

# Water Source Reliability Kamuli; Project Final Report

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## UNICEF CONTRACT Number: 43215637

Improving the reliability of primary water sources and reducing down-time through preventive maintenance

REPORT NUMBER

5

Engagements with Water Committees  
Strategy for Viability

Date:

16 February 2019

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# 1 Background and Action Plan

## 1.1 Background

Access to safe water in rural Uganda, both at communities and schools is constrained by poor Operation and Maintenance (O&M) structures and poor quality-control during design and installation phases. Breakdowns are frequent and delays in repair time are often prolonged, leading to a lack of sustained access despite the presence of an improved source, even amongst sources deemed as functional. Prolonged down-time causes rural families to use contaminated water frequently, and so has the effect of exacerbating ill-health, poor educational attainment, poor productivity, and infant mortality.

In this project, Whave is collaborating with the District Local Government of Kamuli (DLGK) to establish institutional structures to assure improved reliability of water sources and to reduce the number of improved sources falling out of use. The project supports UNICEF's commitment to sustained use of safe water facilities in rural schools and rural homes. At least 200 communities are expected to be paying for preventive maintenance agreements at the end of the second year.

## 1.2 Terminology of PPP

An important aspect of progress toward a self-sustaining structure for rural water supply is emergence of a common terminology shared by central government, development partners, local government, and private sector actors. Considerable effort was made by Whave to assist with emergence of a common language. This report uses the terms which are most common to and preferred by the central and local government, in some case diverging for terms used in previous years, for example:

WSC Water and Sanitation Committee generally replaces WUC, Water User Committee (WUC). This change was strongly requested by local government partners in 2017 multi-district meetings.

Service Area Provider (SP) replaces Service Utility, and is shorthand for a Rural Water Preventive Maintenance Service Provider. In discussions with MWE we learned that Utility could be confusing for some stakeholders, and it is expected that HPMAAs can develop capabilities as SPs, but it does not seem appropriate to describe them as Utilities, so we are using the more general term Service Provider which works for all kinds of entities.

MOU is a term preferred currently by local government partners to mean Performance Contract or License. In forthcoming months, Whave will be prompting local government to adopt Performance Contract as the term denoting SLG/DLG approval of a Service Provider, in line with emerging Umbrella Authority terminology relating to small town piped water schemes. However, we remain currently with MOU in alignment with current local government preference.

The term "Recovery Rehabilitation" (RR) has been suggested to describe a fresh strategy introduced by Whave in collaboration with the District Water Officer of Kamuli, to describe rehabilitations which are done as a first step in a preventive maintenance service agreement (PMA) signed between a SP

and a WSC. The difference between conventional rehabilitation and a RR is that a community receives the benefit of investment in overhaul, major repair, and renovation of its water source on condition that it signs into and pays for a PMA, which then assures that all following major overhauls and parts replacements are continuously undertaken within the terms of the PMA. This approach is described further in the report below. Initially Whave used the term “Upgrade” to describe it, but the comment was made by the MWE officer governing O&M that this caused confusion with process of upgrading hand-pumps to motorized piped supply.

## **2 Water and Sanitation Committee engagement**

### **2.1 Data to end Feb 2019**

The project has engaged the WSCs of more than 200 rural communities, as shown in the tables below. The WSCs have signed into preventive maintenance service agreements (PMAs) with Whave. All the WSCs have adopted a standard constitution approved by local government and many have registered with local government as legal entities (CBOs). The standard constitution has an annex which defines community bylaws specific to itself, for example imposition of penalties to households breaking hygiene guidelines, and tariff collection arrangements. However, the main body of the constitution is standardized to better enable local government extension officers (such as CDOs, HAs, parish chiefs, councilors) to support the WSCs. Many of the WSCs have also opened bank accounts in order to build confidence amongst community members that tariff monies collected are being accountably managed. The PMA terms and conditions oblige the WSCs to bank tariff revenue and review bank statements with their communities in regular quarterly meetings; also, they are obliged to disclose their bank accounts to supervisory and partnering bodies such as local government and the Service Provider, so that community members have recourse to transparency and supervision. The WSCs are considered as key partners in a PPP structure, and these obligations and PMA terms are key elements in a clear division of roles and responsibilities in the PPP, shared between the WSCs, the Service Provider/Provider, and local government.

**Table 2.1 WSCs engaged through to end February 2019**

<b>Sub-county</b>	<b>Community</b>	<b>Recovery rehabilitations (RRs) in 2018</b>	<b>Rehabilitations in 2017</b>
Balawoli	Bugobi Balawoli		
Balawoli	Bugaya		
Balawoli	Bunangwe		
Balawoli	Bwase 1		
Balawoli	Buwalankamba		
Balawoli	Nawantale TC		
Balawoli	Kawaga Butalaga		
Balawoli	Nabulezi TC		
Balawoli	Bubyasi Self help		
Balawoli	Butante		
Balawoli	Bulondo		
Balawoli	Bugaya Budhikubera		
Balawoli	Butimbito Nawangaiza		
Balawoli	Naluwerere		
Balawoli	Butoigo Bulwire		
Balawoli	Nawantale Katalo		
Balawoli	Namaira TC		
Balawoli	Bubyasi 2		
Balawoli	Bukaaya		
Balawoli	Bunangwe Isanga		
Balawoli	Buyima Mukayaka		
Balawoli	Balawoli Primary School	2018	
Bugaya	Bwogereza		
Bugaya	Bupendo Kigweri		
Bugaya	Bugembe Nabitula		
Bugaya	Busoko Bubaale Gyaffe		
Bugaya	Buleero Buzibu		
Bugulumbya	Bukapere A Butwoli		
Bugulumbya	Busubo Nawenende		
Bugulumbya	Bukapere B		
Bugulumbya	Buyomba Busuyi LC 1	2018	
Bugulumbya	Isinwa CCF		2017
Bugulumbya	Nankuni Nawanende		
Bugulumbya	Nume Nakibungulya		2017
Bugulumbya	Abali Awalala Bukyonza A		
Bugulumbya	Bugulusi Misango		
Bugulumbya	Bukubembe (Kirangira)		
Bugulumbya	Bukyonza B LG		
Bugulumbya	Buswaigira		

