report on progress in the previous year and will set a target for its work in the year ahead and subsequent years for analysing and understanding the Asset Base.

In the first year there could be a low target to be achieved due to the establishment of the Team and getting used to its internal processes, with rising targets in the rest of the five year plan. On the other hand, the most critical assets (maybe 20 in year #1) will be extremely obvious to everyone and will probably not present much of a challenge in terms of analysis within the Team. However, time will be well spent on developing the maintenance strategies, analysis and forecasting costs etc. In later years the work will become more complicated due to refinement, but this will be offset by greater experience, so higher targets for criticality analysis can be set and finer detail can be considered.

There should be some descriptions of how the work was done and some motivations for what the results were in terms of asset criticality in tabular form. The consequences of failure of the critical assets could be described as well as the costs for remedial action.

This report should not give the impression that permission or approval for these decisions is being requested outside of the CU executive management, it should be a statement of fact. The Team is well provided with qualified representatives of all technical, financial and customer viewpoints from CU staff and the result should not be a matter of opinion for others to "second guess". It would be unwise to allow technical decisions to be compromised by non-technical parameters at an early stage of development.

6.5   Operational and Maintenance Strategies

This chapter would be a description of activities carried out in arriving at specific operational or maintenance strategies for different categories of functions and assets. For example, work could be planned to develop SOPs for 5 different operational activities during each year. Maintenance strategies could be explored for adoption for the selected critical assets and 2 additional categories of critical asset or subcomponents of asset.

The expected impact of adoption of said strategies should be explored in terms of improvement of LoS and/or financial provisions, while the necessary support should also be

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reported (e.g. stores provision; funding). In subsequent years the results of applying said strategies can be reported, including difficulties caused by resource constraints.

6.6   Data Capture

This chapter will cover the decisions made to date on selection of software, data structure and data capture methods, as well as the data gathered by consultants and contractors as they create new assets. NWASCO has previously given support for this, so any progress in this regard should be mentioned, while drawing attention to gaps to be filled somehow.

Progress reporting on extent of static data (for a GIS) could list areas and category of assets now captured and other (dynamic) data gathering as history of failure, repair, maintenance, refit and replacement. The dynamic data could be reported in a tabular format.

6.7   Financial and Funding Strategies

With the focus of the Road Map being on a progressive improvement of understanding throughout the organisation of the sensitivity of assets to the way they are managed, the first step in communicating the financial component should be on tracking the O&M spend (or spending deficit) over several years with respect to the identified critical assets.

This means that proposals should be put forward to support the life span of the critical assets as described in the maintenance strategies based on logical parameters and the result should be reported, particularly highlighting the benefits of such spending. If funds are not available, the message that needs to be sent is to highlight the accumulation of deferrals and the likely impact this will have on the performance or failure of the asset.

For example, planned refits that are deferred are likely to result in higher operating costs (maybe electricity) and then in failure and costly refurbishment or replacement. The message that should be communicated is to bring this reality to light for decision makers. Constant deferral results in failure, other costs and a drop in the LoS.

At some stage the matter of the loss of life span should be considered for reporting. This might be necessary if there are important assets that are clearly approaching the end of their lives because of high maintenance costs. The second or third year of AMP reporting might highlight some critical assets that should be earmarked for decommissioning and replacement, with an explanation of why these have been selected and indication of the age and the history of failures, with costs if these are available. The consequences of not replacing them will be an important feature of such a report.

6.8   Continuous Improvement

The AM Team must remember that this Road Map approach is a simplified step by step approach to installing an evolving Asset Management culture and capability in the organisation. The Road Map actually has no end, it is a continuous journey. The last chapter of the AMP should set out the plans and aspirations for continuous improvement during the rolling 5 year horizon, with associated budgets, targets and any training or resource requirements.

Annexes

Basic Principles of Asset Management

There can be a much detail to distract management from the strategic potential of Asset Management and much of the work will be done by other staff during the early stages as the Road Map is planned and followed.

The fundamentals and principles of Asset Management are listed below for quick reference and these will be referred as the document expands the concept. However, we must emphasize that reference to IIMM or AMB should be made when greater detail is required and some training for selected specialists is recommended.

