



RAPID WATER AND SANITATION MARKET ASSESSMENT

December 2018

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ACKNOWLEDGMENTS

This report was developed through the assistance provided by the U.S. Agency for International Development under its Supporting the Policy Environment for Economic Development project. The Assessment Team extends its deep appreciation to USAID and all of those who took the time to meet with us and provide information, insight and a better understanding of the policy and operating environment for how water supply and sanitation markets and services operate in Mozambique. As the list of individuals who gave generously of their time and assisted us is very long, we limit ourselves to highlighting the important information we received from several Government of Mozambique staff, private water operators and the leadership of the Association of Water Providers of Mozambique (AFORAMO), district and municipal government officials, and representatives of private companies that supply services and sell water and sanitation related equipment. We are very grateful for your time and willingness to share information and ideas; acknowledge that any mistakes are our own doing; and sincerely hope that our findings and recommendations lead to policy and market improvements and investments that help Mozambique achieve universal access to safe water and sanitation.

ACRONYMS AND ABBREVIATIONS

AFORAMO	Association of Water Providers of Mozambique
AIAS	Administration for Water and Sanitation Infrastructure
APE	Community Health Worker (Elementary Health Agent)
ARA	Regional Water Administration
CLTS	Community Led Total Sanitation
CRA	Water Regulation Council
DAS	Water and Sanitation Department (in municipal and provincial government)
DNAAS	National Directorate for Water Supply and Sanitation – under the Ministry of Public Works, Housing and Water Resources
DPEDH	Department of Education - Provincial Directorate
DPOPHRH	Ministry of Public Works, Housing, and Water Resources - Provincial Directorate
EDM	Mozambique Electric Company
FIPAG	Water Supply Investment and Asset Fund
GoM	Government of Mozambique
ICT	Information and Communications Technology
INAE	National Statistics Institute
MAEFP	Ministry of State Administration and Public Services
MINEDH	Ministry of Education and Human Development
MOPHRH	Ministry of Public Works, Housing and Water Resources
MISAU	Ministry of Health
MZN	Mozambique Metical (currency)
NGO	Non-Government Organization
PRONASAR	National Rural Water Supply and Sanitation Program
PLAMA	Mozambique Water Platform
PWP	Private Water Providers (FPAs in Portuguese)
SD	District Secretary
SDJET	District Secretary of Youth, Education, and Technology
SINAS	National Information System for Water and Sanitation
SPEED+	Supporting the Policy Environment for Economic Development (USAID Project)
USAID	United States Agency for International Development
WSUP	Water and Sanitation for the Urban Poor

INTRODUCTION

This rapid assessment for water supply and sanitation was sponsored by the USAID-funded Supporting the Policy Environment for Economic Development (SPEED+), a four-year project (2016 to 2020) designed to support broad-based inclusive economic growth and the conservation of natural resources in Mozambique.

SPEED+ works with both public and private sectors, providing technical assistance and capacity-building to improve the business enabling environment, attract investment, and expand markets. SPEED+ supports public-private policy dialogue and the implementation of government policies and regulations in four broad sectoral areas: 1) agriculture, 2) trade and business enabling environment, 3) power and water, and 4) biodiversity conservation.

In water and sanitation, the Government of Mozambique (GoM) faces significant challenges meeting its sustainable development goals. The National Directorate for Water and Sanitation (DNAAS) estimates the country needs at least US\$ 3.1 billion in new investments in water supply and sanitation infrastructure to achieve universal access by the 2030 target date. Accomplishing this goal will require mobilizing both public and private sector investment and expertise to expand and improve infrastructure and services. Historically, the GoM has relied on its own resources and those of donors for investment in better water and sanitation systems. SPEED+ is working with DNAAS and the Association of Private Water Providers (AFORAMO) to create a more favorable policy and regulatory environment for mobilizing private sector investment to expand private sector involvement in the provision of water and sanitation services. In addition, SPEED+ is assisting DNAAS to strengthen the capacity of public sector entities tasked with overseeing private sector water providers.

OBJECTIVE OF THE ASSESSMENT

The overall objective of this rapid market assessment is to analyze current government water and sanitation policies, regulations and practices and suggest changes and actions that will lead to more rapid growth of private sector investment and involvement in water and sanitation services provision in urban and peri-urban areas, as well as secondary cities (towns). To accomplish this objective, the team conducted a market systems assessment to:

- Identify the value chains in the water and sanitation sectors and different actors (network and system actors) and their relationships, interactions, and transactions across water and sanitation value chains.
- Develop water and sanitation market maps that include existing public and private sector initiatives and approaches in service delivery, power dynamics between market players, and the existing breaks in policies, operations and information exchange.
- Unpack the incentives/forces that have shaped the present water and sanitation situation in urban and peri-urban areas.
- Identify pressing constraints and near-term opportunities to stimulate market system change and speed more coordinated investments by the public and private sectors to help Mozambique achieve its universal coverage objectives.