Bugulumbya	Nawanende Nabirama		
Bulongo	Buyunze A		
Bulongo	Nakabugu Muslim SS		
Bulopa	Butonti Bageya		
Bulopa	Bulopa P S		
Bulopa	Bukuutu Badiru		
Bulopa	Butonti Kawubiri		
Bulopa	Asuman Bunabi		
Bulopa	Buganza Nagweni	2018	
Bulopa	Bugobi 1		2017
Bulopa	Bugobi 2		2017
Bulopa	Bukaibale Bulondo	2018	
Bulopa	Bukuutu Gabula Kamiigo	2018	
Bulopa	Bulondo Bukaibale	2018	
Bulopa	Bulopa HC	2018	
Bulopa	Bulopa SSS	2018	
Bulopa	Bunabi		2017
Bulopa	Buyemba		
Bulopa	Buzidolo 1		2017
Bulopa	Tasaaga	2018	
Bulopa	Bubango Gabula		
Bulopa	Buwoya		
Bulopa	Buyemba Mpuuga		2017
Bulopa	Buzungu Buyemba		
Bulopa	Nababirye P/S		2017
Butansi	Bulyampanda		
Butansi	Naluwoli PS		
Butansi	Kantu		
Butansi	Ntansi		
Butansi	Tibasiima		
Butansi	Kiwungu TC		
Butansi	Bubogo Balirwa		
Butansi	Bulebi Buluma		
Ikumbya	Kawanga		
Irongo	Buwala		
Kagoma	Foundation of Hope P S		
Kagumba	Busongole A		
Kagumba	Bususwa Magadha		
Kagumba	Bugaga		
Kagumba	Dembe		
Kagumba	Busongole Kayaka		
Kagumba	Bugobi Namusita		

Kagumba	Namisu Mawembe	2018	
Kisozi	Busige Budhugu		
Kisozi	Naikesa		
Kisozi	Nawantale Ntogo		
Kisozi	Bubago A Ibembe		
Kisozi	Bubago HC		
Kisozi	Bubago Muvule		2017
Kisozi	Bugaga Kiyunga	2018	
Kisozi	Bukaaya 2 Butadiba		
Kisozi	Bukooyo		
Kisozi	Bulamuka P S		2017
Kisozi	Buseeta		2017
Kisozi	Buseeta Kanakutanda		
Kisozi	Busige	2018	
Kisozi	Buyuka	2018	
Kisozi	Buzaya SS	2018	
Kisozi	Ikaaba A	2018	
Kisozi	Kisozi TC Kasaka		2017
Kisozi	Kiyunga Bukaya		
Kisozi	Kiyunga TC	2018	
Kisozi	Namatovu	2018	
Kitayunjwa	Bunagani		
Kitayunjwa	Budaudi	2018	
Kitayunjwa	Bugaga Buganza	2018	
Kitayunjwa	Bugaga Busubo		
Kitayunjwa	Bugogolo		
Kitayunjwa	Bulondha Bujames	2018	
Kitayunjwa	Bunakatwe	2018	
Kitayunjwa	Bunangwe A		
Kitayunjwa	Busota Alwooza		2017
Kitayunjwa	Busota Musalwa		
Kitayunjwa	Busota Nabirye	2018	
Kitayunjwa	Buwaiswa Bulema		2017
Kitayunjwa	Kabukye Bwambala		2017
Kitayunjwa	Namisambya SDA Bubale		
Kitayunjwa	Bukosia II		
Kitayunjwa	Bukosiya		
Kitayunjwa	Bulase		
Kitayunjwa	Bulase Dhabangi	2018	
Kitayunjwa	Bumyuka Namisambya		2017
Kitayunjwa	Bunafu Kisule		2017
Kitayunjwa	Bunangwe B		

Kitayunjwa	Buwaiswa B		
Kitayunjwa	Buyego		
Kitayunjwa	Kiroba Malulu		
Kitayunjwa	Namaganda Butoli		
Magogo	Nabukidi Nankadulo		
Magogo	Buluba Nankandulo		
Magogo	Matuumu SS		
Magogo	Nabukidi Ikoba		
Magogo	Bugwala Musenero	2018	
Magogo	Kawule West	2018	
Magogo	Kiduna B		2017
Magogo	Lwanyama TC	2018	
Magogo	Nakaato B		
Mbulamuti	Bugondha		
Nabwigulu	Nawambale		
Nabwigulu	Bulondo Mbugusi		
Nabwigulu	St. Peters Busuyi		
Nabwigulu	Bulondo 1	2018	
Nabwigulu	Busuyi	2018	
Nabwigulu	Bugaya Bugaga		
Namasagali	Kisaikye A		
Namasagali	Kavule A Hamuza		
Namasagali	Mengo Kasozi		
Namasagali	Bugaga Kasozi		
Namasagali	Kabanyoro Balamu		
Namasagali	Kisaikye A RUWASA		
Namasagali	Kavule A Ruwasa		
Namasagali	Kavule C		
Namasagali	Busambu P S		
Namasagali	Kisakye B		
Namasagali	Nansololo D	2018	
Namasagali	Kakindu Musana	2018	
Namasagali	Kakindu P S	2018	
Namwendwa	Bukapiso T C		
Namwendwa	Kidiki PS		
Namwendwa	Bugobi Busikwe		
Namwendwa	Bubwana Ikabyo		
Namwendwa	Butaya Azira		
Namwendwa	Bubwama Bubanda		
Namwendwa	Bukampala		
Namwendwa	Budhumba	2018	
Namwendwa	Bughongho		2017

