

Preventive Maintenance Approach (PMA) of community hand pumps in rural villages of Sierra Leone – Towards a non-breakdown

approach

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# Abbreviations

GI	Galvanized Iron
IP	Implementing Partner
MLGRD	Minisry of Local Government and Rural Development
MoWR	Ministry of Water Resources
OPT	Official Pump Technician
PCT	Pump Care Taker
PMA	Preventive Maintenance Approach
PMS	Preventive Maintenance Season
PT	Pump Technician
WD	Water Directorate
WPC	Water Point Committee
WPM	Water Point Mapping

#### **EXECUTIVE SUMMARY**

Sierra Leone hand pumps main types are robust ones, requiring professional maintenance. However data show that post operations are generally missing in the implementation of water points. Around 30% of the hand pumps are not functional at any time, and functionality drops very quickly within 3-4 years after installation, stressing the importance to start the maintenance operation as soon as possible.

Standardization of hand pumps, spares parts availability, money contribution and readily available pump technicians are essential aspects of the hand pumps sustainability.

In order to increase the functionality and terminate the vicious cycle of breakdown and dependency, Inter Aide Sierra Leone has progressively tested, implemented and adapted a Preventive Maintenance Approach (PMA) in Bombali District. The PMA allows to target 100% functionality: 99% of the maintained hand pumps are in working conditions, only 6 out of 610 being non-functional.

In October 2017, Bombali District is covered by a network of 17 private Pump Technicians, covering the 13 chiefdoms and supervising 610 hand pumps out of the 1400 existing, in more than 517 villages. Activities started in Tonkolili District end of 2016 with the methodology and tools presented in this document.

The PMA consists of two main operations 100% paid by the community: Bi-weekly (minor) and Annual (major) preventive maintenances. The bi-weekly maintenance is performed by a member of the community. The annual preventive maintenance is performed by pump technicians, dedicated local service providers paid by the water users. Besides preventive maintenance, they allow quick reaction in case of unexpected breakdown and the quality of their work is insured by a guaranty. They are fully recognised by the district authorities and institutions.

The PMA is adapted to the type of pump in the country, and with average direct cost of less than 0.2 USD per year and per person, is clearly affordable. However, communities used to free approach are often reluctant to pay for water.

The approach starts as a demand-driven approach combined with subsidies as incentives. It evolves in a complimentary obligatory service for which implication of the authorities in mandatory. The role of governmental institutions is central in the coordination of Implementing Partners (IPs) and recognition of the pump technician network. Field and office staff are needed for the implementation and monitoring of the PMA.

Spare parts supply chain remains a weak link in the rural water supply provision. A test to implement a spare part supply chain for commonly used spares during preventive maintenance operations is undergoing. Future spare parts availability, prices and quality control remains a challenge.

Recommendations for further development include, wherever possible :

- Generalise the use of maintenance contracts for any hand pump related activity
- Consider a financial contribution as prerequisite for any hand pump related activity by any IP
- Generalise the use of Official Pump Technician, wherever available for all IPs
- Share experience related to the type and quality of spare parts between IPs
- Allow only standard hand pump whose spare parts are available in the country
- Condition the rehabilitations and constructions of water facilities to the respect of the preventive maintenance.

# 1. Introduction and context

The Preventive Maintenance Approach of hand pumps has been tested, adapted and implemented for years in Bombali District, raising the interest of the national government. This document has been requested by the Water Directorate and Unicef in order to help to upscale the Preventive Maintenance Approach in Sierra Leone.

# 1.1 Hand pumps in Sierra Leone

# 1.1.1 Importance and characteristics

According the the 2016 Water Point Mapping<sup>1</sup> (WPM), hand dug wells and boreholes represent together 72% of all the improved water sources in the country. While the percentage is lower in more urban areas (Wester Urban), their relative importance is above 90% in some Districts (Bonthe, Bombali and Pujehun).

The main type of hand pumps are, at national level, **India Mark** (74%, among which 67% of IM2) and **Kardia** (14%). PB Mark 2 (compatible with India Mark, except for the cylinder) represents 7% while Inkar (compatible with Kardia, except for the cylinder) represents 2%. In this kind of survey, as the pump is not dismantled, the type of pump actually refers to the type of head (the cylinder of a PB Mark 2 pump can be a India Mark 2, etc.)

Kardia and India Mark II are robust type of hand pump, but need complete dismantle of the whole system to get access to the cylinder (which is not the case for Blue pumps or Afridev e.g.), requiring high level of knowledge and professional tools to be maintained. What's more, while India Mark II spare parts can be found in Freetown and even in some provinces headquarters, Kardia spares are very difficult to obtain, and much more expensive (see ANNEXE V), which enforce the importance of the preventive maintenance.

Kardia and India Mark II are the main types of hand pump in the country. They are robust type of hand pump but require professional maintenance to ensure long-term sustainability.

81% of all the hand pumps extract water from a well depth between 6 and 20m.

Seasonality of water point is recorded as being a huge problem. According to the mapping, only 45% of hand pump provide water at any time, while 49% are seasonal, and 6% never provide water!

Table 1. Seasonality of hand pump related water points										
Always water	Dry always / Never water	Seasonal	Grand Total							
5443 (45%)	687 (6%)	5956 (49%)	12086							

Seasonality issues are not specifically dealt with in this document. PMA address the issues of hand pumps, not structural problem of wells. Seasonality issues related to wells/borehole generally need either a rehabilitation (Rebuilding of an important structural part of the system) or alternative measures as fetching water in non-improved water point coupled with household water treatment technology<sup>2</sup>.

<sup>&</sup>lt;sup>1</sup> Statistic Sierra Leone and Ministry of Water Resources, 2016. WASH Baseline Survey and Water Point Mapping 2016.

<sup>&</sup>lt;sup>2</sup> Inter Aide has developed an approach of self-supply house hold water treatment tested and implemented in Bombali District of Sierra Leone. More information can be found here : <a href="http://interaide.org/watsan/sl/category/household-water-treatment/">http://interaide.org/watsan/sl/category/household-water-treatment/</a>

From a functionality point of view, **69% of the water points equipped with a hand pump are functional and in use** (2016 data, mainly during rainy season), while **23% are broken**. 7% are damaged, and 5% are functional but not in use.

Pretty surprisingly at first look, **the functionality of the water point doesn't seem to be linked with the age of the system** Table 2). Whatever the date of construction, the percentage of water point working and in use amount for about 65% of the hand pumps, while the broken down plus functional but damaged amount for about 30% (the survey was conducted mainly during the rainy season). The reason **behind being most probably the non-record of corrective measure operated to the water point**: successive subsidised repairs operated by different Implementing Partners and Agencies after the war, after Ebola, etc.

Construction Date	Functional and in use	Functional but not in use	Functional But damaged	Broken down	Total
before 1980	36 (63%)	4 (7%)	3 (5%)	14 (25%)	57 (100%)
80ies	728 (63%)	38 (3%)	88 (8%)	297 (26%)	1151 (100%)
90ies	553 (65%)	49 (6%)	54 (6%)	191 (23%)	847 (100%)
2000ies	2753 (61%)	197 (4%)	331 (7%)	1199 (27%)	4480 (100%)
2010ies	3557 (67%)	304 (6%)	347 (7%)	1075 (20%)	5283 (100%)
Grand Total	7627 (65%)	592 (5%)	823 (7%)	2776 (23%)	11818 (100%)

#### Table 2. Functionality of hand pump related water points and year of construction

Looking more in detail at the most recent year, it appears that even one year after construction, the functionality does not even reach even 80%, showing **important problems of implementation**. Some of those water points are reported to always dry! A **first drop in functionality is observed after 1 to 2 years after the installation date** (the year of the survey being mainly in 2016 plus few samples in 2017).

**3** to 4 years after the construction date, the percentage of functionality reaches the average (65%) considering all construction years, showing the importance to start working on the maintenance of the hand pump straight from the beginning.

Table 51 Functionality of Water points in relation to the construction date (last 7 years)										
Construction	Functional	Functional but	Functional	Broken down	Total Number					
Date	and in use	not in use	But damaged							
2010	534 (62%)	42 (5%)	65 (8%)	218 (25%)	859 (100%)					
2011	424 (65%)	30 (5%)	52 (8%)	149 (23%)	655 (100%)					
2012	545 (64%)	27 (3%)	53 (6%)	232 (27%)	857 (100%)					
2013	605 (65%)	49 (5%)	60 (6%)	219 (23%)	933 (100%)					
2014	525 (71%)	47 (6%)	47 (6%)	124 (17%)	743 (100%)					
2015	467 (71%)	38 (6%)	55 (8%)	98 (15%)	658 (100%)					
2016	435 (79%)	67 (12%)	14 (3%)	34 (6%)	550 (100%)					
2017	22 (79%)	4 (14%)	1 (4%)	1 (4%)	28 (100%)					

#### Table 3. Functionality of water points in relation to the construction date (last 7 years)

The **hand pumps are mainly owned by Communities** (65%) and by School (19%). Health facility own 5% of the water points, while 6% are owned by Private individuals.

Water from a hand pump is generally considered as free. From the survey and replies, only 3% of hand pump related Water Point Committee collect fees on regular basis (per volume or months), while 3% collect fee only after breakdown. The vast majority of hand pumps related Water Point Committee doesn't collect any contribution (93%). There is no real change considering only communities' owned water point (91% without payment).

Payment?	Number			
1:No payment – its free	8370	(93%)		
2:Yes, Per jerrican 20L	219	(2%)		
3:Yes, Metered (LE/m3)	8	(0%)		
4:Yes, Flat rate (LE/HH/month)	123	(1%)		
5:Only after system breakdown	308	(3%)		
Grand Total	9028	100%)		

#### Table 4. Type of payment for the water of the hand pump related water point

#### Surprisingly, half of the hand pumps (48%) are reported as missing any Wash Committee.

50% of the hand pumps would be 1h distance to a spare parts supplier.

Nearly two third of hand pump mapped are **lacking of pump mechanic availability** (63%). It is probable that the distinction between pump mechanic and pump care taker was not too clear during the survey. However, this number is impressively high. The lack of pump mechanic even seems to increase when the time since installation reduce, showing that this aspect is clearly missing in the construction process of most IPs.