Five important dynamics are shaping private investment in water and sanitation services and product markets. Each one is complex, but all are interconnected and will need to be addressed in parallel:

1. **The evolving and still uncertain legal and regulatory framework** weakens transparency and predictability of market signals from government to private investors—individuals and companies—in the water supply sector, which increases investment and business risks.
2. **A more rural population with higher levels of poverty and less disposable income**, particularly in the Central and Northern regions, presents challenges for private sector involvement and investment in developing water and sanitation services and products, especially those that are accessible to the very poorest households.
3. **The lack of a sector investment framework that guides local authorities in the mix of options to secure water supply services**—beyond waiting for the Water Supply Investment and Asset Fund (FIPAG) or the Administration for Water and Sanitation Infrastructure (AIAS) to invest—is a barrier. Even when approached by private investors, few local authorities understand how the new licensing system works or that the private sector can serve various functions, including building new systems or rehabilitating FIPAG/AIAS systems to operate in a delegated management arrangement.
4. **Limited and fragmented market information available** increases risks and costs for water services investors who are looking to expand their businesses. For example, private investors will need information on areas that currently lack water services, groundwater maps to increase their prospects for securing water resources, and related supply chain services (e.g. borehole drilling and availability of pumps, meters and technical expertise) to facilitate their business expansion.
5. Finally, **sanitation represents a very different and more challenging market** that, while involving many of the same public-sector actors, is much more focused on stimulating household investments in basic sanitation infrastructure. GoM statistics show only limited improvement in sanitation coverage over the past 12 years. Most public/donor investment to date has focused on public education and advocacy designed to stimulate greater household investment in improved sanitation. Only Maputo and Beira have limited waste collection and treatment infrastructure. Current market actors include suppliers of basic hardware inputs (cement, bricks and pipes), and a few companies that provide latrine/septic tank emptying services.

To better inform policy makers, entrepreneurs, and funders about the status of the water services market in Mozambique, SPEED+ recently surveyed private water services providers (PWPs) in every province and completed two foundational analyses – one focused on water tariffs and the other on Consumer Willingness and Ability to Pay for water services. This rapid market assessment will build on these studies to provide analysis designed to inform revisions in policies and regulations and suggest actions to accelerate private sector investment in water and sanitation service sectors.

ASSESSMENT METHODOLOGY

The SPEED+ team has applied a three-element approach to completing this rapid assessment.

- 1) Desk analyses of existing information and data. This encompassed an in-depth review of a number of background studies on the current state of water and sanitation services and

markets in Mozambique. The team also analyzed current data on household access to water and sanitation through the National Statistics Institute (INAE) on where households secure their water supplies and the type of sanitation infrastructure employed by households. Finally, the team analyzed the comprehensive set of data on PWPs that was recently compiled by the SPEED+ team.

- 2) One-on-one interviews and small focus group discussions with key market actors and stakeholder groups from Maputo and Nampula, Cabo Delgado and Sofala provinces. These interviews included:
 - Government officials engaged in setting policy, regulating water and sanitation services and managing urban water systems;
 - Owners/operators of private water systems;
 - Financial service providers;
 - Donors and international Non-Government Organization (NGOs) engaged in supporting water and sanitation improvements; and
 - Other companies that provide technical support such as well drillers, hardware supply (pipes, pumps and storage), a manufacturer of water storage tanks and septic tanks, and engineering service providers.

- 3) Information-sharing and feedback workshops organized at the regional level to present and discuss findings and conclusions with stakeholders in Nampula and Pemba. The team conducted a final workshop in Maputo to present country-wide findings, highlight regional differences in the water and sanitation markets and identify opportunities to increase investment across regions.

This approach enabled the team to develop a comprehensive snapshot of the water and sanitation market systems, identify existing information/knowledge flows, and gain insights into relationship dynamics within the water and sanitation services provision markets and interconnected support systems (e.g. drilling services, financial markets and access to technical expertise). This approach enabled the team to identify several market system weaknesses and selected actions that could spur expanded private sector involvement and investment in water and sanitation services delivery that could help Mozambique achieve universal access to safe water and improved sanitation.

RAPID WATER SECTOR ASSESSMENT

OVERVIEW OF THE WATER SECTOR IN MOZAMBIQUE

Like many poor countries worldwide, Mozambique has made limited progress improving access to safe water and sanitation over the past decade (see Table 1). Widespread poverty, weak sector policies, governance and technical capacity, and investment strategies highly dependent on donor funding all contributed to this slow progress. In recent years, the GoM has taken significant steps to reorganize water service regulation, delegate more responsibility for water and sanitation to local governments and create a clearer policy for licensing PWPs in order to achieve

Table 1: Access to safe water and improved sanitation

	2006	2016	% Change
Access to improved drinking water source (% of population)			
- Rural	32	37	5
- Urban	47	81	34
- Total	46	56	10
Access to improved sanitation (% of population)			
- Rural	7	10	3
- Urban	39	42	3
- Total	17	21	4

Source: Joint Monitoring Program, 2016

its commitment to Sustainable Development Goal 6 - Ensure availability and sustainable management of water and sanitation for all.

GoM investments in urban and rural water systems are managed by three national institutions:

- DNAAS that manages the National Program for Water and Sanitation in Rural Areas (PRONASAR),
- FIPAG that directly manages 15 city water systems and has delegated the management of another six city water systems to a private operator, although at present only Maputo water supply system remains under this arrangement; and
- AIAS that has constructed water systems in five secondary cities and 126 towns. Both FIPAG and AIAS have struggled to meet demand growth, maintain the delivery of existing services, and recover operating costs (See Text Box on the City of Nampula). As a result, there is a growing gap between demand and public water service provision that is being filled by local governments NGOs and by PWWPs.