Namwendwa	Bukooma Bunyirwa	2018	
Namwendwa	Bukyabita		2017
Namwendwa	Bulyango Kadaga	2018	
Namwendwa	Busiri	2018	
Namwendwa	Butaya P S		2017
Namwendwa	Butimbito Butege		2017
Namwendwa	Kawolera	2018	
Namwendwa	Kidiki Bulungu		
Namwendwa	Kinu PS		
Namwendwa	Kiseege	2018	
Namwendwa	Kyeeya PS	2018	
Namwendwa	Makoka		
Namwendwa	Makoka Butamilike		2017
Namwendwa	Ndalike P S	2018	
Namwendwa	Ndalike TC	2018	
Namwendwa	Bukonte		
Namwendwa	Bunyirwa		
Namwendwa	Butamilike		
Namwendwa	Kinawampere		2017
Namwendwa	Ndali	2018	
Namwendwa	St. Peters SS		
Nawampiti	Nawampiti		
Nawanyago	Bulondo A		
Nawanyago	Buwagi Bugaga B		
Nawanyago	Buwagi Gerenti		
Nawanyago	New Destiny PS		
Nawanyago	Buwango Mutobaano		
Nawanyago	Bupadhengo TC		
Nawanyago	Nakabaale B		
Nawanyago	Buwagi Buwangwe		
Nawanyago	Buwagi Bwase		
Nawanyago	Bupadhengo S S		
Nawanyago	Itukulu Busabo	2018	
Nawanyago	Nalimagha		
Nawanyago	Vision for Africa P S	2018	
Southern Division	Trinity Junior School		
Wankole	Butimbito 2A		
Wankole	Bubaale Infant School		
Wankole	Nawandyo Central		
Wankole	Bukitimbo		
Wankole	Bulondo Bukitimbo		2017
Wankole	Bunabala		2017



Wankole	Butimbwa A		2017
Wankole	Buyeru B Kirangira		
Wankole	Buyeru Bunangwe	2018	
Wankole	Kibeto Bulangira West 2	2018	
Wankole	Luzinga SS	2018	
Wankole	Nabeta Bulawa	2018	
Wankole	Bugobi A DW		
Wankole	Buwala Bukubembe		
Wankole	Luzinga Community P/S		2017
	Total	218	

<b>Summary of WSC engagement end February 2019</b>	
Average spot functionality	99%
Number of communities with active PMA contracts	218
Number of conventional rehabilitations with UNICEF funding:	46
Number of Recovery rehabilitations (RRs) with UNICEF funding:	60
Number of communities with >95% reliability:	204

### 3 Progress with Public-Private Partnership PPP

In addition to WSC engagement as described above, the project focused on the following key characteristics of a financially self-sustaining PPP structure for reliable rural water supply in Kamuli District:

- Service Provider (SP) capability to provide preventive maintenance services and with high functionality performance, at cost levels which can be recovered from community tariffs
- Service Provider (SP) capability to work in partnership with Sub-county Local Governments (SLGs) within a Public-Private Partnership (PPP) structure
- SLGs and DLG capacity to regulate and license Service Utilities through tariff setting, standard constitutions, mandatory registration and banking of WSCs, preventive maintenance services, agreed performance standards for service utilities, and agreed procedures for SP performance review and SP licensing
- SLG and DLG capacity to share costs of preventive maintenance service provision, in particular in respect of (a) financing “exclusions” (tasks which cannot be handled by a SP) and (b) providing subsidies to the SP service cost appropriate to ensure balance of Service Fee revenue and SP service costs.

The project has proved already that a local SP can achieve high functionality levels (see the tables above in section on WSC engagement), and training of staff and contracted technicians has been successful in this respect. However, the costs of service provision remain too high for cost recovery through tariffs, and therefore the work this period has been to:

- **Increase willingness-to-pay.** Several strategies were developed to address this challenge. One of these has been described above in context of WSC engagement: the requirement that WSCs to operate bank accounts which are supervised and which have transaction details discussed in regular community meetings, so community members have confidence in accountability and are therefore more willing to pay maintenance tariffs. Other strategies are:
  - a. use of radio talk shows to disseminate awareness of the cost saving and income/livelihood enhancement potential of maintenance tariffs, due to reduction of medicine and funeral costs and increase in productivity
  - b. Scaling up of number of PMAs in all sub-counties with uniform service fees so that maintenance tariff payments become socially normalized. Kamuli has more than 1400 rural communities so this is a challenging task. Saturation is however essential so that community members do not continue to avoid paying tariffs by requesting their wives and daughters to walk far to free-of-charge water sources (saturation means that the neighboring water source is also organized with a PMA). A strategy for efficient use of limited budgets to scale and saturate, and reach viable balance of cost and revenue, is being prepared by Whave for presentation MWE and UNICEF.