Table 5.	Availability of pump	mechanic in regard to	the date of con	struction of the wate	r point
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	<i>i</i> , , ,			0				•					
Pump Mechanic available	before 1980	80's	90's	2000's	2010	2011	2012	2013	2014	2015	2016	2017	Total
No	30	580	477	2666	514	402	533	557	459	413	389	20	7040
	(53%)	(52%)	(59%)	(63%)	(63%)	(67%)	(67%)	(64%)	(66%)	(66%)	(71%)	(74%)	(63%)
Yes	27	546	336	1574	296	200	265	313	240	210	158	7	4172
	(47%)	(48%)	(41%)	(37%)	(37%)	(33%)	(33%)	(36%)	(34%)	(34%)	(29%)	(26%)	(37%)
Grand Total	57	1126	813	4240	810	602	798	870	699	623	547	27	11212

# Post operations are generally missing in the implementation of water points : Water is generally considered as free (no community contribution), half of the hand pump lack a WPC, two third lack of pump mechanic/pump care taker

#### 1.1.2 Main issues related to hand pumps

Predominance and issues related to hand pump functionality are not specific to Sierra Leone. Hand pumps are the predominant mode of supplying water in rural sub-Saharan Africa, with more than 60,000 installed every year<sup>3</sup>. Yet, globally it is estimated that around one in three are non functional at any one time<sup>4</sup>, which is the average for Sierra Leone.

Predictors of sustainability for community-managed hand pumps have been analysed for Liberia, Sierra Leone and Uganda using logistic regression analysis<sup>5</sup>. For Sierra Leone, only the hand pumps installed less than nine years prior the time of data collection (2012) were considered.

The odds of a hand pump being non-functional were significantly higher when:

- i. <u>Time increased since the hand pump was installed</u>, is directly linked with the increase frequency of breakdown.
- ii. <u>Hand pumps were installed on **hand-dug** well rather than boreholes.</u> The plausible explanation given was that while the mean time between failures might be lower for boreholes than shallow wells, the down time may be shorter due to the imperative to have the hand pump repaired promptly (generally no alternatives, while hand dug well can still be used with bucket when the hand pump breaks down).
- iii. <u>The hand pump **type was uncommon.**</u> Spare parts are not available for uncommon types of pumps! Standardization is essential to enable long-term hand pump sustainability.

<sup>&</sup>lt;sup>3</sup> Sansom K. and Koestler L., 2009 cited by Foster T., 2013

<sup>&</sup>lt;sup>4</sup> RWSN, 2013 cited by Forster T., 2013

<sup>&</sup>lt;sup>5</sup> Foster T., 2013.

- iv. Implementation was conducted by **government** rather than an NGO. Reason might be that government use to work with contractors, with relatively low level of **follow-up** due to internal constrains
- v. <u>There was **no revenue collected** from users</u>. It was found out that communities **collecting money from users in advance** enjoyed higher levels of hand pump functionality than those that did so only after breakdown. Money collection is however very seldom practiced.
- vi. Spare parts were non-available within 20 miles from the hand pump.
- vii. <u>Readily available mechanic was lacking.</u> From the logistic regression analysis data set considered, half of community-managed hand pumps in Sierra Leone lacked a skilled mechanic that could be called upon. More recent information tends to show that the lack of pump mechanic is even higher.
- viii. <u>Water quality was considered as poor</u>. Experience show that the water quality can be linked with the environment of the water point (type of soil, sources of contamination around, etc.) as well as the quality of the spare parts. Corrosive water can cause premature aging of the spares, with bitter taste and colour of food cooked and clothing washed as consequences, stressing the importance of quality spare parts.
  - Hand pump standardization, spare parts quality & availability, money contribution and readily available mechanics are essential aspects of hand pump sustainability

## 1.2 Institutional context and main actors

# 1.2.1 Institutional actors

**The Ministry of Local Government and Rural Development** (MLGRD) has responsibility for implementing decentralization and other local governance reforms. MLGRD is among other responsible to certify local council by-laws and standardizing by-laws (by statutory instrument). Other government ministries have national policy-making, technical guidance and monitoring responsibilities for relevant devolved functions.

**The Ministry of Water Resources** (MoWR, previously part of the Ministry of Energy and Water Resources MoEWR), established in January 2013, provides strategic leadership by formulation and implementation of the policy framework within which all sector actors must operate. The MWR coordinates, supervises and monitors the water sector. Technical Guidelines for the Construction and Maintenance of Hand Dug Wells were elaborated by the MWR in 2014, but ensuring their compliance is the responsibility of the District Councils.

**The Water Directorate** (WD), technical branch of the Ministry of Water Resources has also been established recently (used to be the Water Supply Division of the MEWR). The Water Directorate provides technical and back-up support to local councils and the broader WASH sector. National WASH coordination meetings are held at the WD of Freetown.

There are **19 local councils**: five city councils and one municipal council in the urban areas, and **13** district councils in the predominantly rural areas. **District Councils** are the owners of the community water points in their area. They are in charge of the district regulations and rural water supply functions including construction and post-construction monitoring of water points. The District Councils coordinate, supervise and monitor the Implementing Partners within their area.

The **Water Directorate**, locally representing the MWR is implemented at District level to support the District Council. It comprises among other staffs: an engineer, supervisor, lab technician and mapper. The Water Directorate at district level coordinates actors operating in water supply, and monitors the water supply constructions.

The political head of a District Council is a **Chairperson**, elected by the general population. The MLGRD appoints a local council **Chief Administrator**. **Councilors** are elected on ward basis (one per

ward) in the 13 District Councils. Every ward has a ward committee comprising the ward councillor, paramount chief and up to ten members elected by ward residents in a public meeting, whose main function is to champion self-help and developmental activities within the ward. Local councils hold **monthly council meetings** with the Chairperson and all the councilors, open to general public and during which decisions are voted.

A local council may delegate any of its functions to a chiefdom council.

Rural Water related activities are under the responsibility of the District Councils, supported by the Water Directorate from the Ministry of Water Resources

# 1.2.2 Traditional authorities: the chiefdom council

With exception of the Western Area, The paramount chieftaincy is an important institution in the governance of Sierra Leone. The Chieftaincy Act 2009 makes provision for the election of **Paramount Chiefs** and sub-chiefs. Each Chiefdom (149) is headed by a paramount chief who is elected for life from a ruling family of the chiefdom. A Chiefdom is divided in Sections – headed by **Section Chiefs**-, made up of a number of towns or villages – headed by **town chief/village headman**-.

Presided by the Paramount Chief and comprising all the sub-chiefs and chiefdom councillors, the **chiefdom committee** serves as an executive body to the chiefdom council. Chiefdom councils can make and enforce bylaws for the people within their chiefdom.

# Sierra Leone is characterized by a strong traditional authority structure, implemented up to the village level

# 1.2.3 Implementing partners

According to the MoWR<sup>6</sup>, Over 25 major implementing organizations are actively involved in building and funding water points in Sierra Leone. These are in addition to smaller non-governmental organizations

(NGOs), government agencies, local communities, religious groups, and private persons who are also doing the same (MoEWR 2012). Coordination of the different IPs is a difficult and challenging task, especially in a context where attendance is low.

# 1.3 Presentation of Inter Aide

Created in 1980, Inter Aide is a humanitarian organization specialized in the implementation of development programs that aim to promote **the participation of the most vulnerable populations** in improving living conditions in their communities.

Inter Aide has **globally about 50 programs** implemented in the rural areas of 6 countries: Haiti, Ethiopia, Madagascar, Sierra Leone, Malawi, and Mozambique, and covering Water and Sanitation, Agriculture, Health and Education programs,

Inter Aide is developing an **expertise of water point maintenance in several countries**: maintenance of hand pumps in Malawi, Mozambique, Sierra Leone; maintenance of gravity fed systems in Ethiopia and Madagascar.

**In Sierra Leone,** WASH activities started in 2007 in Kamakwie's area with water points' construction and/or rehabilitation, sanitation and hygiene promotion. In 2011, were launched the first steps of the maintenance program when the first local technicians were trained for hand pump maintenance. Household Water Treatment (HHWT) is also implemented in places where population, geologoic or

<sup>&</sup>lt;sup>6</sup> MoWR, 2014.

technical constrains make it difficult to rely on hand pumps. See <u>http://interaide.org/watsan/sl</u> for more information about the HHWT in Sierra Leone

Many supporting documents and tools produced by Inter Aide and related to WASH in Sierra Leone can be found on internet : <u>http://interaide.org/watsan/sl</u>

# 2 Preventive Maintenance Approach

## 2.1 History

**In Sierra Leone,** The Preventive Maintenance Approach was progressively developed based on experiments that started in Kamakwie's area with the water points constructed or rehabilitated by Inter Aide and progressively extended to target all the water points in Bombali District. In 2011, were launched the first steps of the Project when the first local pump technicians were trained for hand pump maintenance.

In October 2017, Bombali District is covered by a network of 17 private Pump Technicians, covering the 13 chiefdoms and supervising 610 hand pumps out of the 1400 existing, in more than 517 villages. With exception of few hand pump that were relocated due to road construction, stolen or collapsed due to poor implementation, all the water points under the Preventive Maintenance Approach are in working order and in use<sup>7</sup>.

The Project started as a demand-driven approach combined with subsidies as incentives, and is evolving in obligatory service where possible.

Based on the progressive implementation, tests and adaptations through time developed in Bombali District, activities started in Tonkolili District end of 2016 with the methodology and tools presented in this document.

The PMA has been founded by Unicef and European Union in the past as well as by the current funders: Agence Francaise de Developpement (AFD) ProVictimis and other private foundations.



Figure 1. Current scale of Intervention - Bombali (plein) and Tonkolili (ligned) districts.





## 2.2 A zero breakdown approach

As any mechanical device, hand pumps continuously used are subjected wear and breakdown: rotating/moving spares lacking of lubrication get corroded, sealing crackle, iron spares corrode, etc.