The Challenges Facing Public Urban Water Providers

The FIPAG system that supplies the City of Nampula illustrates a story common to many public-managed water systems in Mozambique. The water network serves approximately 37 percent of the city's households. **System managers estimate** that non-revenue water (NRW) is approximately 62 percent. These significant water losses, combined with the low public system tariff rates, have left the system with insufficient funding to undertake necessary maintenance and repairs, much less expansion. The city's water network depends on a reservoir that has capacity to supply 4.0 million cubic meters of water. FIPAG managers are looking at acquiring access to the Mantanuska dam that could address the shortage in current supplies and meet future system expansion requirements. In the meantime, the system managers indicated no plans to undertake system upgrades or major repairs until they have secured additional water supplies. **Yet undertaking repairs to reduce non-revenue water from 62 to 20 percent—if their NRW estimates are correct—could essentially double the current amount of water they deliver and sell, and significantly improve water system's service quality and finances.**

Source: Field interview with FIPAG-Nampula system managers

WATER MARKET SYSTEM ACTORS

Annexes 1, 2 and 5 provide a general map of the urban/peri-urban water market in Mozambique for Maputo, Nampula and Cabo Delgado. These market maps were developed based on available data and individual and group interviews. The authors recommend that the reader use the full-page maps provided in the Annex as a tool to guide the narrative that follows. The maps provide a visual snapshot of how the market system for urban and peri-urban water supply (public and private) currently operates. They identify the principle organizations involved in each water supply market, how donor funds are being used to support water services expansion, the sources of water that households use, and where PWWPs access inputs and technical expertise. The maps also provide an overview of how the various market actors interact with one another (in terms of information, policy, and transaction exchange) and the locations of key constraints. The narrative below complements the information in the maps, providing more details about each of the market actors and identifying apparent root causes of existing constraints, and offers some recommended entry points for USAID intervention.

Essentially, the water market can be divided into three main groups of actors: policy and regulatory organizations; water service providers; and market services supply chains that include support services outside of the core supply chain such as financial services and Information and

Communications Technology (ICT) . Each group has an important role in helping Mozambique achieve universal access to safe water.

POLICY AND REGULATORY ORGANIZATIONS

The development and implementation of national water policies is led by the National Ministry of Public Works, Housing, and Water Resources (MOPHRH), which is responsible for national strategic planning for water resources. Currently, the Ministry is implementing the National Strategy for Urban Water and Sanitation (2014-2025). Under MOPHRH, three organizations play key roles in water supply policy and regulation - DNAAS, Water Regulation Council (CRA), and Regional Administration of Water Resources (ARA). At the municipal and district level, local governments license private water providers. Each of these is discussed in greater detail below.

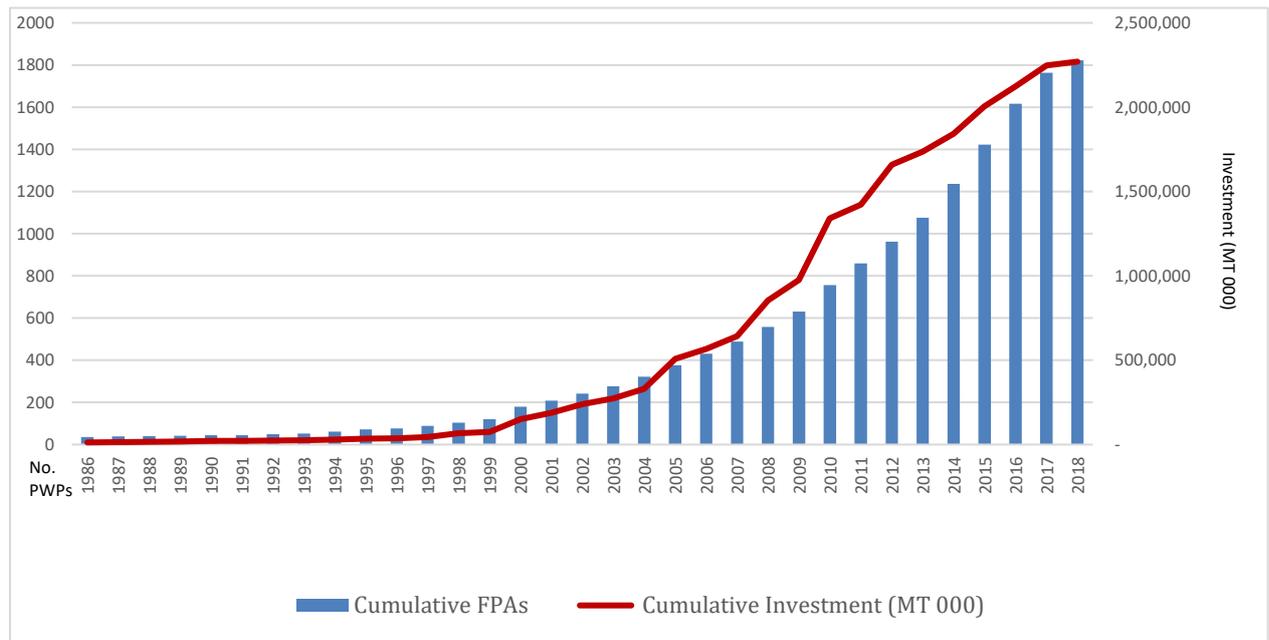
- **Directorate of Water and Sanitation (DNAAS)** – is responsible for water and sanitation supply policy development and management, resource management and planning, and investment mobilization. DNAAS led the development of Decree 51/2015 that legitimized the role of PWP's under five-year licenses.
- **Water Regulation Council (CRA)** – sets the tariffs for both public and privately operating water systems and regulates sanitation treatment and disposal. All water tariffs must be approved by the relevant municipal council. The involvement of municipal councils in tariff approvals potentially introduces political influence onto CRA's ability to function as an independent regulator and set tariffs that enable water system operators to recoup operating costs and depreciation while protecting customers from exorbitant charges.
- **Regional Administration of Waters (ARA)** – each of the five regional ARA offices (South, Central, Center-North, Zambezi, and North) is tasked with regulating the use of surface and ground water resources by authorizing and registering well development and collecting fees for water abstracted by both public and private water service providers. The current tariff for water charged to public sector water service providers (FIPAG and AIAS, including AIAS systems managed by private operators through concessions) is 0.6 MZN per cubic meter while the proposed tariff for water abstracted by private water providers is 1.5 MZN per cubic meter. Per current regulations, households with wells on their own property for self-consumption do not pay a water abstraction fee; however, abstraction fees are required (but not well enforced) for all wells intended for business use or water sale. FIPAG and AIAS are more than one year behind on payments to ARA for water abstraction. The rapid growth of PWP's, particularly in the Southern region, has created its own set of challenges for ARA. Many of these PWP's are unlicensed, pay no abstraction fees, and their reliance on groundwater resources poses risks for resource sustainability.
- **Municipal/District Governments.** Decree 51/2015 made the Water and Sanitation Representative under the local authorities, Municipal Councils and District Governments, outside municipalized areas, responsible for licensing all PWP's. To date, approximately 20 percent of the PWP's in Maputo City and Maputo Province are licensed. In other provinces, the licensing of PWP's is delayed as local governments develop licensing procedures. In lieu of licenses, many municipalities currently collect an annual business fee from PWP's. In Nampula, this fee ranged 3000-5000 MZN per year and provides a general permit to operate as a business but does not serve as the PWP license envisioned in Decree 51/2015.