- **Reduce service delivery costs.** To do this, the project undertook two initiatives during the reporting period. These were:
  - a. Introduction of a “Recovery rehabilitation” (RR) strategy. RRs are rehabilitations which are done as a first step in a preventive maintenance service agreement (PMA) signed between a SP and a WSC. The difference between Rehabilitation and a RR is that a community receives the benefit of investment in overhaul, repairs, and rehabilitation of its water source on condition that it signs into and pays for a PMA. Also, the amount of money that the external body (whether government or a SP) spends on a RR is limited – currently Whave’s policy is to cap it at 1m UGX. If the RR requires more than 1m, the community pays the surplus, which is not a burden because the PMA anyway covers the community for major repairs which may be undertaken soon after. Also, as with conventional government rules for rehabilitations, the community contributes 100k UGX to the cost. This approach has been appreciated by Kamuli DLG and supported during the project period with contributions from the DWO of the DLG hardware stock purchased with the DLG rehabilitation budget, of value 7.8 mill UGX. The reason this approach has been adopted by the DLG is that it makes more efficient use of the DLG Rehabilitation budget than is currently the case : more rehabilitations are done with the same budget, and the prospect of breakdowns following rehabilitations (which are common currently) is eliminated; indeed this approach promises to eliminate rehabilitations entirely in the course of time, so that the DLG budgets for O&M can be used instead to assure universal functionality through the PPP approach. This is best understood by considering the full name of a PMA, which as Preventive Maintenance and Continuous Renovation/Rehabilitation Agreement (PMCRAs). The PMA includes rehabilitation within its terms, therefore there never comes a point where a source under a PMA is o a waiting list for Rehabilitation. WE call this type of Rehabilitation Continuous Renovation, to mark the different approach integrating preventive maintenance. This subsidy provided by the DLG to RR cost, is evidence of full collaboration on PMCRAs and of active engagement in the PPP.
  - b. Whave facilitated agreements between the SP and the SLGs and DLG, as to division of roles and responsibilities within a PPP structure for reliable water, with special attention to division of costs: “who pays for what”. This is described in the next section.

### 3.1 Division of PPP responsibilities

The discussion on PPP roles is ongoing at the end of the report period. However considerable progress was made in the period. Discussions centered on a proposed division of roles, responsibilities, and costs as shown in Table 3.1:

**Table 3.1 Division of PPP Responsibilities:**

#### 1. WSCs and communities

- a. Follow pre-requirements for PMAs (for example register as CBO, open bank account, contribute to Recovery Rehabilitation cost, deposit funds sufficient for half annual Service Fee)
- b. Sign into PMAs with the SP

- c. Follow terms of PMAs (for example collect tariffs sufficient for tariff collection cost and Service Fee, protect source from theft and vandalism, review bank transactions with community, pay Service Fees in timely manner using cashless transfers)

## **2. Service Provider**

- a. Follow pre-requirements for PMAs (shorthand for PMCRAs, Preventive Maintenance and Continuous Rehabilitation Agreements)
- b. Sign into PMAs with eligible WSCs
- c. Provide preventive maintenance services to compliant WSCs following terms of PMAs, at affordable cost levels
- d. Provide DLGs and SLGs with monitoring data following KPIs, for example number of active PMAs, functionality, payment compliance, customer satisfaction
- e. Assist DLGs/SLGs with their responsibilities, such as PPP information dissemination and Mobilization (defined below) as appropriate to Service Fee revenue and subsidy limitations
- f. Provide on-the-job training on preventive maintenance procedures and management to members of Hand Pump Mechanics Associations (HPMAs) and prepare HPMAs to operate as Service Providers
- g. Upgrade sources from hand-pumps to motorized or gravity piped systems supplying kiosks and yard taps
- h. Provide Mobilization guidelines and training to assist HPMAs and SLGs to undertake Mobilization tasks

## **3. HPMAs**

- a. Ensure competence and professionalism of members
- b. Assist members to contract with the Service Provider approved/licensed by SLGs/DLG as Water Service Technicians (WSTs) undertaking preventive maintenance serving of sources
- c. Assist with Mobilization of communities (inform communities of the Resolutions, the purpose of PMAs, the pre-requirements for PMAs, and prompt communities to travel to seek meetings with the Service Provider at SP offices or SLG offices during SP desk-days or markets during SP desk-days)
- d. Develop competence as a Service Provider through training by incumbent Service Provider

## **4. SLG/DLG**

- a. Developing and passing of appropriate sub-county local government (SLG) resolutions
- b. Development of sub-county by-laws derived from the resolutions
- c. Development of district ordinances derived from SLG resolutions or bylaws
- d. Implementation of the SLG resolutions, and of any SLG bylaws, district ordinances derived
- e. Mobilization of all rural communities (meaning the process of informing communities about the resolutions, training WSCs, setting appropriate CBO registration fees for WSCs, registering WSCs as CBOs using the standard constitution, prompting them to open WSC bank accounts and assisting, for example by arranging meetings with banks, encouraging

them to make the appropriate deposits in the bank, and prompting them to sign PMAs with the SP at the SP office or desk)

- f. Subsidizing the cost of preventive maintenance services for all rural communities, for example by transfer of hardware stocks purchased under government rehabilitation budgets to the SP for use in on-going rehabilitation within terms of PMAs
- g. Undertake works categorized as Exclusions in PMAs
- h. Monitoring performance of the SP by application of appropriate key performance indicators (KPIs) through quarterly performance review meetings
- i. Issuing SP licenses, otherwise known as Performance Contracts or MOUs
- j. Define uniform Service Fees and tariff guidelines at levels affordable to communities and appropriate to balance service cost and subsidies,
- k. Publicize uniform Service Fees and tariff guidelines and the associated Resolutions/SLG By-Laws/DLG Ordinances for example through radio and public meetings

### 3.2 Progress with PPP training

In this reporting period, significant progress was made in sharing of PPP responsibilities and cost between partners. Table 3.2 shows results so far.