<sup>&</sup>lt;sup>7</sup> Please remind that this paper doesn't deal with the Rehabilitation of wells/boreholes. The focus here is to make sure that any hand pump in suitable conditions is in good working order. More information about Rehabilitation of hand dug wells are available here : <u>http://interaide.org/watsan/sl/category/rehabilitation-of-wells/</u>

Lacking of proper means to maintain their hand pump (basic technical knowledge, social organization, tools, spare parts, qualified manpower, etc.), the rural communities tend to "manage" their water point, until an inevitable breakdown happens. Considering the main type of hand pump in the country (see point 1.1.1 page 1), most of the time, even if qualified manpower and spare parts can be found, the costs implied with the repair of a never maintained hand pump appears to be high and out of reach for the community itself. The hand pump is then temporarily abandoned, and the community resigns to fetch water on alternative water point, often unimproved sources. By chance, an agency/implementing partner may come to repair the hand pump (generally for free) which restore temporarily the water point until the next breakdown.

The whole operating system (water point constructed, and successively repaired with external means), based on "fix-on-failure" is terribly inefficient in terms of spending, and relegates the communities at second plan's actors in their own development.



Figure 3: Corrective vs Preventive Approach in regards to hand pumps

Experience in Bombali, based on water points repaired between few months to 9 years prior to the last preventive maintenance (see Table 6) in 410 villages shows that hand pump, equipped with good quality material, and regularly preventively maintain **hardly experience any breakdown**.

 Table 6. Estimation of the time between the first Repair/maintenance and the last preventive maintenance. Data per village

Year	<1	1	2	3	4	5	6	7	8	9	Total
Number of villages	34	21	67	69	78	72	49	10	6	3	410
% of villages	8%	5%	16%	17%	19%	18%	12%	2%	1%	1%	100%

The Table 7 presents the working status of the hand pumps, in relation to the involvement of the water point in the Preventive Maintenance Approach.

Among the water points that have never been diagnosed by a Pump Technician (704 have never been dismantled), 36% present a hand pump not working, while 64% of the hand pumps are in working status (corresponding to the average percentage of working and in use hand pumps in the country, see chapter 1.1.1 page 1). To be considered as maintained, at least one Maintenance Operation should have been performed in the past 6 years by a Pump Technician. *99% of the maintained hand pumps are in working conditions, only 6 out of 610 being non-functional.* 

#### Table 7. Working status of the hand pump in relation to the status of the water point in Bombali.

	Not diagnosed	Out of use	Maintained	To be rehabilitated	Total
HP not working	254 (36%)	33 (100%)	6 (1%)	5 (43%)	298 (22%)
HP working	450 (64%)	0 (0%)	604 (99%)	8 (57%)	1 062 (78%)
Total	704 (100%)	33 (100%)	610 (100%)	13 (100%)	1 360 (100%)

Besides high functionality rates, the PMA enables the development of a private business for technicians and spare part retailers.

The PMA allows to target 100% functionality of hand pump at any time. 99% of the maintained hand pumps are in working conditions, only 4 out of 569 being nonfunctional.

#### 2.3 Preventive Maintenance Operations

The Preventive Maintenance Approach a promoted by Inter Aide in Sierra Leone consists of two main operations 100% paid by the community: Bi-weekly and Annual preventive maintenances (see Table 8). The Annual Preventive Maintenance is subdivided in Promotion Tour and the maintenance operation itself.



#### Table 8. Two types of Preventive Maintenance (PM)

The PMA consists of two main operations 100% paid by the community: Bi-weekly and Annual preventive maintenances

## 2.3.1 Bi-weekly (minor) Preventive Maintenances

**Bi-weekly Preventive Maintenance** isn't time consuming nor require extensive qualifications, but has to be done regularly by (or under the responsibility of) a Pump Care Taker (preferably a woman), member of the Water Point Committee. Greasing of the moving spares is essential: lack of greasing is one of the main problems leading to spare replacement. Other operations include the cleaning of the platform, tightening of the nuts and general security check (fence, cover, pit). The bi-weekly preventive maintenance is considered as service to the community, this position is not paid<sup>8</sup>.

<sup>&</sup>lt;sup>8</sup> There are very few exception, in more urban context and decided by the community, where the Pump Care Taker receive a little incentive



Figure 4. Greasing and tighning of the head by community PCT

# 2.3.2 Annual (major) preventive Maintenance

**Annual Preventive Maintenance** consists in a complete check-up of the hand pump: complete dismantle, cleaning, greasing and replacement of all waring spares that might break within the year with quality new ones. This is a technical work, requiring experience, practice and tools. It has to be performed by a professional: the Official Pump Technician.

The annual Preventive Maintenance is subdivided in two main operations:

- The Promotion Tour
- The annual preventive maintenance

During a meeting organised on July or August, the pump technicians are provided by the Project their individual booklet containing the list and characteristic of all hand pumps in their area and the calendar. Besides identifying the potential area of work, it is also used as a tool of communication between the Pump Technician, the WPC, the authorities and the Project

128 Kabata Hig	pway-N	Aakens									Colored States
Chiefdom: Ghanti Ka	amarank		Section	g Gbi	ainkfay						
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Geansley 1	HOW	2004	192	12		27211/16			-		
Ghann by neath Certis	HOW		682	85		27/11/16			-		
Sberker@rt1	HOW	2013	87	12		10/12/16			-	_	
Kathasundu 1	NDW	2011	162	80		21/11/48			-		
Madeh 1	1070	2011	443	88		22/13/96					
Malat Bana 1	HOW	200Y	Settie	10	T	19:01/13	-		-	_	
U ataffor	-			0							
Millere 1	HOW	2011	842	80		24/11/16				_	
Palatu 1	HOW	2011	102	10		11/11/16					
Roctain Varia 1	HOW	2004	Kattia	83		25.63/06					
Romatoh (	HOW	2005	Xettie	10	3	23/62/17		-			
Rothanter	-	1		0			1				
Rovela 1	HOW.		Xattia	8		18/12/16				_	
Rayantan 1	NOW	2005	Xettie	8	2	20/12/16					
Theways Y	HOW	2054	Xardia.	8	2	11/11/16					



(sample)

Figure 5. List and characteristic of hand pumps by section and pump technician

At the end of the yearly preventive maintenance season, the Pump Technician reports to the Section Chiefs and Paramount Chiefs.

**The Promotion Tour** is performed by the pump technicians during the month of September. Each Pump Technician visit all the communities in his area in order to agree on a maintenance date with the WPC, and perform a "visual diagnose" consisting in pumping water, observing the delay flow, the looseness and weight of the handle. The visual diagnose allows to estimate quite accurately the amount and spare parts needed for the annual maintenance, as well as the total costs that will have to be paid by the WPC.

The Promotion tour is meant to be quick, only few members of the WPC have to be present; no need to gather the whole community. *The Promotion tour is a perfect opportunity for the Pump Technician to check the amount in the cashbox and/or in the Secretary book.* 

The selected date is written in the pump technician booklet (see Figure 8.), where a member of the WPC has to sign to acknowledge the agreement, as well as on the reminder sticker (correction of the Next Maintenance date), permanently fixed in a public place around the hand pump.



Figure 7. Hand pump maintenance reminder

A calendar for the months of September to January filled by the Pump Technician with the names of communities for the Promotion tour and the Preventive Maintenance operations. This tool is mainly for personal organization of the Pump Technician.

At least in the Chiefdoms equipped with a bylaw, the Pump Technicians have to inform the Section Chiefs about the date selected and the difficulties encountered.

*It is important to note that the Promotion Tour is an investment done by the Pump Technician* as this operation is not paid (not even reimbursed for the transport), but allows the Pump Technician to prepare the ground for the annual maintenance, which he is paid for.

**Annual preventive maintenance** is meant to be done during the agreed date (date in the booklet of the Pump Technicians and on the Reminder Sticker), between October and December. Restricted period eases the work plan of the Pump Technicians, allows annual reports and authorities follow-up, and corresponds generally to availability of water (a dried water point is difficult to diagnose and maintain) and cash in the communities.

While the Annual Preventive Maintenance target all working water points in a chiefdom with specific bylaw, where no bylaw has been signed by the traditional authorities the Pump Technicians focus mainly on the water points where a date has been agreed (at least the ones equipped with a maintenance contract).

The wear spare parts are replaced, taking into account that the Pump Technician has to give 6 months guarantee on his work. Besides the spares identified during the Promotion Tour, the Pump Technician has always with him the most common spares in order to maintain the hand pump on the spot. The well is lightly chlorinated by the Pump Technician at the end of the reassembling to prevent any contamination.

The annual Preventive Maintenance takes at least two hours and requires help from youths of the community to help dismantling and washing the pump. It requires also the presence of all the members of the WPC record and finance transaction proceeding. It is always advisable to check that the required money is available before starting to dismantle...!

2 copies of the **Pump Technician Declaration of Intervention**<sup>9</sup> (Figure 31) are filled and signed by the Pump Technician and the Secretary of the Water Point Committee: one as receipt for the community, one kept by the Pump Technician, later collected by the Project in order to encode the operation

<sup>&</sup>lt;sup>9</sup> The Pump Technician Declaration of Intervention exists in two versions, corresponding to the main types of hand pumps (i) India Mark II and (ii) Kardia.

Soft Copies are available here: <u>http://interaide.org/watsan/sl/category/maintenance/</u>

done in the maintenance database (see chapter 2.8). The status of the hand pump is updated in the pump technician booklet.

The document has been conceived to be quite easy to fill, even with very basic writing knowledge.



Figure 8. Declaration of intervention forms (IM2 and Kardia)

Whenever the Pump Technician faces any difficulty, he is invited to discuss the matter with the Section chief. In a chiefdom with specific bylaws, the Section Chief is required to enforce the compliance of the communities.