WATER SERVICES PROVIDERS

This rapid assessment focused on both public and private water providers that operate primarily in urban and peri-urban areas. This includes the two public water providers - FIPAG and AIAS, and all PWPs. Given our focus on water services provision in the rapidly expanding urban and peri-urban areas, the assessment did not examine the rural community point water sources and small-scale systems developed by DNAAS under the National Rural Water Supply and Sanitation Program (PRONASAR), Provincial Directorates of Public Works and Water Resources, NGOs or municipal governments and placed under community management. We have shown these rural community water services in the market systems maps for each region as they suffer from many of the same challenges facing the urban/peri-urban water services providers.

- **FIPAG** – manages investment in and maintenance of the public water supply networks in 21 cities across Mozambique through 15 regional offices. FIPAG’s national headquarters in Maputo is responsible for medium and long-term strategic planning while its regional offices carry out oversight of construction and management of FIPAG-built water networks in each region. FIPAG has received considerable support over the years from the World Bank. FIPAG directly manages five city water systems in Maputo and Matola cities and has delegated the management of 16 smaller city systems and distribution networks to private operators. These 16 systems are part of a pilot delegated management program in which FIPAG covers the initial investment cost of the borehole drilling, acquisition of pumps and construction of elevated tanks, and a manager/operator is responsible for the development of the distribution networks and additional capital and operational investment. FIPAG staff interviewed in Nampula indicated that they focused on immediate plans to expand water supplies but are not involved in medium and longer-term plans for infrastructure investments for Nampula.
- **AIAS** – like FIPAG, AIAS oversees investment in and maintenance of public water supply networks in five secondary cities and 126 towns. Over the past decade, AIAS has received considerable donor support from the Netherlands and the World Bank. AIAS delegates through tenders the management of newly constructed or rehabilitated water systems to private operators. Many of AIAS’s water networks are in need of significant repairs and reconstruction before they can be turned over to a private operator. For example, of the 20 AIAS systems in the Nampula Province, AIAS successfully mobilized resources to rehabilitate 4, which are functional and managed by a private operator (through a tender). The remaining 16 are out of service or operating at very limited capacity by the local administration.
- **PWPs** – in the past two decades, PWPs have emerged as essential providers of water services, having invested almost US 40 million in water systems that now supplying an estimated 1.8 million people (see Figure 1 below). The growth of PWPs, is particularly impressive in the South where, despite any legal or regulatory framework, the number of PWPs more than doubled between 2009-2013. In response to this rapid growth, the government passed the Regulation for Licensing of Private Water Providers in the Supply of Potable Water (Decree 51/2015). Decree 51/2015 builds on the existing policy for the delegated management of public water systems and legitimizes the construction and operation of 100 percent privately owned water systems under five-year renewable licenses.