**Table 3.2 Kamuli District Reliable Rural Water PPP: Indicators February 2019**

Number of PMAs	Number of WSCs with standard constitution	Number of WSC registered as WASH CBOs	Number of WSCs with WASH bank accounts	Number of SLGs participating in PPP	Number of SLGs resolving reduced CBO registration fees	Number of SLGs resolving mandatory PMSAs and CBO reg, bank accounts	SP Performance Contracting (MOU), SP Performance Review meetings, number of SLG/DLG Mobilizations, number of HPMA Mobilizations
<b>218</b>	218	71	103	14	14	14	See narrative below

A key element of PPP development is the concept of licensing or Performance Contracting. Kamuli DLG leaders appreciate the concept and have engaged in development of a MOU which acts as an initial stage towards Performance Contracting or licensing and includes clauses which define a division of roles and responsibilities, implying a division of cost responsibilities. A draft MOU was circulated to 66 DLG officers in a meeting in which all engaged in examining the draft. Senior DLG representatives engaged actively – these included the RDC, the DWO, the DHI, and several senior SLG representatives, including LC3s, SAS’s and CDOs. The HPMA was also represented in this meeting and took part in the comments.

The participants all agreed on one principal request, which was that the DLG was not committed to a specific minimum subsidy but were comfortable to include a commitment to “add hardware” without specifying a minimum amount. This was explained as opening the door to greater subsidies than suggested, rather than a restriction. The meeting felt that a small floor would lead to restriction, which was not desirable.

The MOU was signed by all parties on 4 September 2018 and constitutes a license for operation of a preventive maintenance Service Provider in Kamuli. It has been written as a key Public-Private Partnership document suitable for as a first template definition of division of roles and responsibilities within a professionalized rural O&M framework, and as a preliminary performance contract, which acts as a major step in developing local government capacity for regulation for rural water Service Providers.

The training approach Whave is using is to familiarize all partners with the practical operations of a Performance Contract first, so that it is clear to all partners what the contract is governing, its purpose and mode of implementation. The key practical function is quarterly SP Performance Review meetings involving agreed KPIs.

Accordingly, during this period, review meetings with Whave were conducted on a quarterly schedule by the DLGs and SLGs, demonstrating compliance with the PPP concept and acting as a training process. The KPIs discussed in 2017 and early 2018 were continued with changes made as requested by the D/SLGs as follows. Individual reports were given per sub-county, as requested:

- Number of communities contracted
- Payment compliance
- Reliability (explanation of each indicator was added to Whave self-assessment reports):
  - Spot functionality
  - Average down-days
  - Number of breakdowns (changed from “incidences”)
- Customer satisfaction

The most recent DLG-Whave quarterly review meetings were held on the following dates: 02<sup>nd</sup> May 2018, 18<sup>th</sup> July and 31<sup>st</sup> October 2018. A March 2019 meeting is scheduled.

#### **4 Progress in local Service Provider training**

In 2017, Whave conducted meetings with the Kamuli HPMA, and offered training to the HPMA to become a rural water preventive maintenance Service Provider (SP). This met with interest and approval from some HPMA leaders. Whave ensured that all its contracted technicians were HPMA members, so that on-the-job training was already under way, but since Whave activities were restricted to some sub-counties and not all, it wasn't yet possible to familiarize all HMA members in 2017 with this new type of professional work.

However, in both 2018 and early 2019, Whave and the HPMA of Kamuli organized collaborative meetings which involved HPMA members from all sub-counties and included a training in preventive maintenance structures and approaches, in particular the role of the Water/WASH Service Technician. Existing WSTs HPMA members were present to explain their views on how the WST role offers improved and stable incomes for rural technicians.

The members of HPMA now participate regularly in our periodic PPP Quarterly review meetings and the contracted technicians receive one day training session every month from Whave. Two major training were held in 2018, one in March and one in June. As a follow-up and refresher schedule, every single month, there is a fixed training day for HPMA members to learn PMCR techniques.

HPMA members are now mobilizing communities for Whave service agreements voluntarily, on an on-going basis, 75 communities have already been mobilized by HPMA members, and 50 of these have signed into Whave service agreements.

## 5 Findings

The project has provided a very valuable evidence base for assessing the cost of preventive maintenance services which assure full functionality. The findings are presented in the two tables shown here:

### 4c. Target cost for full functionality:

<b>Technical costs</b> <i>(4 years experience of Service Agreements in &gt; 200 communities, and DWO/HPMA alignment)</i>	UGX/year/source averages
<b>Local technician income</b> <i>(all technicians members of HPMA)</i>	192,000
<b>Hardware (all major and minor parts)</b> <i>Aligned with DWO records 2017</i>	Current estimate: 467,000
<i>Total technical costs current replacement patterns</i>	659,000
<b>Hardware (all major and minor parts)</b> <i>Reduction as PM system strengthens</i>	Future estimate: 350,000
<b>Total technical costs</b>	<b>542,000</b>

### 4d. Target cost for full functionality:

<b>Management Costs</b>	UGX/year/source averages
Target Management and Self-Monitoring	410,000
From previous slide: Total technical costs	542,000
Total PM Service Costs excl defaults	952,000
Default rate (% of service cost not recovered from tariff revenue)	20%
<b>SP Service Fee required (rounded)</b>	<b>1,200,000</b>

### 5.1 Average earnings of local technicians

The evidence supporting the first cost, average technician income, is presented in the table below of actual total spend on technician income in 2018. In this table the annual average is calculated. The figure is rounded up to by a small percentage to account for inflation in future years and also to correspond to a simple formula which allows for average monthly income to be easily understood in national and district planning meetings with DLGs and MWE; this is a projection of average technician income of 400k/month assuming 25 sources on average are maintained per technician, which calculates out at 192k/year/source.