# 2.3.3 Frequency of the major maintenance

According to a study conducted in Kenya (Turkana area) and Gambia<sup>10</sup>, Blue Pumps, considered as robust technology with frequency of breakdown lower than for India Mark II or Afridev (although Blue Pump are 2 to 3 times more expensive), estimated that average breakdown appeared about once every three years. Afridev and India Mark II had breakdown average occurrence of respectively 1.3 and 0.8 per year in Kenya. At the beginning of the Project, 6 months or bi-annually maintenance were tested. It appeared that the frequency was too high. In a context of well seasonality, it is also easier to set the major maintenance when the probability of water availability is high. Annual maintenance is easy to remember by the communities, and to follow by the different actors.

# 2.3.4 Costs of Preventive Maintenance Operations

The cost related to the **minor maintenance** is mainly linked with grease tin purchase (a 15,000 SLL tin, can last roughly for one year), and a bag of cement when top concreate work is needed (as a rough estimation, 60,000 SLL including sand and cement every 3 years), representing an average of **35,000 SLL per year**.

**Cost of the Annual Preventive Maintenance** is more difficult to estimates as it is more variable. Real costs paid by the communities during the 2016 Preventive Maintenance are presented in Table 9. Please note that the transport is not included here as it was not included previously in the data collection. The average of 371 preventive maintenance cost is 85,206 SLL.

While the average cost is slightly higher for Kardia then for India Mark II, the maximum costs paid is much higher for Kardia. 885,000 SLL have been paid during the 2016 season by a community for the replacement of the flange bearings. The need for replacement is due to the lack of greasing. Apparently the PCT travelled and was never properly replaced...Thanks to the Pump Technician Promotion Tour, the problem was identified before any breakdown and the community was able to contribute required money to proceed the preventive maintenance on time (operated in November 2016).

<sup>&</sup>lt;sup>10</sup> Foster, T. & McSorley, B. (2016)

Table 9. Average, minimum and maximum costs in SLL of the 2016 Preventive Maintenance season (transport not included)

India Mark II					к	ardia		Total			
#	Average	Min	Max	#	Average	Min	Max	#	Average	Min	Max
308	80 190	60 000	233 000	63	109 730	60 000	885 000	371	85 206	60 000	885 000

As security measure, we advise the community to gather **150,000 SLL per year for the Preventive Maintenance**, considering the official manpower fee (60,000 SLL), chlorination (10,000 SLL), agreed prices for transportation (roughly 20,000 SLL) and spare part changes (roughly 60,000 SLL).

Considering about 150 users per hand pump and an average cost of 185,000 SLL per year for the operational and minor expenditures, the cost of maintaining a hand pump functional represent less than 0.2 USD per user and per year, much lower than commonly considered<sup>11</sup>.

This cost is expected to increase in the future as the time between the major repair/standardization and the maintenance increases. But affordability is not considered as a real issue. In a study covering 16 countries, A ordability constraints by rural households were not identified as a critical issue in the study countries<sup>12</sup>. Maintenance costs recovery issues seem more linked with (money) management issues and/or willingness to pay, than capacity to pay for the service.

- Average direct cost of the PMA represents less than 0.2 USD per year and per person, clearly affordable for the communities.
- Average cost is expected to increase in the future but will remain affordable.

The community has the choice of the mode of contribution. In rural communities, nearly all the villages under the PMA chose flat **rate contribution** (amount set per house, per tax payer, etc.). There are very few examples, in more urban areas, where the community chose a pay-as-you-fetch contribution, as out of the community users are more frequent.



Figure 9. Bylaw edited and displayed by a WPC in Makeni, with pay-as-you-fetch contribution (100 SLL per 5 gallon)

## 2.4 Subsidized Corrective measures as entry point in the PMA

The objective of the PMA is to cover all useful hand pumps in the area of work. However, **in some cases** (broken system, lack of standardization, seasonality), **corrective measures are required** before

<sup>&</sup>lt;sup>11</sup> WashCost, 2012 consider a total recurrent expenditure for boreholes and handpump of 3-6 USD per year and person, among which 0.5-1 USD per year and person for Operational and minor expenditure and 1.5-2 for capital maintenance expenditure. IRC 2013, consider for boreholes with hand pumps, actual expenditure on recurrent operation and minor maintenance ranging from US\$ 0.20 to US\$ 1.10 per user per year, the majority of schemes studied expenditures being well below US\$ 0.50 per user per year.

<sup>&</sup>lt;sup>12</sup> World Bank Group, 2017

the community can join the PMA: the problem is above the community's ability to pay the full cost and/or the pump is not standard (no spares available).

For example, a community with a India Mark III pump bucket issue (cost around 1,5 USD) will have to replace the whole cylinder (IM2 cylinder cost is above 100 USD in the provinces) because IM3 pump bucket is not available in Sierra Leone.

**Subsidized hand pump repair and standardization, preceded by contribution and commitments** from the communities, has been so far the **main entry point into the PMA for the communities**.

Repair and standardization are divided in two main operations performed in presence of the community by a Pump Technician with at least a member of the Project:

- A diagnose, aiming to evaluate the damages, spares, costs and prepare the maintenance contract
- **A repair**, during which the hand pump is standardized and fixed.

# 2.4.1 The maintenance contract

All Inter Aide subsidized hand pump related activities are linked with a **financial contribution and commitments** from the Communities explained in a written **Maintenance Contract**, signed by traditional authorities, WPC and the Project, aiming to enforce the respect of the PMA by the community (See ANNEXE III page 38). It is clear for all actors that a repair subsidized by the Project will be conducted once and only once on a hand pump, and that the WPC engages itself, on behalf of the community, to fully comply with the PMA, which direct cost is 100% paid by the community.

Taking into account the Country's context, corrective actions should always be an entry point to a Preventive Maintenance Approach through a Maintenance Contract.

## 2.4.2 Contributions to ensure Demand Driven Approach and sustainability

There are 4 main commitments and contributions from the communities linked with a Repair, aiming to involve the community in their development and establish the success of the PMA in the future:

- 1. **Insure the cleanness and security of the water point**, including the presence of a safe cover, a drainage system, a proper fence and door. During the rainy season, the community is required to prepare a stick-fence that will be replaced by a earth-blocks bricks plastered with cement, build by the community, during the dry season. When building the block fence, the community has to provide one bag of cement, while the project provides the other one needed.
- 2. The community has to elect a Water Point Committee (WPC), which will be trained by the Project. A lot of WPC have been trained in the past, especially during the construction phase of a water point. However:
  - i) WPC training poorly designed and delivered, done as once-off exercise without periodic follow-up provides little benefit<sup>13</sup>.
  - ii) Without any regular activity/responsibility, idle WPC stop to be functional.

The project has developed several tools for the training of WPCs specifically in line with the PMA among which a **WPC training manual**<sup>14</sup>.

3. A financial community contribution is required before any hand pump repair. The financial contribution is essential for the success of the PMA as it conveys the message that the maintenance service has to be paid. In return, the community gets tools to improve money management (cash box) and to perform the bi-weekly preventive maintenance (toolbag), a complete repair and standardization of the hand pump and a WPC training.

<sup>&</sup>lt;sup>13</sup> Foster T., 2013

<sup>&</sup>lt;sup>14</sup> Available on internet here : <u>http://interaide.org/watsan/sl/category/water-committees/</u>

Note: The financial contribution to the capital cost of the water point, with exception in emergency situations is clearly stated in the National Guidelines<sup>15</sup>, community participation in terms of free labour being considered as not enough! This is unfortunately seldom observed on the field....

- A financial contribution is a prerequisite for any hand pump related activity in a community as a way to assess the community's motivation and ability to raise fund for the maintenance.
- 4. Any subsidized repair is linked with a **Maintenance contract**, explaining all the contributions from both sides, and binding the community to fully enter the PMA, including the **compliance with the bi**weekly and annual preventive maintenance, **100%** paid by the community.

The Table 10 displays the amount of the financial contribution which has been set at maximum **400,000 SLL** by September 2017, divided as follow:

		piller	
	ltem	Community contribution	Real cost
	Quality and available hand pump spare parts	MAX 200,000	1,451,000 <sup>16</sup>
	Cash box lockable with two padlocks. Three different	50,000	85,000
22	WPC members are needed to open the cashbox.		
SIMP	Toolbag for the Pump Care Taker with tools and grease	70,000	90,000
	to tight and lubricate the moving spares.		
0	Chlorination done by the Pump Technician after	10,000	10,000
	remantling the whole system to protect from handling		
	contamination.		
N	Pump Technician <b>manpower</b> at official district rate.	60,000	60,000
ATT	<b>Starting contribution</b> , given back to the community's	10.000	10.000
	cash box.	_0,000	_0,000
	TOTAL	MAX 400,000	1,706,000
60 A	Locker and chain (optional) for communities where the	55,000	135,000
	pump is off the houses.	-	

Table 10. Financial contribution for hand pump repair and standardization – October 2017 prices in SLL

Globally the communities pay, on average, around 25% of the cost of the repair. All the costs are reported in the Maintenance Contract.

## 2.4.3 Diagnose, repair and standardization

Once the community has understood the maintenance contract and contributed, diagnose and repair can take place. A member of the Project, the Pump Technician and the community are required.

During the **Diagnose**, the system is completely disassembled by a pump technician. When possible, before disassembling, **the structure of the well** and the **security distances** are checked: non-ligned water points (local wells, bricks wells) may present risk of collapse and non-respected minimum

<sup>&</sup>lt;sup>15</sup> MoWR, 2014

<sup>&</sup>lt;sup>16</sup> Any amount above 200,000 Le is paid by the Project. 1,451,000 represents the average cost of spare parts used for repairs considering 59 subsidized Repairs conducted between 2016 and 2017 in Bombali. The real spare parts cost varies from 174,000 to 4,464,500 SLL.

distance from pollutants present a risk of contamination: these water points need rehabilitation or a closure due to risk factors.



Figure 10. Newly installed hand pump on local well, within few meters form a Figure 11. Brick well latrine block

**Diagnose forms**<sup>17</sup> (see Figure 12) have been developed to record the current status and needed spare parts. Well measurement is important: it is possible to mitigate or even solve seasonality issues when the distance between the bottom of the cylinder and the bottom of the well allows to add riser pipes and connecting rods. It is also essential to check that the minimum safety distances are respected (latrine, tree,...)