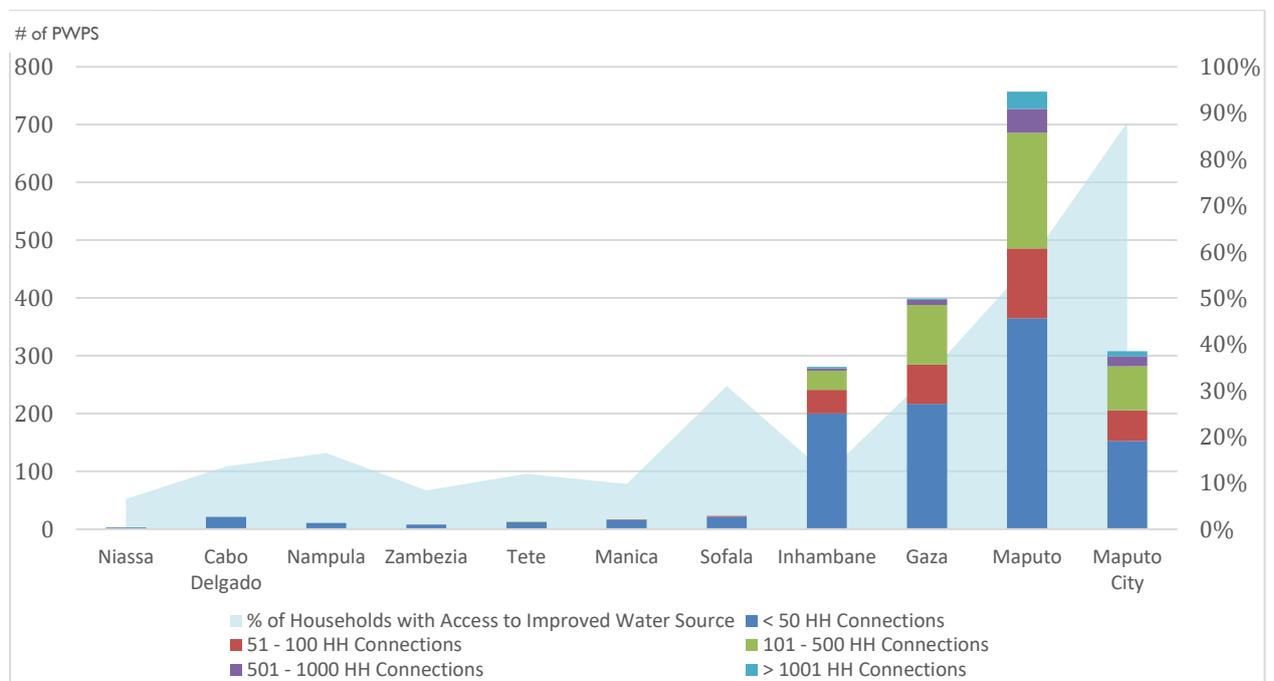
Figure 1: Growth of PWP's and Private Investment in Water Systems



Source: SPEED+ PWP Mapping Report, 2018

Recent surveys carried out by the USAID-funded SPEED+ project showed that 95 percent of all PWP's operate in the Southern region, and while most are very small (less than 50 active household connections), several have made significant investments in piped networks that now serve between 1,000 to 5,000 customers (see Figure 2).

Figure 2: Percent of Households with Access to Improved Water Sources, Total Number of PWP's, and System Size (# of HH Connections) by Province



Source: SPEED+ PWP Mapping Report, 2018

This rapid growth of PWP in the South reflects several factors:

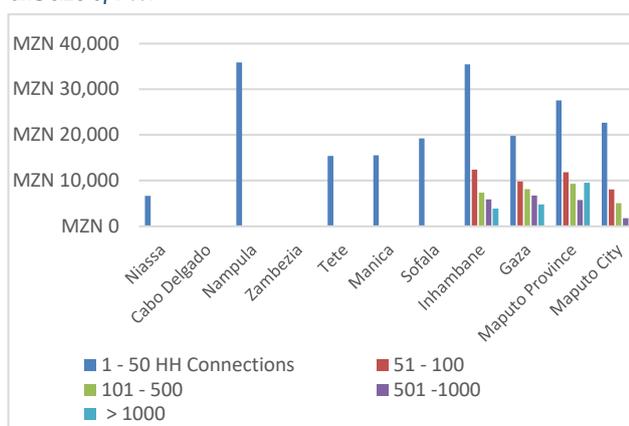
- Rapidly expanding demand from urban and peri-urban areas that FIPAG and AIAS are unable to serve;
- Greater frequency of seasonal droughts that disrupt public water supplies dependent on surface water sources and reservoirs;
- Relative abundance of groundwater that facilitates the development of local water sources using boreholes and pumps requiring little sophisticated treatment; and
- Greater willingness by households to pay for reliable water supplies piped to their homes.

Most PWP exhibit three common characteristics:

- **Reliance on groundwater for raw water supplies.** Most PWP surveyed rely on groundwater to supply their networks. While the use of groundwater simplifies water treatment requirements, it does raise concerns about the sustainability of ground water resources, particularly in coastal zones where salt water intrusion is an increasing problem.
- **Self-financed initial construction and growth.** While some operators have borrowed funding from banks to start or expand their businesses, most have used personal savings or other sources of income to finance the construction of wells and networks. Figure 1 above shows the growth of PWP investments in water systems.

- **Investment per customer declines as PWP increase customer base.** Survey results show PWP make significant up-front investments to set up their water service operations. These initial investments include the construction of boreholes and water storage tanks, installation of pumps and piped networks, and setting up customer billing/collections systems. As PWP add customers, the capital investment required per customer declines significantly (see Figure 3).

Figure 3: Average Investment Per Household Connection by Province and size of PWP



Source: SPEED+ PWP Mapping Report, 2018

Based on anecdotal information collected through interviews with PWP owners, many small-scale water system owners made initial investment in boreholes, pumps and pipes to supply their immediate family needs, and then expanded operations in response to requests from neighbors and nearby communities to meet perceived expectations and social obligations. In contrast, some owners of larger PWP began investing in order to create a water supply business and now based on their experience want to keep growing their business. Based on the current landscape of PWP, almost all growth oriented PWP are based in the South, and the PWP in the North are largely unaware of their profits and driven by social obligations (see the profiles below).

Profiles of PWP Owners

Maputo

Adriano Chirute established his first water supply network in 2007 after retiring from Mozambique Telecom. He used his retirement income to invest in his water supply business and now operates three systems that serve 2,100 households. Mr. Chirute is also the President of AFORAMO. When he began his business, Mr. Chirute's relied on generators to pump water. He recently installed 64 solar panels to cut his generator fuel costs. He expects to recoup his 1.8M MZN investment in solar energy in 2.5 years. Mr. Chirute learned the water supply business on the job. He now is focused on improving the quality of his current service networks by improving network pressure, installing an automatic chlorinator, and expanding services from 18 to 24 hours per day. Some of Mr. Chirute's customers have connections to both the nearby FIPAG water network and his network. While FIPAG charges less for water, they often run out of water in the dry season, so customers use the two systems to secure water all year. Mr. Chirute cannot expand in his current location because he is surrounded by other PWPs. Mr. Chirute and a few other PWP owners are interested in exploring new areas for investment outside of the South where they could establish new networks, but they need support with the initial market exploration.