<b>Average earnings of technicians 2018, Kamuli District</b>				
<b>January to March 2018</b>				
Month	Expenditure Technicians Q1 2018	Number of PMAs	Average earned by technician per source	Average annual earning per source
April	UGX 1,739,720	144	UGX 12,081	UGX 144,977
May	UGX 1,948,000	152	UGX 12,816	UGX 153,789
June	UGX 2,308,000	166	UGX 13,904	UGX 166,843
Average earning	1,998,573		UGX 12,934	UGX 155,203
<b>April to June 2018</b>				
Month	Expenditure Technicians Q2 2018	Number of PMAs	Average earned by technician per source	Average annual earning per source
April	UGX 2,552,000	144	UGX 17,722	UGX 212,667
May	UGX 2,638,000	152	UGX 17,355	UGX 208,263
June	UGX 2,735,000	166	UGX 16,476	UGX 197,711
Average earning	UGX 2,641,667		UGX 17,184	UGX 206,214
<b>Average annual earnings</b>				<b>UGX 180,708</b>
Simple calculation useful for stakeholder planning communications				
Average earnings of technicians	UGX 400,000	/month		
Average number of sources	25	per technician		
Average technician earning per source				<b>UGX 192,000</b>

## 5.2 Hardware

Initial long-term maintenance costing data was based on knowledge of local technicians, leading to a publication by Whave's Technical Training Specialist Sam Butterworth (S. Butterworth, & D. McNicholl, Whave Solutions (2018). *Life cycle analysis: assessing the capital and operational expenditure of handpump preventive maintenance*, 41st WEDC International Conference). The research done for this paper was mostly based on gathering knowledge from local technicians with long experience, a necessary method since no written records exist, combined with written tracking by Whave of replacements over relatively few years, resulting in the estimate of 467,000 UGX/year replacement cost. Following this paper, Whave continued to track replacement costs and also took fresh initiatives in selection of optimum components. This led a more recent revised calculation of hardware replacement costs, as shown in the table below. These costs were calculated using the average depth of all water sources across Kumuli District who received a Recovery Rehabilitation and entered into a service contract with Whave. This average depth was approximately 24 m, equivalent to 8 pipe sections of rising main.

<b>Annual costs Kamuli</b>	
<b>Below Ground</b>	
U2 Cylinder Components	UGX 58,427
U2 SS Connecting Rod	UGX 49,000
U2 uPVC Pipe (White)	UGX 28,636
U2 SS Rod Coupling Nut	UGX 23,333
U2 SS Rod Lock Nut	UGX 10,667
U2 SS Top Connecting Rod	UGX 11,000
U2 Rod centraliser	UGX 2,800
U2 Pipe Centraliser	UGX 4,400
U2 uPVC Adapter Set Complete	UGX 15,000
<b>Sub-Total</b>	<b>UGX 203,263</b>
<b>Above Ground</b>	
U2 Above Ground Components	UGX 149,608
<b>Total</b>	<b>UGX 352,871</b>

### 5.3 Management and Self-Monitoring

The table below shows how the recurrent Management and Monitoring cost is calculated, based on current salary levels and expenses. The calculation is based on the assumption that at least 600 of the 1,300 point water sources in Kamuli are serviced, since any smaller number does not provide economic scale or financial viability. The increase in volume of business from the current figure of approx. 200 up to 600 is a major challenge since most sources currently suffer from sub-standard technology, and therefore funds are required for large volumes of Recovery Rehabilitations as explained above. The process of recovering the technology quality is one element of the overall investment activity needed, which includes building local regulatory capability and developing willingness-to-pay conditions. The cost of the investment process is separate from the recurrent cost reflected here of servicing 600 sources.

Implementation experience to date shows that management and monitoring necessitates a senior engineering, administrative, and management team that has regional capability (a Regional Service Provider of RSP), providing liaison with central government, support for procurements, engineering and management expertise, to 20 local teams known as District Service Providers (DSPs). The DSPs operate in one or more neighboring districts within a single language group with a focus on district government liaison. Engineering, administrative, and management salaries reflecting professional capability needed, together with expenses are shown on the table below under the heading RSP.

Implementation experience in respect of operations in Kamuli to date shows that a professional Manager is needed to oversee a group of 4 WASH Service Officers (WSOs), all salaried inclusive of income tax, as shown under the DSP in the table below. Expenses are travel and subsistence of the 5 professional staff as they carry out their duties, which are primarily to collect service fees from

signed-up communities, manage the local technician contractors, and liaise with local government partners.

<b>Management and Monitoring</b>		
Number of sources	<b>600</b>	sources
<b>DSP</b>		
Manager	<b>UGX 5,000,000</b>	month gross
Four assistants	<b>UGX 10,000,000</b>	month gross
Total personnel	UGX 15,000,000	month gross
Total personnel	UGX 180,000,000	year gross
Expenses	<b>UGX 24,000,000</b>	year
Total DSP	UGX 204,000,000	year
DSP per source	UGX 340,000	year / source
<b>RSP</b>		
DSPs supported	<b>20</b>	LSPs
Salaries	<b>UGX 30,000,000</b>	month gross
Salaries	UGX 360,000,000	year gross
Expenses	<b>UGX 480,000,000</b>	year
Total RSP	UGX 840,000,000	year
RSP per DSP	UGX 42,000,000	year /DSP
RSP per source	UGX 70,000	year / source
<b>Total Man/Mon</b>	<b>UGX 410,000</b>	<b>year/source</b>

## 5.4 Dependence on DLGs

The two parts of this question are

- how do DLGs feel about contributing supplies in terms of numbers and cost
- how much dependence has been reduced through the exchange of paying (ie, how dependent are Communities on DLGs in the district)

## 5.5 DLG position on contribution of supplies and finance

The project has made a significant step in dependency on the DLG in respect of the Rehabilitation process.

In the period July 2017 to June 2018 (GoU FY 2017/8) the DLG conducted 29 rehabilitations, spending on average 2.6 mill Ush per rehab. They did not reach all the non-functionality sources requiring rehabilitation, which the District Water Officer estimates to be 80. In eth last financial year therefore, the DLG managed to return only 30 to 40% of the sources which had been installed by government and had fallen into disuse.