A community meeting is organised before and after the Diagnose. The whole process is explained before, and the maintenance contract (see ANNEXE III page 38) is filled after, referring to the spare parts prices lists (see ANNEXE V page 40). Water points bylaws and modes and amount of contribution type (per house, pot, taxpayer, volume, etc.) are also decided by the community.



Figure 12. Diagnose forms for India Mark II and Kardia pumps

Figure 13. Well measurement

The **repair** takes place as soon as possible after diagnose (within a week). A first displays the spare parts delivered. The hand pump is then reassembled and tested, and the well chlorinated by the technician.

<sup>&</sup>lt;sup>17</sup> Available for download on <u>http://interaide.org/watsan/sl/category/maintenance/</u>



Figure 14. A Pump Technician present the new spares before the repair



Figure 15. Hand pump reassembled during a subsidized repair

- A general meeting takes place after the repair. The cashbox, 10,000 SLL seed grant and toolbag are delivered to the WPC. The maintenance contract is signed and 3 copies signed thereafter by the Section Chief before each party gets back his version. A declaration of intervention (see Figure 8 page 11) is filled by the pump technician and the secretary. The reminder sticker is filled (see Figure 7)
- ⇒ **The pump technician then teaches the pump care taker** how to grease the bearings and the chain/link head and tight the important nuts.
- ⇒ The assignments of the community are to continue the money contribution in order to be able to proceed with the next yearly preventive maintenance, keep the well clean and safe, and respect the bi-weekly preventive maintenance.

#### 2.4.4 Transparency of money management

Several tools<sup>18</sup> have been created to create a constructive money management scheme within the community, and between the stakeholders:

- The **money contribution form** gives the users an overview of the contributions (see Figure 16)
- The **Accountancy book form** provides overview of the cashbox balance and operations (see Figure 17)
- The **cashbox** with 2 padlocks is a way to prevent mismanagement (see Table 10)
- **Regular meetings** are organized by the WPC with the community about money management
- The **maintenance contract** contains information about the intervention cost and includes the community contribution (see ANNEXE III page 38)
- A **contribution receipt** is produced whenever the community make a contribution for a subsidized corrective measure.
- Spare parts price lists are shared with the communities (ANNEXE V)
- The **declaration of interventions** filled and signed by the PT and a member of the WPC clearly states the price of the service delivered and the type and prices of spares changed (see Figure 8 page 11). A copy is kept by the WPC as receipt.

Transparency of money management is essential. Tools have been created

<sup>&</sup>lt;sup>18</sup> Most of the tools created by the Project are available here : <u>http://interaide.org/watsan/sl/category/maintenance/</u>





Figure 17. Accountancy book template

#### 2.4.5 Difficulties

Experience shows that **PMA promotion and triggering is not enough to convince communities to enter the PMA**. While the PMA interest is generally understood when hand pump is broken and no alternative to fetch safe water exists, communities tend to delay the entrance in the PMA when the hand pump is still working.

In the context of the post-war and Ebola, communities have been **used to free approach** (which are still common), and often prefer to wait either for a breakdown, or for another program to repair the water point for free, even with bad quality materials, than to contribute and enter in a sustainable management.

In cities, where the cohesion of the community might sometimes be lower, the first contribution is more difficult to be contributed.

The latest development of the Project involves the Paramount Chiefs and Section chiefs for the enforcement of the PMA (see chapter 2.6.2).

Communities used to free approach are often reluctant to pay for water

#### 2.5 Pump Technician network

#### 2.5.1 Concept

Pump Technicians are key actors of the Preventive Maintenance Approach. They are skilled **professionals** that have to practice on a regular basis. Based at **chiefdom level**, they operate as a **local network**, able to provide **immediate response in case of unexpected breakdown**.

**Identified, trained, promoted and supervised with the support of the Water Directorate** and/or the Local authorities, they remain private service providers, **100% paid by the water users following standard and transparent prices**, agreed at District level.

They are involved during all the processes of the PMA in order to familiarize with its different aspects, and **progressively become autonomous**. Once they are officially recognised by the District, **they become the dedicated service provider for all actors of the chiefdom**, including other IPs for any hand pump work.

Follow-up of pump technicians is essential, and experience shows that more than needed have to be identified, selected, trained and followed in order to dismiss the poor-performers.

Pump Technicians are dedicated service providers paid by the water users.

# 2.5.2 Identification, selection and training

➡ Identification of pump technicians is done during the chiefdom introduction meeting when the project is explained to the main stakeholders and local authorities are asked to suggest appropriate candidates. Already active Pump Technicians, even though non-officially recognized, are always considered first.



Figure 18. Chiefdom introduction meeting in Kholifa Rowala chiefdom, Tonkolili District

Depending on the number of pumps and geographical accessibility, initial identification should consider at least 2 Pump Technicians per chiefdom and at least 1 Pump Technician for 50 hand pumps.

They have to live permanently in the chiefdom, to have another independent activity, preferably linked with mechanic, and to be located at strategic points of the chiefdom in terms of access to hand pumps.

Other criteria include basic ability to read and write (in the perspective of reporting), behaviour and team spirit, seriousness, conflict management, ability to convince and to sensitize communities, ability for self-promotion, etc<sup>19</sup>.

**Training**: although a formal training component is proposed at District Level, the practical and **most important part of the training is field based**. During 6 months to 1 year, potential Pump Technicians are involved on all the diagnosis, repairs and maintenances done in their area of intervention.

Selection: Depending on the strength and number of candidates, the size of the chiefdom and the number of hand pumps to cover, 1 to 3 Pump Technicians are selected per chiefdom (every 50 hand pumps). The selection is not only based on the technical skills but other others skills also, much more difficult to improve. Honesty and social skills like the ability to capture attention, explain, counsel and convince a community or to manage a conflict are also essentials.



Figure 19. Pump Technician training a woman Pump Caretaker –Pedagogical skill evaluation

<sup>&</sup>lt;sup>19</sup> A job description is available on <u>http://interaide.org/watsan/sl/category/maintenance/</u>

Once the potential Pump technicians have been selected, 3 to 4 additional days of formal training are organized in partnership with the Water Directorate of the District. This tackles different aspects of the Pump technician's work and alternates with theoretical, technical and practical training:

- Presentation of the Preventive Maintenance Approach.
- Technical training on the different types of hand pumps. **Technical guidelines for India Mark II** and Kardia have been developed by the Project<sup>20</sup>.
- **Practical training** on hand pumps: presentation of the different spare parts, dismantling/reassembling the full hand pump, cylinder setting, etc.
- Theoretical and practical training on **hand dug well chlorination**. Guidelines have been developed by the Project<sup>21</sup>.
- Theoretical training on social and pedagogical aspects: business management, self-promotion, reporting, etc.
- Theoretical and practical training on reporting tools



Figure 20. Certified Pump Technicians after a training session in Makeni

- Pump Technicians are selected on technical and social skills.
- The training is mainly field based

# 2.5.3 Toolbox and mobility

At the end of the certification training, the Pump Technician get access to a **Toolbox**, within the frame of a contract (see ANNEXE IV page 39). There is a financial participation, to insure the motivation of the Pump Technician. The contract includes a clause to get the toolbox back in case of breaking-off for any relevant reason. It is important that the toolbox is complete with quality tools (see details in ANNEXE IV page 39)



Figure 21. Bend riser pipes as result of an amateur using non-professional tools

Mobility of Pump Technicians has been promoted by the Project through **subsidized bicycle** (contribution of 100,000 SLL for a real cost of 350,000 SLL).

Mobility of Pump Technicians has been addressed by the Project through **subsidized bicycle**. Most active and skilled Pump Technicians can be granted a loan to purchase a motorbike, formalised in a

<sup>&</sup>lt;sup>20</sup> India Mark II and Kardia guidelines are available here: <u>http://interaide.org/watsan/sl/category/maintenance/</u>

<sup>&</sup>lt;sup>21</sup> Chlorination guidelines are available here: <u>http://interaide.org/watsan/sl/category/maintenance/</u>

**motorbike loan agreement**<sup>22</sup> to be paid back. The motorbike is bought, registered as commercial number plate (allowing the OPT to work also as moto-taxi), insured and the OPT equipped with a driving license. The contract binding the OPT with the Project is also signed by the Paramount Chief.

# 2.5.4 Warranty to ensure the quality of work

In order to insure the quality of the services, Pump Technicians are compelled to provide **6 months** guaranty on manpower for any work done on a hand pump. This means that if the pumps breaks down within 6 months of the service delivered, the Pump Technician has to solve the problem without asking any payment as manpower (spares to be changed and transport will be paid by the community).

## **Guaranty of work insure the technical quality of the pump technician's work**

# 2.5.5 Recognition and promotion

Recognition and promotion of the Pump Technician network by all actors is a key. After the final selection and training by the Water Directorate, the candidate becomes Official Pump Technicians and receive a "Hand pump Technical training Certificate" signed by the Water Directorate and/or a District official, as well as an ID card. The ID car is renewed annually/biannually.

These documents are the proof that the technician is entitled by the local government to work on hand pumps for the well-being of communities.



Figure 22. Hand pump training certificate

Figure 23. ID card for Official Pump Technician

Once Pump Technicians are selected, **Pump Technician Stickers** are given to all hand pump community of the designed area, providing picture and contact information for the WPC, as well as alternative contact in case of lack of availability. The sticker is replaced by a colour laminated one, and displayed in each hand pump community as soon as the Pump Technician becomes officially recognized. These stickers are updated in case of pump technician change or modification of designed area.



<sup>&</sup>lt;sup>22</sup> Template of motorbike loan agreement can be found here : http://interaide.org/watsan/sl/category/maintenance/

A **Pump Technician Map**<sup>23</sup> of Bombali Chiefdoms, presenting all Pump Technician, including pictures and contact information has been edited, and given **to all Implementing Partners of Bombali**. The map is also displayed at the Bombali District Council, and at the Water Directorate buildings.

**Radio programs** are also done on regular basis to promote the PMA, during which Pump Technicians are promoted. At least one pump technician is also invited to explain his work and constrains. Invitation of WPC members has also proved to be efficient in the strategy promotion.