Nampula

Alberto Bonifácio operates a truck repair business on the outskirts of Nampula. In 2015, he had a well drilled to supply his house because there was no public water system that served his area. His neighbors asked him to install a public fountain which he did. He subsequently developed a small piped network that serves eight neighbors. Households that use his public fountain pay 1 MZN per 20 liter can of water while those with household connections pay a flat rate of 500 MZN per month. He charges no fee to connect households to his network. Two years ago there was an outbreak of cholera in his community, and the government asked him to provide water free of charge until the outbreak was stopped, which he did. Mr. Bonifácio says his water sales currently do not cover his operating costs. The flat rate charge poses a problem as it leads households to waste water while complaining about the high monthly cost. He believes installing household meters would improve customer willingness to pay and reduce water waste. When asked if he plans to expand his network or start a new network in another area, he said no, and explained that costs, such as well drilling, have almost doubled since 2015 making the business very risky.

Pemba

Agelina Baloi is a primary school principal and teacher in Metuge, Cabo Delgado. In 2015, like most other households in and around Pemba, Ms. Baloi was facing a severe water crisis and found an affordable service provider to drill a borehole. "Tanzanian" drillers, as they are known throughout Pemba, were offering inexpensive manual borehole drilling services, dug to a typical depth of 15 meters. While not perfect, the slightly brackish water was enough to help Ms. Baloi and her daughter through daily household chores. And at 160,000 MZN, which included drilling as well as pipes and pumps, it was a bargain when compared to the 500,000 MZN charged by professional companies (who drill much deeper to avoid the brackish water.) To pay for the cost of the borehole, she took out a loan at 2.7% interest/month. While expensive, it allowed her to have water, and at the request of her neighbors, to install a fountain and sell water at 3 MZN for 20 liters. Today, Ms. Baloi's side business is proving enough profit that she now wants to develop more small water systems in other water hungry parts of Cabo Delgado. While she has some experience operating a small water system, she acknowledges more information on how to build and maintain a system would help her become a more successful private water operator.

Retail Water Providers – In addition to the above providers, in areas unserved by public or private water providers, alternative models of retail water provision have emerged. These include **tanker trunks** that purchase water from FIPAG and deliver to customers, and local **water kiosks** that sell bottled water along with other goods. This report has not included these providers, instead focusing on opportunities to increase investment among the more common borehole-sourced PWPs.

AFORAMO – AFORAMO, the association of PWP owners/operators, has three main roles: resolving conflicts between PWPs over areas of supply and tariffs; negotiating and advocating for PWP interests with national government agencies; and conducting and sharing studies and market information with PWPs. AFORAMO worked closely with DNAAS to develop Decree 51/2015 that provides the basis for licensing PWPs to serve as legitimate water service providers. AFORAMO currently is only active in the Maputo, Gaza, and Inhambane Provinces, with an office and delegation of members in each.

WATER SUPPLY CHAIN SERVICES

The supply chain for water services includes many different actors that provide equipment and services needed by both public and private water services providers. These actors include:

- Equipment Supply Companies (pumps, tanks, fittings, pipes, off-grid energy, etc.).**
 The options for purchasing equipment include imported products from regional (South Africa and Zimbabwe) and international (China, India, Europe and U.S.) markets and some local manufacturers, such as the PLASTEX and RHINO water tank brands. Water supply equipment is sold by the manufacturers and importers to large-scale water providers or to large and small-scale, regional hardware suppliers. Larger hardware suppliers such as Construa/Build-It distribute products through their regional and provincial retail outlets.
- Well Drilling Services.** In Maputo and nearby provinces, well drilling services are readily available from local and South African-based companies, and the geological conditions are such that boreholes have high success rates. Growing demand for services from the PWPs in the South has increased the number of fraudulent drilling services in the market that use low quality equipment that results in low functioning boreholes. The North has fewer established well drilling companies, most of which are based out of Nampula, and geologic conditions make it both harder to locate water and often require deeper wells. One PWP reported waiting a month to secure a well driller’s services while two well drillers interviewed noted that in some areas of the North, such as Nacala, they have had low success rates even after drilling as deep as 200 meters. Most drilling equipment used throughout Mozambique is imported from South Africa or Asia.

Table 2: Access to drilling services

PROVINCE	DEPTH (m)	AVERAGE COST (MZN)	TYPE OF PROVIDER
Maputo	35-90	150,000-250,000	Maputo-based South African Provider
Nampula	45-60	400,000-500,000	Nampula-based
Cabo Delgado	20-35	120,000 190,000-500,000	Tanzanian Provider – lower quality Nampula-based; range depends on depth of well requested
		250,000-300,000	Pemba-based
Sofala	35-60	300,000-400,000	Maputo-based

Source: Field interviews

- Plumbing and Electrical Installation Services.** PWPs reported that they source plumbing and electrical installation expertise from locally known companies and individuals. These are specialists with experience in construction. Some local suppliers such as Construa/Build-It will recommend plumbers and electricians as well if customers ask. Conversely, some electricians and plumbers will advise PWP-operators on the equipment they think is needed, recommend reliable brands and install equipment once purchased. However, very few plumbers and electricians, particularly in the North, have specific training in water systems design, installation and operation which can lead to operating problems for PWP owners when the equipment is not sized or installed properly to match their needs.
- Electricity Supply Services.** Electrical systems and services are critical components for water system operations. Pumps, in particular, require skilled electricians to set up and stable, reliable electricity supplies to operate. PWPs interviewed all reported significant challenges with

electricity supplied by the national electric company (EDM). Service interruptions and voltage surges damage pumps and other electrical equipment. PWP operators also noted the high cost of electricity which can represent as much as 75 percent of their operating costs in areas not yet served by EDM. PWPs have installed solar energy systems and/or use diesel generators to power their water systems. Solar energy offers one solution for reducing electricity costs and stabilizing supply, but it requires a high up-front investment, and PWPs will still need source of electricity to keep their systems operating at night.