The DWO estimated that “about 18” of the 29 rehabilitations carried out were needed because of sub-standard initial work by the DLG, and he therefore judged that it would be unfair to ask the community for the standard capital contribution of 0.1 mill Ush in those cases.

Whave has rehabilitated 100 sources using high quality durable components. 52 of these were done in 2017, and 48 in 2018. The earlier 2017 batch cost averaged UGX 1.1 mill Ush, following the conventional approach but still very much less than the average DLG cost of 2.6 mill Ush. The later 2018 batch followed the new approach called “Recovery Rehabilitation” with an average cost of 0.8 mill Ush. The RRs were conducted as a first step within the terms of a preventive maintenance and continuous rehabilitation agreement (PM CRA or PMA for short).

Under RR, communities are obliged to pay the standard capital contribution to the RR cost, and Whave succeeded in collecting approximately 12 mill in contributions, or 0.15 mill per RR. However Whave will align with the government standard of 0.1 mill capital contribution, therefore the net cost of RRs on average is 0.7 mill Ush, the average 0.8 minus 0.1.

The new RR approach has had the effect of influencing the DLG to move toward the Whave approach within the framework of a PPP. The reason is that the RR approach enables the DLG to do two things at once:

- The RR approach reaches a larger number of rehabilitations within the same budget constraint. For example, the same budget that was recently spent by the DLG on 29 rehabs, could have reached more than 100 rehabs, more than 4 times as many rehabs. It would have completely recovered all the 80 non-functional pumps in Kamuli.
- The RR approach ensures that those sources being rehabbed, do not revert to poor functionality and possible breakdown, requiring a rehab again prematurely, a scenario sometimes observed by district stakeholders. The RR approach uses high quality durable components and also places the sources into a continuous parts replacement protocol, so avoiding any future need for rehab. All the non-functional sources in Kamuli could have been recovered and then assured of continuing functionality, using the same government budget of FY 2017/8.

The DLG recognized the significance of the PPP in this respect, and decided to support it with concrete action. Administrative procedures so far have prevented a direct deployment of DLG finance into the RR approach, but it was feasible for the DLG to transfer hardware purchased under the government rehab grant into the RR protocol. In this period, hardware to the value of 8m Ush was transferred into RR by the DLG. This was equivalent to 11 rehabs under the PPP RR approach, and only 3 using the current DLG approach.

This report therefore marks a significant step forward in WASH service delivery in rural Uganda, since this sharing of the government rehabilitation budget by Kamuli DLG substantiates a PPP approach that assures full functionality for sources which are accessible to all, based on efficient use of government budget, and heralding real potential for investment at scale for conversion to piped systems in rural areas.

## **5.6 Reduction in community-DLG dependence**

The Whave maintenance system is endorsed by the DLG through a MOU signed between Whave and the DLG, and through a set of sub-county council resolutions, which are currently being considered for ordinance status by the DLG. These documents contain key commitments by government and substantiate the Whave system as a PP system for maintenance. The reason the sub-county councils

and the DLG support the system is that it assures full functionality, drawing on service fees paid by the communities. This means the pressure felt by government to undertake repairs and replacements is reduced, since the evidence is that all the service communities have continuous full functionality and do not revert to government for assistance and expenditure. Dependence on DLG is therefore significantly reduced.

How much of a reduction is this? Currently only 178 communities are actively paying their service fee, while Kamuli has over 1,300 needing the same service. The PPP objective therefore is to scale approximately 6-fold. This will be possible as soon as funds are available for rehabilitation of a large number of sources, along with a social marketing program.

### **5.7 Technology quality and life-cycle cost-effectiveness**

Whave works with the same technicians that conduct DLG operations, and the information provided by these technicians is that a significant portion of the parts used by the DLG are sub-standard with falsified claim to fit-for-purpose. One example of this is the recent use of stainless steel for rising mains – a good deal of the pipes claiming to be stainless steel are not stainless steel, although coated to look the part, and these are used in DLG operations.

In contrast, Whave has been careful to use only rising main and other parts supplied directly by the hand-pump manufacturer and acknowledged by experienced technicians to be durable.

This means that the rehabilitations and the servicing done by Whave under the PMCR contracts, constitutes a significant lift in technology quality. When combined with the cost savings Whave is achieving, this constitutes also a significant lift in value-for-money and cost-effectiveness.

Cost effectiveness is transformed because Whave is properly tracking of parts lifetimes and life cycle costs. No such tracking is being done conventionally, with the result that substandard parts are easily be introduced, and parts are commonly replaced prematurely. In contrast Whave is recording all dates at which parts are installed, the type, materials and origins of each, and tracking their wear rate and replacement date. This means Whave is in the position of screening out sub-standard or low-performance parts, and is ensuring that premature replacement does not take place.

### **5.8 Coverage improvement**

Coverage in Kamuli is below 80%, with 5 sub-counties below 70% and one at 32%, according to MWE in 2018. 78% of the rural population is designated by MWE as without water supply service even at the level of hand-pumps, and 79% of the total population is unserved. One reason for the low coverage figures is abandonment of rural water sources. MWE reports that 182 water points have been non-functional for more than 5 years. The Whave-Kamuli DLG PPP approach changes this situation radically, by introducing legislation that ensures all water points have their major and minor components replaced cost-effectively and continuously under PMCR agreements, so that not only is functionality assured, but premature abandonment is avoided.

### **5.9 Comparing baseline and project service**

The baseline service situation in Kamuli was measured in 2017 by the Wave monitoring team. It is also measured regularly by MWE in the form of spot-functionality figures which are published in the Uganda Water Atlas. The results of both surveys in 2017 are given in the tables below in the section Baseline. The updated figures from MWE are also shown, for 2018.