Thanks to the involvement of the District Council and Water Directorate of Bombali, the decision was taken in November 2016 that all implementing partners have to use an Official Pump Technician for the implementation of a hand-pump related activity, which is expected to provide a major boost for their business.



Pump Technicians have to be fully recognised by the district authorities and institutions

# 2.5.6 Immediate response in case of breakdown and Promotion of the PMA

The establishment of a local pump technician network allows the communities to call a professional in case of any hand pump issue. Some communities prefer to opt for a corrective way rather than a preventive one.

Other communities agree to perform the annual preventive maintenance but don't want any maintenance contract (especially true in area with big men, paying for the communities). However, the pump technician advises the community to adhere to the whole scheme, and get involved through a maintenance contract, which insure functionality at reduced cost for the community and regular work for the pump technician.

Actually, **the earlier a hand pump enters the PMA through a maintenance contract, the best**: the cost for the spares is lower and the community hardly experience any breakdown. The community is equipped with the toolbag, cashbox and gets the WPC training/refreshment

In some cases, a lack of maintenance can have irremediable consequences on a borehole. Riser pipe disconnection for example, may cause the obstruction and loss of the system. It happened on Rokulan, Rogbin Section of Sanda Tendaran chiefdom. The pump was not working due to riser pipe disconnection. When the system was extracted, a connecting rod broke sinking nearly the whole system on the bottom of the borehole. Fishing was never successful. Hopefully the borehole was very deep, so the Project was able to replace a functioning system, but it could have made the water point out of use.

A Pump Technician network permits quick reaction in case of unexpected breakdown.
 Pump Technicians are active promoter of the PMA.

# 2.5.7 Difficulties encountered

Find committed pump technicians in some chiefdom might not be that easy. The situation is getting better with time as the potential pump technicians have some models in other chiefdoms, but the management of the network remains challenging. Follow-up is essential. In the past, Pump

<sup>&</sup>lt;sup>23</sup> The last version of the pump technician map is available here :

technicians have been dismissed in collaboration with the District because of lack of compliance with the PMA (disrespect of the promotion tour, lack of dynamism and commitment, use of wrong spares, disrespect of the official labour or spare prices, etc.). Low ability to read and write may reduce the quality of information provided. Internal constrains linked with reimbursement of motorbike loans have also been encountered.

Gender balance is difficult to achieve within the Pump Technician network. Up to now, there is only one woman pump technician identified in Tonkolili.

### 2.6 Involvement of the different partners and service obligation

# 2.6.1 Promotion of the PMA to and by the District council and Water Directorate

⇒Implication of the **District Council** in the PMA is primordial. The graphical strategy explanation (see ANNEXE I page 34), as well as the pump technician network map are displayed at the District Council Office's, as well as at the Water Directorate office's wall.



Figure 26. Explanation of the Preventive Maintenance Approach at Water Directorate's office

Support of the District allowed the Project to present the PMA during a council meeting, in September 2016, during which all the councillors were asked to spread the idea of PMA within their area of work.

⇒The Engineer of the Water Directorate and the District Planning Officer have been involved in the training and promotion of the Pump Technician Network of Bombali. The ID cards of the OPT are signed by the District Chief Administrator, recognizing them as fully official at District level. Since September 2016, meetings with all the Pump Technicians of Bombali are organized two to three times a year with the Engineer of the Water Directorate as chairman in the Water Directorate office.



Figure 27. Pump Technician meeting at Water Directorate

**CAnnual Reports and chiefdom reports** are shared with the DPO and Engineer of the Water Directorate.

**District Wash Coordination Meetings** are held monthly at the Water Directorate, and are opportunities to discuss about the PMA with the different actors. During a Wash coordination meeting in November 2016, the District Council decided that **all implementing partners** have **to use an Official Pump Technician** for the implementation of any hand-pump related activity in the District.

Maintenance contracts have been shared with the other IPs.

The District Council imposes the use of Official Pump Technician for any hand pump related activity by any Implementing Partner. This is a major way to promote PMA.

⇒At national level, the PMA has been presented during Wash Coordination Meetings, and field visits of the Project have been organised with members of the Water Directorate of Freetown. It is thanks to the interest and collaboration with the Water Directorate of Freetown that an upscale of the PMA is under reflexion and the present document produced.





Figure 28. Field Visits of the Freetown Water Directorate

#### 2.6.2 Traditional authorities and service obligation

Paramount and Section chiefs are important partners in the successful implementation and follow-up of the PMA. They are involved in the **promotion** of the PMA, the **selection of pump technician**, the **follow-up of the maintenance**, and the signature of the different types of **contract** (maintenance contract, motorbike loan contract, spare parts supplier contract). The traditional authorities are also involved in the **chiefdom bylaw** for preventive maintenance of hand pumps.

The Project staffs are usually lodged by the Section Chief while working in his section. The Section Chief's village will be the first targeted by the Project: if the news spread that the Project has successfully implemented an activity in the Section Chief's village, compliance with the Project is easier in the other villages.

Experience shows that **PMA promotion and triggering is not enough to convince communities to enter the PMA**. While the PMA interest is generally understood when hand pump is broken communities tend to delay the entrance in the PMA when the hand pump is still working.

Implication of Paramount Chiefs and Section chiefs on the follow-up of the PMA is currently being implemented and tested in Bombali. After each Preventive Maintenance Season, **Chiefdom follow-up meetings** are being held with the stakeholders in order to present and discuss the results of the campaign in the different villages, and more especially the issues related to non-compliance of communities.



Chiefdom reports are presented to the local authorities.

#### Figure 29. 2016 season Sanda Loko Chiefdom report

These chiefdom reports will probably be replaced by reports based on the Pump Technician Booklet (see Figure 5 page 9) for the next season (chiefdom follow-up meetings to be held early 2018).

The latest development of the Project involves the Paramount Chiefs and Section chiefs for the **enforcement of the PMA through bylaw covering all working hand pumps** of the concerned area.

Oral bylaws have been tested in early 2016 the impact of which on Preventive Maintenance Season was mitigated but promising. In Sella Limba, 2 communities were sent to court, officially fined 100 000 SLL, and requested to perform their maintenance as soon as possible, after a report by an OPT. Even though all the offenders have not been fined, the message is now clear in Sella Limba.

Written bylaws have been decided after **the 2016 Preventive Maintenance Season** (early 2017). Most of the Paramount Chiefs were in favour of **written bylaws**, that were designed by the Project, discussed during chiefdom meetings (see ANNEXE II page 37), and signed by Paramount Chiefs in 8 out of the 13 chiefdoms. Although it is early to assess the outcome, discussions with OPT involved in those chiefdoms report easier compliance and more and more calls from communities to perform the annual maintenance.

The establishment of bylaws is only possible when the quality of work operated in the chiefdom by the Project has enabled confidence of the traditional authorities, and when OPT are sufficiently available

#### A normative and regulatory dimension set by the authorities seems necessary to adopt practices that benefit the whole community. Collaboration with Traditional authorities to enforce compliance and enforce PMA is mandatory.

# 2.6.3 Promotion of the PMA to other IPs

Promotion of the PMA to other IPs is carried out through direct contact as well as through the district Wash Coordination meetings (for which attendance and information sharing is a challenge). Collaboration with some IPS is good as they tend to share their information and push the communities where they work to adhere to the PMA. With some other IPs, it is very difficult to have any contact as participation in the district wash coordination meetings is somehow loose.

As a way to improve information sharing about water points in the district between the different actors, a **mailing list** has been created (<u>bombali-wash-team@googlegroups.com<sup>25</sup></u>) and has been used to send PMA documentation (templates for contract of maintenance, strategy explanation, pump technician map, etc.) to other IPs. Unfortunately, this email list appears to be rarely used by the different actors.

Actually it appears that the collaboration is much easier when enforced by a district council officer or the water directorate.

Coordination and collaboration with other IPs is still a challenge. The role of Institutions is central

# 2.6.4 Responsibility of actors and priority of actions

The Project advocates for a prioritization of actions related to hand pumps' water point:

1. **Maintenance of functional existing facilities.** Ideally, this should be done everywhere, starting from any intervention on a hand pump through a maintenance contract. However this requires a network of pump technicians.

<sup>&</sup>lt;sup>25</sup> Anyone can join the group using the following link and clicking "Subscribe this group": <u>https://groups.google.com/forum/#!forum/bombali-wash-team</u>

- 2. Subsidized repair and standardization of non-functional/non-standards hand pumps. Nonfunctional hand pumps never properly maintained generate costs beyond the community's ability to pay. Subsidized repairs are also very useful to build confidence with the communities and authorities
- **3.** Rehabilitation of maintained hand pumps. The rehabilitations of water points, wherever possible, should be considered after the maintenance.
- **4. New-constructions** should be considered after repair or rehabilitations of infrastructures. Prioritize chiefdoms where preventive maintenance is better respected for constructions or rehabilitations.

Conditioning the rehabilitations and constructions of water facilities to the respect of the preventive maintenance could be used as a way to ensure the commitment of the authorities to the PMA, and could be used at village, section, chiefdom or district level.

# 2.7 Development of a Spare parts supply chain

The spare parts supply chain remains is a weak link in the rural water supply provision<sup>26</sup>.

# 2.7.1 Spare parts type and quality

Even for the same type of hand pumps, quality of spares can be very different, depending on:

- The type of material
- The type of pump/cylinder
- Type of fittings/threads
- The origin/producer

**Type of material**: Many hand pumps were installed in the past using Galvanised Iron (GI) spares (riser pipes, connecting rods, and cylinder). These spares are subjected to corrosion, which may have a terrible effect on the water quality. Most common spares used in the field are now PVC or stainless steel.

#### Type of cylinder: The most common types of cylinder (

Figure 30) are the India Mark II (A,B,C,D); India Mark III (E); PB Mark II (F, G, H); Kardia 2000 (I) and Kardia 65 (J).

Even within the same type of pumps, cylinder can be different in terms of material quality and threads and seals. The difference between India Mark II and India Mark III can appear minimal, but as the pump buckets are different and not available in the Market of Sierra Leone, communities are not able to maintain their hand pump without changing the whole cylinder.