- **Technical Assistance/Service Providers.** As with installation services, when technical assistance or maintenance is required, PWPs typically engage known technicians and service providers from the community. PWPs report only spending an average of 5 percent of total input costs on system maintenance.
- **Geologists.** PWPs and well drillers in the South do not use geology expertise before drilling wells given the high success rate of boreholes. In the North, the well drillers interviewed all hired geologists to help identify locations where they will have a greater chance of finding water.
- **Turn Key Installation Services.** Turn-key installation services have emerged in the North and Central regions that develop small scale water systems funded by donors and the national government through PRONASAR. While many of these businesses started out as well drillers, the large number of donor and government-funded tenders for small scale community water systems has led some drilling businesses to evolve into turn-key providers that drill wells, source all needed equipment and materials (almost all imported), and set-up entire piped water systems. Many of the small-scale systems funded by PRONASAR use improved technologies including solar energy to power pumps.
- **Financial Services.** Based on the survey conducted by SPEED+, 92 percent of PWPs have self-financed investments in water supply businesses. Those that have borrowed funds to build their water systems have taken out personal loans using personal property or other established businesses as the loan guarantee.
- **ICT solutions.** Interest in integrating ICT solutions into water service provision is nascent, and only anecdotal ideas are reported by a handful of stakeholders. One PWP in Meconta indicated interest in improving his billing system to allow for auto-billing and cellular or online invoice payment. Some PWPs are testing the use of a real-time meter reading and automated billing software that stores data in the cloud and can be monitored from a cellphone or tablet. A turn-key water system provider in Nampula expressed interest in setting up water kiosks in under-served urban areas where customers could purchase water using pre-loaded debit cards.

CONSTRAINTS AND ENTRY POINTS

In each of the water system snapshots for Maputo, Nampula and Cabo Delgado (Annex 1, 2 and 4), the red lines and text indicate specific issues or concerns that reflect symptoms of larger challenges facing the development of better water services. Given the importance of the private sector in helping the GoM achieve universal access to safe water, the following discussion summarizes the significant constraints to expanding private sector provision of safe water services.

POLICY AND REGULATORY CONSTRAINTS

Limited Opportunities for public-private information sharing, dialogue or dispute resolution. The water sector lacks a sustainable platform for national and local government entities, public water providers, regulatory bodies, and PWWs to share information, address disputes, and discuss issues. **Information sharing** between the PWWs and the various government agencies is reported to occur irregularly, often organized by a donor-funded consultant or project, and typically focuses on a limited set of policy or operational issues/challenges, rather than opportunities for market investment. In the public sector, interest in working with PWWs presently depends on a few champions within DNAAS. However, this interest could change quickly if these individuals leave the directorate. PWWs report limited access to **dispute resolution** resources when public and private water service providers compete for customers in the same territory. The lack of routine **public-private dialogue** has contributed to several significant and long-standing policy challenges since the emergence of PWWs as significant providers of water services. As with any sector, more issues likely will emerge as services expand and improve.

Expanding the Mozambican Water Platform's (PLAMA) role or establishing another mechanism/platform that specifically focuses on improving dialogue between the GoM and PWWs could help resolve several challenges including:

- **PWP concerns about the value of being licensed.** Decree 51/2015 created the framework for registering and providing PWWs with a five-year operating license. In spite of this decree, PWP owners expressed concern about the validity of the license in terms of protecting licensed providers from direct competition from other PWWs or public water systems being developed by FIPAG and AIAS.
- **PWP concerns about how they would be compensated if they lose business to a public water provider** that extends its network into areas they already serve and charges less for water.
- **Lack of comprehensive water supply strategies and specific plans for each province.** The development of a national and province level plans that identify areas for potential services could accelerate private investment in water supply services, particularly in the Central and Northern regions; and enable the GoM through FIPAG and AIAS to focus its limited resources on improving existing services and extending networks into areas where private investors are unwilling or unable to invest in water networks due to technical or physical constraints.

Public-Private Water Sector Platforms

Currently, several organizations exist that represent different elements of the water value chain including the Mozambican Water Platform (**PLAMA**), the Mozambique Association of Well Drillers (**APM**), **AFORAMO** and the Confederation of Economic Associations (**CTA**). Of these, only PLAMA has the specific mandate to serve as a platform for information sharing and public-private dialogue focused on water-related issues. PLAMA's members constitute a diverse array of public sector, private and not-for-profit organizations that include chemical suppliers, NGOs, private consultants, academic and research organizations, well drillers and other service providers. Of its members, however, only Águas da Região de Maputo and Aquatech are actual water providers, and none of AFORAMO's members appear to be members of PLAMA. AFORAMO presently is the only organization engaged in policy discussion with DNAAS on issues that directly address concerns raised by PWWs. However, it is relatively new with members concentrated in the South, and as a result has limited capacity to advocate effectively for all PWWs.