In contrast, the service provided by Whave in 2018 is detailed in the section below heading Whave Service.

The upshot of this comparative study is that Whave has improved functionality service significantly, as summarized in this table:

	Baseline		Project
	MWE	Survey	Survey
Spot-functionality	88%	84%	99%
Equivalent down-days	44	58	
Average down-days			2

### 5.10 Baseline

Baseline surveys aimed at assessing how many rural water sources are adequately functional, were conducted in Kamuli in 2017 using a smart-phone facility. The surveyed sources were identified through the Ministry of Water and Environment (MWE) database. Sources which were under service or rehabilitation contracts with Whave by the time of conducting the survey, were excluded as not qualifying as baseline.

shows the MWE 2017 spot functionality figures for the sub-counties surveyed by Whave. This figure of 88% also is reported as the spot functionality rate for Kamuli in the Water Atlas in August 2018. The table also contains, the results of “adequate functionality” survey questions which determine the percentage of sources which produced no water at all or which produced insufficient water for the community they served. The parameters used to assess adequate functionality were as follows:

- whether or not the source produces some water
- whether the source fills a jerry can at an acceptable rate
- whether it yields sufficient volume through the year for the community size

The first parameter, “source produces some water”, was determined by observation. The surveyor operates the pump and checks if the source produces water at all, even if the rate of supply is inadequate. The second parameter, jerry can filling-rate acceptable, was determined by how full a 20-litre jerry is after 60 full strokes of the pump handle once the water is flowing. The definition of acceptable filling rate is a jerry can that is at least three quarters full after 60 strokes. For the third parameter, yield sufficient all year, the community members were asked if the source provides sufficient water for the community all year. The precise question was “when functioning does the source provide sufficient water for the community all year?”. Community members were also asked to give a reason for not providing sufficient water all year. Examples of answers given are: always, in the afternoon it dries out, it doesn’t work in the dry season, after over pumping.

The first parameter, “source produces some water”, is equivalent to the “spot functionality” surveys conducted by the MWE working through the District Water Officers.

	MWE surveys: spot- functionality	Whave survey of "adequate functionlity"			Whave question-survey: Adequate Reliability		Number sources in census of specific sub- counties
	e.g 85% implies 55 down-days	"Some water"	Filling rate OK	Yield	% communities with <11 down- days per year	% communities with <7 down- days per year	
Kamuli	88%	84%	48%	84%	65%	64%	694 (6 SCs)

	Bugulumbya	Bulopa	Kisozi	Kitayunjwa	Namwenda	Wankole	All sub- counties
Number of water sources	117	67	128	156	152	74	694
Source produces some water	85%	85%	85%	88%	79%	84%	84%
Jerry can filling rate acceptable	67%	22%	16%	91%	36%	31%	48%
Yield sufficient all year	85%	78%	69%	97%	82%	92%	84%

It should be noted that a rating of 88% spot-functionality, (or “source-produces some water” spot-check) average implies 44 days a year of down-time, which signifies lost investments in rural water infrastructure and a key cause of poor rural health, gender and child issues, and poor economic productivity. It is clear that even this figure, and more so the adequate functionality figures presented, indicate an inadequate level of service not commensurate with National Development Plans or achievement of SDG 6.1 and 6.2.

### 5.11 Whave Service

Careful monitoring of the water sources in the communities serviced by Whave reveals a functionality rate of 99% implying an average down-time days of less than 4 per year.

The number of breakdowns and the number of days on average taken to repair breakdowns is recorded in quarterly reports to the DLG and shown in the table here for each subcounty.

Indicators of adequate functionality are also shown on the table, to allow comparison with the baseline survey.

A significant improvement in service level is observable.

District Service Q2 2018									
Source produces some water	99%								
Spot functionality*									
Jerry can fill rate acceptable	94%								
Yield sufficient all year	91%								
Average down-days **	2								
Number of breakdowns	18								
<b>Sub-counties surveyed</b>									
	Bugulumbya	Bulopa	Kisozi	Kitayunjwa	Wankole	Namwendwa	Nawanyago	Magogo	Nabwigulu
Number of water sources	20	22	26	37	21	32	5	6	3
Source produces some water	100%	100%	100%	100%	100%	97%	100%	100%	100%
Spot functionality*									
Jerry can fill rate acceptable	85%	91%	92%	100%	95%	94%	100%	100%	100%
Yield sufficient all year	90%	86%	88%	89%	95%	94%	80%	100%	100%
Average down-days **	0	2	2	2	0	1	0	0	0
Number of breakdowns	0	5	4	4	0	5	0	0	0
*Spot functionality: all PMSA communities are visited once during the quarter, in batches, one third per month. The figure is the percentage of observations of water flowing, divided by the total number of observations									
**Average down-days: the total number of down-days associated with all breakdowns is divided by the number of breakdowns									

## 5.12 Numbers of Over and Underground Repairs

The table<sup>1</sup> shows the number of parts replacements undertaken since the start of the project in early 2017.

Period considered: 2017 - 2018								
	Below Ground			Above Ground		Total		
	# Replcmnts	% Replcmnts Below Ground	Tech visits with downhole rplcmnts	# Replcmnts	Tech visits with above ground rplcmnts	# Replcmnts	Tech visits	% of tec visits with downhole rplcmnts
<b>Rehab</b>	1058	64%	95	584	100	1642	100	95%
<b>Service</b>	194	40%	80	288	181	482	181	44%
<b>Total</b>	1252	59%	175	872	281	2124	281	

<sup>1</sup> This table derives from Technical Implementation Reports (TIRs) submitted to our Technical Specialist, so does not include a small additional number of rehabilitations that have been completed (as detailed in Table 2.1 above), because the TIRs are still being processed by the Kamuli administration team