<sup>&</sup>lt;sup>26</sup> MoWR, 2014





Figure 31. Different types of India Mark II cylinders and cylinder seals

{1} = GI cylinder; {2} = PVC cylinder {3}= Stainless steel cylinder

The type of riser pipe, and especially the type of fitting between the riser pipes also vary greatly (see Figure 32). The Project uses and promotes [1] Stainless Steel pipes for India Mark II, and [5] original riser pipes and fittings for Kardia. Neither [4], previously used by Salwaco in boreholes with PB Mark II hand pumps, nor [6] can be bought in Sierra Leone, as spare or within full pump set. [2] and [3] are PVC riser pipes and sockets for India Mark II hand pumps, for now used by many IPs. Their main advantages are their lower costs, the lightness of the spares and the possibility to adjust the height of the cylinder in the well. But the type of threading, compared to all other types of PVC fittings, is very light. The type of threading for [2] and [3] are the same as for the Stainless steel ones [1], while the material (PVC) is much softer. This poses a higher risk of cross-threading and breakage while mantling and dismantling the spares. This is also true for the PVC cylinder (See Figure 31). The Project lack of experience for now about the maintenance of these types of spares, but the lower quality may have an impact on the maintenance costs and frequency. Up to now, the PVC pipes (except Kardia) have always been replaced to stainless steel. The balance between high quality maintained water points and cheaper repair has still to be assessed. As comparison the PVC option is around 30%<sup>27</sup> cheaper considering the whole hand pump set (equipped with 5\*3m riser pipes and connecting rods) but the difference is probably minimal when considering the whole cost of the water point.



Figure 32 Different types of fittings for riser pipes

[1]=Stainless Steel [2]=PVC for boreholes [3]=PVC for wells [4] Old type of PVC [5] Kardia [6] Old type of PVC

Quality of spares varies and it would be good to share experience.

<sup>&</sup>lt;sup>27</sup> In June 2016 the whole India Mark II set costed around around 550 dollars for stainless steel and 400 dollars for PVC.

**Type of origin/manufacturer**: According to our experience, the pump seals produced in China for India Mark II are of lower quality than the one produced in India, due to difference of plastic type.

Not only is the quality of the spare parts important, implementation is also crucial. For example, glued riser pipes cannot be dismantled!



Figure 33. Glued riser pipes

## 2.7.2 Spares parts prices and availability

It is important to distinguish between two types of spares when considering their availability:

- The common used spares, required at local level to operate the main preventive maintenance operations
- The less commonly used spares, often more expensive, that are exceptionally needed during the preventive maintenance operations, but required during the major repair.

The Table 10 presents the spares that have been recorded for the preventive maintenance operations since the beginning of the program (2008), representing 1446 operations (1217 for India Mark II compatible hand pumps). The most commonly used spares are O'rings, bolt and nuts, pump bucket, rubber seating, centralizer, bearing sets, long nut, nipple and axle. Further analysis will be needed to analyse the spare parts needed in relation to the time since installation/repair.

Table 11.	Types of spares replac	ed during preventive	e maintenance,	considering 144	6 operations do	ne since 2008	(only
spears wit	th frequency higher that	n 5 have been displa	yed for India Ma	ark II)			

India Mark II Spares	Number
O ring for Riser Pipe	718
Bolt and Nut	354
O ring Cylinder	190
Pump bucket	130
Rubber seating Big size	126
Centralizer	89
Bearings set	86
Long nut Stainless steel	48
Nipple SS	40
Rubber seating Small size	37
Axle	28
Connecting rod 3m SS	17
Chain	7
Washer for axle	6

Kardia Spares	Number
Pump Bucket Kardia	21
Back nut 19mm s/s	13
Non return sleeve	13
Plug K2000	3
Axle (bolt & nut linked)	2
Link-head K2000	2
Link-head K65	2
Flange bearing K2000	1

While buying complete sets of hand pumps for India Mark II is easy in Freetown as well as in the main towns in the country, only few suppliers sell individual spare parts needed for the maintenance or repairs of India Mark II and Kardia in Freetown, and almost none in the provinces.

There are limited types of spares needed for the preventive maintenance.
 Only pump types with spare parts available in the country should be used.

Fast moving spare part kit can be found in some main town's shop, but the price and content is not easy to adjust with the actual need of the communities under the PMA.



Table 12. Fast Moving Spare Parts kit content

Up to now, the spare parts used by the Pump Technicians during the different operations were bought in bulk by Inter Aide in Freetown and later in Makeni (roughly once a year or every two years), and sold back at recovery price to the Pump Technicians (or subsidized prices to the community in case of Repair).

However, this impeded the development of a local private supply chain: the spares were sold at gross prices (not including transport costs and reseller margin), and didn't take into account the dollar exchange rate evolution which (increase above 15% within the last year and above 60% within the last 2 years). Yet it has a direct impact on imported spare parts (no original spares are produced in country). This represents a major challenge to settle spare parts prices lists, important for transparency which is an essential aspect of the relationship between the communities and the pump technicians. **Regular updates of the spare part price lists are needed in order to keep under the market prices**.

Since last year, prices have been updated, taking into account 15-20% margin to reduce the unfair concurrence with private suppliers.

A test is under progress to develop a local supply chain supplier network, for the most commonly used spare parts during the preventive maintenance operations. Contract of service have been concluded with two shop owners in Northern Bombali in order to supply all the spare parts during the 2017 preventive maintenance season in their coverage area, at controlled price and quality.

The best way to implement local private supply chain is probably for the IPs to buy all their spares as locally as possible, but this may have an important impact on their budget.

A test to implement a spare part supply chain for commonly used spares is undergoing. Future spare parts availability, prices and quality control remains a challenge.

# 2.8 Project staff and monitoring

It is an emerging consensus that rural communities are unable to manage their own water supplies without some degree of external support that encompasses monitoring, technical advice, administrative support, training and encouragement<sup>28</sup>.

<sup>&</sup>lt;sup>28</sup> Foster T., 2013

The long term objective for IA is to delegate external support of the PMA to national authorities for a sustainable action. This has not yet been achieved, and the monitoring, follow-up and reporting remain mainly done by the Project even if implication of institutional and traditional actors has greatly improved during the last two years.

The Project **field staff, although quantitatively limited, is still essential to the PMA** implementation and follow-up. Regular contacts with the communities and support of the traditional authorities are important. Field staffs are usually lodged by the Section Chief while working in his section. Support, training and follow-up on the field of the pump technicians are also primordial.

The Project has developed a database, essential tool for monitoring and reporting of the activities. **The Maintenance Database**, developed in Access, collects information about all hand pumps in the area of work of the Project, containing detailed information about all maintenance related activities, including spare parts changed and costs related. This Database allows analysing the maintenance activities: status of each pump, number, type and frequency of replaced parts, total costs of each intervention, coverage and respect of preventive maintenance, etc. It is also a good tool to follow the evolution and the progress of each Pump Officer's activities: total number of pumps, number of pumps repaired/maintained, generated incomes, etc.

The database is updated regularly thanks to the Project's field officers work and the declarations of intervention (see Figure 8 page 11) transmitted by the pump technicians. The pump technician booklet (see Figure 5 page 9) and meetings with traditional authorities are also used to update information.

The database is used to produce pump technician and section/chiefdom/district follow-up indicators and reports, as well as to produce the pump technician booklet. It is a friendly tool, but require experimented office staff for the follow-up, data check-up and cleaning to keep it functional.

m k Field and office staff are needed for the implementation and monitoring of the PMA

Pump Officers and	naintenance attributions	Reports to Select Tables for a Mant Mant Spore	Reports be printed ion for reports analyses in Eb enance situatio enance activitie e parts	iccel n is			Parame Chiefdoms Sections Villages Spare part - i Pump types Organisatione Water Comm	etres intervention s ittees	ilist		Par of aut exti	amet Ma omat ractic	ers settin intenance ic repc ons.	gs, en Act orts,	codii ivitie exc
Maintenance	s follow-up	-				_									P.
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BENI - Persiá		· in village	BH.	*	01/06/10	Salvace	· Ph2		236	810	repular main	101014	2013 REP		
BEN - Serthal		· in village	HØR		25/05/10	Inter Aide			276	88 []	repular main	* 3101/17	2010 NC		
-										III.	1	*			

#### List of all maintenance activities by water point

I.

Intervention (manps/wer) : dismanteling all pipes / check the damage		1	30,000	30,000
Spare parts M2: 0 ring R#		6	4,000	24,000
Intervention (manpswer) remembers all poes / napar		1	30,000	30,000
Spare parts M2: Rubber sealing 85		1	1,000	3,000
	-	- 1	10	

#### List of all spares and manpower used by maintenance activities

Figure 34. Maintenance Database (extracts)

# 3 Main steps of implementation

The figure below refers to the main different steps involved in the Project. The project in not purely linear and steps cannot be completely separated as they are inter-dependent. The follow-up and supervision of the different steps, at all scale, is an essential aspect of the successful implementation of the PMA!

	Sensitization and implication of traditional authorities and institutions	_	
	$\Rightarrow$ District council and councillors supports $\Rightarrow$ Water directorate support		
	<ul> <li>⇒ Chiefdom authorities support</li> </ul>		
	Development of a pump technician network		<u>io</u>
	⇒ Trained and supported up to autonomy		cat
A	Officially recognized by Water Directorate and District Council (renewable license)		i Li
	Known by the communities and the Paramount Chief		n E
	Progressively equipped with adequate tools		E
	Communities sensitization and WPC trainings		ŭ
	Active Water Point Committees		aŭ
E	Pump Caretaker practice hi-weekly preventive maintenance		E
	⇒ Users are registered and start money contribution		oție
			Ĕ
	Implement first pump maintenance/reparation and maintenance contracts		pro
	⇒ Financial participation of the users		Ó.
C	⇒ Expensive spare parts subsidized		
	Pump system upgraded to standard when necessary		<u>0</u>
			fol
	Yearly preventive maintenance operations		'n,
	Directly operated by the Pump Officer		isi,
C	Promotion tour and visual diagnose		Ž
	Service and wear parts fully paid by the communities		ədr
	□ Fransparent service charge of Pump Officer and spare part price		SI
	Sensitization – implication of other IPs		sno
	→ Promotion of WPC tools and training		ğ
E	→ Promotion of OPT network		Ţ
	⇒ Promotion of the maintenance contract		ō
			Ŭ
	Enforcement and control of the PMA		
	→ Chiefdom bylaws		
- r	⇒ Guidelines and national policy		
	⇔ Coordination with the Water Directorate and traditional authorities to supervise the process		
	Development of a spare parts supply chain		
	Quality spares available		
	→ Transparent and stable (?) prices		

The types and intensity of activities vary through time, evolving year after year. It is difficult to imagine an implementation of the PMA in less the 3 to 4 years.