1. Assets are expensive and critical to provide water supply and sanitation services.
2. Assets are usually part of a system that comprises of mutually interactive and interdependent assets. Few assets can be considered in isolation from the system.
3. Assets have a finite lifespan. No asset lasts for ever. Some can last for eight years while others can last for 30 years. It is not the same for all assets as all assets behave differently, but all assets must be replaced eventually – this cannot be ignored.
4. Although assets will all fail eventually, the life of an asset can be extended by doing maintenance and refits, or it can be shortened by neglecting these actions.
5. Failing to operate and maintain assets is a failure of management. An asset that is not operated or maintained correctly will fail much sooner than it should. A failure of responsibility to manage assets is to fail to get the best service out at optimal cost.
6. Assets can fail in other ways than a lack of maintenance, such as the demand placed on them exceeding their capacity, leading to strain, so they have to be upgraded.
7. Operating an asset incorrectly such as placing too much pressure on a pipe or pump, restarting a pump too often, or allowing the electricity voltage to a pump to drop or surge, will shorten the life of that asset dramatically. Instead, the service, or protection must be upgraded and the operators trained appropriately.
8. Many maintenance tasks can be done at low cost, just as long as workers know their responsibilities and do those tasks. For instance, valves must be operated frequently to stop them from becoming frozen and inoperable when they are needed for a shut down. This does not cost anything, except a worker doing another task in the vicinity takes this action to operate the valve at the same time. Likewise, domestic meters can leak, stick or lose accuracy - sales are lost - unless the problem is reported by the meter reader immediately on return to depot.
9. There are different maintenance strategies that should be applied to different classes of assets, with different criticalities. Asset Management is about mindfully and proactively deciding and defining which maintenance strategy is appropriate.
10. This all presupposes that management and supervisors know where the asset is ! Knowing where each asset is IS an important part of asset management. Without this, there can be no Asset Management. So, a register of assets is made, with their location being an important part of the register, amongst other technical details.

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11. An asset register (AR) for asset management (AM) is not the same as a financial asset register. An AR/AM should record the age, material, other technical details, condition, and location of the asset, amongst other things. Over time records can be gathered progressively showing the history of that asset regarding the work done and the performance of the asset. This informs maintenance and replacement plans.

12. Asset registers are important and the associated tools can be quite sophisticated, but a basic record of where they are and other important data can be made even on paper. That is better than nothing. If there is no computer operator trained to manage the data, then paper is the best way forward. However, a spreadsheet can also be used, and eventually a GIS can record the necessary information, but only if someone can operate these computer based software and systems.

13. Another major error: "Automating the Mess". No computer system will help if you do not know much about your assets, their location, technical capabilities, age, etc.

14. When there is an active and evolved AR/AM it includes assets' conditions which are monitored from time to time. This can track how assets are declining over time.

15. In the early stages of developing Asset Management, work should focus on the most critical assets first. There are tools for this. The worst error is to try to manage all assets at once and in the same way, from the start of an AM development project.

16. Evaluating the criticality of assets is a thinking process - to consider how likely a failure might be, and then how bad could be the consequences of such a failure.

17. In a KISS approach to asset management, attention should be given first to the assets that have the highest combination of likelihood of failure and consequence of failure. Attention for planning and spending would then be prioritised for these assets. This means getting as much information about them as possible, ignoring many other assets that are not as critical. When the most critical have specific plans, then the next level of criticality can be considered for analysis.

18. Asset Management cannot just happen, it cannot just evolve of its own accord. Asset Management must be led by senior management, with the assistance of a multiskilled team of senior staff and must be given sufficient budget to proceed.

19. Eventually, after many years of development, Asset Management will come to dominate ALL management processes. In some cases the Asset Management Plan (AMP) has supplanted the conventional annual business plan because it is so comprehensive and successful in targeting attention onto the highest value items of the utility: the Assets themselves.

Bibliography

International Infrastructure Management Manual (IIMM)	IPWEA
Asset Management Basics	IPWEA
BS ISO 55000:2014	BSI Standards
BS ISO 55001/2:2014	BSI Standards

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