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ANNEXE I. Graphical Explanation of the Strategy p1-3





ANNEXES





# ANNEXE I Graphical Explanation of the strategy p2

Water Directorate Bombali District





# = HEADING TOWARDS SUSTAINABILITY



ANNEXES

By-law for yearly preventive n	naintenance of hand pumps at chiefdom level	<ul> <li>In case the pump technician fails to respect the scheduled date he will be fined 10.000 SLL. The cost paid by the water committee for the yearly preventive maintenance service will be then reduced by this amount. Article 5</li> <li>In case the Water Committee fails to collect the required money for the scheduled date:         <ul> <li>The pump technician will inform in the shortest possible time the Section Chief. The Section Chief will then be responsible to enforce the yearly preventive maintenance service with an additional fine of 20.000 SLL and schedule a new date for the service in the shortest possible time.</li> <li>The Water Committee will pay the 20.000 SLL fine to the pump technician in addition to the yearly preventive maintenance service cost at the new scheduled date.</li> </ul> </li> </ul>					
Paramount Chief of SENDA T chiefs and counselors establish <u>Article 1</u> Every working well or borehole use has to respect a yearly preve The yearly preventive maintena December of each year at Committee and the pump t September. Every Section Chief will be i technician. Article 2	ENDAREN Chiefdom with my council of the following bylaw: equipped with hand-pump for collective entive maintenance. Ince will take place between October and a date scheduled between the Water echnician during a promotion tour in nformed of those dates by the pump						
This yearly preventive maintena technician certified by the Wat local authorities. For this chiefde	nce can only be done by the official pump er Directorate and recommended by the om the pump technician is/are	In case the yearly preventive maintenance is not done by the end of December, action will be taken by the Paramount Chief to enforce the failing Water Committee to finally execute the yearly preventive maintenance with the pump technician at the shortest possible time. <u>Article 7</u>					
Certified Pump Technician	Certified Pump Technician						
Morlai KARGBO	Alusane JALLOH						
ROGBOM	ROYANKALOL	The pump technician has to give 6 months guaranty on manpower for any					
088 50 62 43	076 56 27 89	preventive maintenance done in a community. If the hand pump gets a					
	077 32 18 77	breakdown within 6 months, the pump technician has to work again					
<u>Article 3</u>		without charging for manpower.					
Each Water Committee should	collect in advance the required money in	Dana in an tha					
order to cover the cost of the ye	arly preventive maintenance service.	Done III On the					
This cost includes spare parts, c	hlorination, transport reimbursement and						
manpower at the official rate ag	reed with the Water Directorate.						
The yearly preventive mainter	nance service will be paid to the pump						
technician by the Water Commi	ttee.						

# ANNEXE II. Chiefdom Bylaw - example of Sanda Tendaren -

<u>Article 4</u>

#### 

#### This memorandum of understanding is concluded

Between	and			
The Water Committee of the hand pump	Inter Aide Sierra Leone			
located	Wash Maintenance Program			
With coordinates :	128 Kabala Highway – Makeni – Bombali District			
N	Represented by :			
W	Position :			
In the village :				
of the Chiefdom	Here after called Inter Aide			
Here after called the Water Committee				

The Hand pump has been/will be diagnosed by the Pump Technician (name).....on the (date) ...../..... in presence of Inter Aide representative and the Water Point Committee. The intervention needed to repair the hand pump (with high quality materials whose spare parts are available in the country) represent a total amount of ......SLL of spare parts, according to the Hand Pump Diagnose form and Declaration of Intervention attached.

The Water Committee agrees to pay the first 200,000 SLL (two hundred thousand Leones) for thespareparts,soanamountof.....Le.

Inter Aide, agrees to subsidize the remaining price of the spare parts needed, which correspond to an amount of ......Le.

Posts	Real cost	Subsidized	Paid by the Water
		cost	Committee
Spare parts			
Cash box with one padlock (one padlock	85,000 SLL	35,000 SLL	50,000 SLL
has to be found by the community)			
Toolbag for pump caretaker	~90,000 SLL	20,000 SLL	70,000 SLL
Chlorination	10,000 SLL		10,000 SLL
Hand pump Technician manpower	60,000 SLL		60,000 SLL
<b>Starting contribution</b> (remains in the community)	10,000 SLL		10,000 SLL
Locker and chain (optional)	135,000 SLL	55,000 SLL	80,0000 SLL
TOTAL			

Inter Aide commits itself, to guaranty the repair done for the next 6 months.

- **Maintain the hand pump on regular basis** (each two weeks) the hand pump (greasing of the chain, cleaning of the water point)
- Make sure the **fence**, **door**, **soak pit and top concrete structure** are in good order at any time
- Be sure the **bylaws** edited by the community are respected
- **Held regular meetings** with the whole community about the water point and money collection.
- The money contribution will be manage as follow :

Type of contributors (pot/house)	
Number of contributor	
Frequency of contribution (each month/week)	
Period of contribution (every month/fromto)	
Total amount to be collected per year (SLL)	

<u>Remark:</u> the total amount to be collected per year will have to be reevaluated according to the evolution of spares parts prices

- To manage the contribution on a transparent way, including the systematic record of all transactions in the record book with the help of the Secretary and to use the dedicated cashbox.
- Replace any member of the Water Committee if needed (member not sufficiently available,...) in order to insure an efficient work by the Water Committee. The current members are :

Position	Name	Signature	
Chairman			
Chairwoman=Treasurer			
Secretary			
Pump Care Taker			
Advisor			

The two parties commit themselves to communicate and exchange information relative to this MOU at anytime if necessary. If any difficulty, both parties should make all efforts to settle the issue. The information about the maintenance activities will be communicated to the different authorities of the District and Chiefdom.

#### Name, date and signature:

<u> Town Headman /Headwoman</u>	Chairman of the WC	Secretary of the WC	Inter Aide

Section Chief

## ANNEXE IV. Toolbox Participation Agreement for Pump Technician

The below agreement is understood and agreed upon between the two parties:

	And
The Project:	The <b>Pump Technician</b> (PT):
Inter Aide (IA)	Mr
Hand Pump Maintenance Program,	Address:

128 Kabala Highway – Makeni

The project will commit itself for purchasing a toolbox with a set of tools, as the Pump Technician commits himself to financially participate for this purchase. This purchase is done in order to facilitate the Pump Technician's professional work in the frame of the maintenance of the hand pumps in his designated area.

The Pump Technician has accepted the conditions set in this agreement.

This agreement is signed in witness of the Paramount Chief of .....

#### I. Content of the toolbox and the set of tools

Designation	Quantity	Unit
Decameter 30M	1	Рс
IM2 Elbow Spanner -17-19	2	Pcs
Shifting Spanner	1	Рс
Wrench 24''	2	Pcs
Scrue Driver	1	Рс
Mechanical Hammer	1	Рс
Allen Keys Set	1	Рс
Hawksaw Frame	1	Рс
Hawksaw Blade	2	Рс
IM2 Chain Lifter	1	Рс
Wire Brush	1	Рс
IM2 Bearing Pressing	1	Рс
IM2 Chain Support	1	Рс
Spanner 10"	2	Pcs
IM2 T- Bolt	1	Рс
IM2 Center Punch	1	Рс
IM2 Rod Clamp	1	Рс
IM2 Pipe Lifter	1	Рс
Spanner 24"	1	Рс
Spanner 22"	1	Рс
Spanner 17"	2	Pcs
Spanner 19"	2	Pcs
IM2 Riser pipe clamp	1	Рс

#### II. Participation Amount

The Participation amount is : 250 000 SLL (Two hundred and fifty thousand Leones). Considering that the price of the toolbox and the set of tools is above that amount, the project will financially support the rest of the amount.

#### III. Payment of the Financial Participation

#### a. Advance

An amount of at least 100 000 Le (Hundred thousand Leones) will be paid at the delivery of the toolbox and the set of tools, directly to the project by the Pump Technician.

#### b. Repayment

For every handpump maintenance and reparations the Pump Technician will give, an amount of 20 000 Leones (Twenty thousand Leones) will have to be paid directly to the project by the Pump Technician, until the total amount of 250 000 SLL (Two hundred and fifty thousand Leones) is reached. Every financial participation of 20 000 SLL will be written in a "Pump Technician Toolbox Participation Template", signed by both the project and the Pump Technician.

#### IV. Break of Contract

If payment is not respected by the Pump Technician as specified in Part III of this Contract, the following actions will take place

#### a. Inform Paramount Chief

If payment is not received after each of the 8 first work sessions of the Pump Technician, the Project will inform the Paramount Chief.

#### b. Permanent withdrawal of toolbox

If the payments are still not done after the paramount chief has been informed, the toolbox and the set of tools will be withdrawn from the Pump Technician, the Project has the right to permanently keep the toolbox and the set of tools.

#### V. Responsibility of the toolbox and the set of tools

After the purchase of the toolbox and the set of tools, the pump technician is entirely responsible for the toolbox and the tools. If any tool is broken, damaged or lost, he will have to purchase the missing, damaged or broken tool by himself, with the same quality, and with his own money.

This agreement has been read, understood, and signed by the parties involved:

Read and approved on the	Read and approved on the
Inter Aide Sierra Leone	
Maintenance Program Manager	Pump Technician
In witness of the Paramount Chief of	
PC	
Agreement done on the	
In	





Water Directorate