Lack of Harmonized Tariffs for Key Inputs - Raw Water and Electricity. PWWs pay higher rates for raw water and electricity than public water service providers (including AIAS systems managed by contracted private operators through concessions). For example, ARA charges PWWs 1.50 MZN/m³ compared to 0.60 MZN/m³ for public water providers. AFORAMO members stated that they pay ten times more for electricity compared to what public water systems pay. (In fact,

public institutions are frequently criticized for not paying electricity or water bills at all.) The higher rates for raw water and electricity translate into higher tariffs charged to customers. This perceived unfairness by AFORAMO members is reported to be a significant source of tension and distrust. Anecdotal evidence from AFORAMO members suggests that FIPAG purposefully prioritizes expanding public water systems into areas already served by PWPs, and because they can charge lower tariffs and attract customers away from the PWPs. Customers attracted by the lower FIPAG water rates maintain their PWP connections knowing that FIPAG-managed water systems often run out of water during the dry season. As a result, in areas served by both private and public water networks, customers often have two water connections and use the cheaper public water supplies as their primary source and supplement with PWP water when necessary. Harmonizing tariffs for raw water and electricity for both public and private water providers will help avoid unfair competition between providers and reduce the perception among many PWP owners that the government strongly favors public over private water systems.

Infrequent Retail Tariff Reviews for Public and Private Water Services Providers. Public water utilities, including systems operating under delegated management from AIAS, are fully funded by the national government or donors. While FIPAG is meant to operate its systems under the full cost recovery model, it has yet to increase tariff rates to achieve this objective. As a result, CRA has set lower tariff rates that public systems charge customers by volume compared to PWPs. For example, the base water tariff set by CRA for FIPAG and AIAS water services varies between 20 and 26 MZN/m³ for the first 5m³ compared to 50 MZN/m³ for PWPs. Since the operators of the public water networks have no up-front investment costs, the rationale is that tariffs only need to recover operating and maintenance costs, which leads to low tariff rates. However, based on interviews with FIPAG staff, the low tariff rate has remained unchanged for many years while inflation has increased operating costs. As a result, service quality degrades over time. PWPs face a similar situation. CRA established an initial tariff structure for PWPs in 2015 that was last updated in 2017. Meanwhile, the costs for electricity and other inputs increase each year with inflation. Keeping tariffs fixed for several years to protect consumers will lead PWPs to ration maintenance and repairs and eliminate investment in system upgrades and expansion that is not in the long-term interest of consumers nor public health.

CONSTRAINTS IN MARKET SUPPLY AND DISTRIBUTION CHANNELS

Meeting Energy Needs. Approximately 45 percent of PWPs surveyed by SPEED+ indicated that access to the electricity grid, unstable energy supplies, and the high cost of alternatives such as fuel for generators or solar energy systems posed significant constraints to business operations and growth. We anticipate that public and other water systems dependent on electricity face similar challenges. The cost of electricity represents a significant component of total operating costs for water service providers. Those service providers that rely on EDM's grid complained about power outages and voltage fluctuations that damage pumps and other electric equipment. For those water systems not connected to the electric grid, diesel generators have lower up-front costs compared to solar systems, but the operating costs are much higher. Thirty-nine PWPs located in Maputo, Gaza and Inhambane have installed solar systems. Solar companies currently do not market their products to water service providers nor provide technical assistance (through retailers) in solar panel selection and set up. One PWP in Nampula attempted to install a solar energy system, but it failed due to poor guidance provided by the retailer on the number of panels required to operate the pumps and other electrical equipment. Improved information and technical assistance is needed at the point of sale.

Locating Reliable Sources of Groundwater. PWP's rely on groundwater to supply their networks. DNAAS requires well drillers to submit information on the depth and production of every well drilled, yet this information is not widely available to both well drillers and PWP's. This limited access to information on the location and production of existing wells increases risks and investment costs for water providers in the North where ground water supplies are both deeper and less predictable.

Accessing Qualified Technical Expertise. Most PWP owners had no previous experience in water services provision prior to establishing their first water system. Instead, they have learned on the job, sourcing guidance from family members, community connections, and retail outlets. Presently, when PWP owners/operators face issues they cannot solve directly, they often engage local plumbers and electricians. However, the level of skills available varies significantly from region to region, and too often the technicians hired have only limited knowledge of how water systems and equipment operate. This can lead to poorly designed and inefficient water systems or in some cases, wasted investment if the equipment purchased does not match the system requirements.

Accurately Measuring Water Production and Sales. Presently, some PWP's charge customers flat monthly rates while other PWP's charge customers based on actual household consumption using customer meters. The PWP's interviewed in the North were interested in shifting from flat monthly rates to metered connections but indicated that meters were not available where they had purchased their pumps and other supplies. In addition, no PWP's surveyed measure the quantity of water they pumped into their distribution networks. The use of both production and consumption meters would enable the water provider to calculate water losses that translate into lost efficiency and income. As shown in the case example for Nampula City (page 10), high water losses can severely limit the number of customers served with existing water supplies. High water losses also translate into income losses that jeopardize the financial viability of the water provider and limit system repairs, upgrades and expansion. Some of the larger PWP's in the South recognize the utility of production meters but have resisted investing in these meters because it would increase the fees they pay ARA-Sul for raw water. The other four ARAs all report not receiving any payment for water withdrawals from PWP's. Besides a loss of income, this lack of production meters deprives the ARAs of important information they need to monitor and manage water resources use.

Improving the Delivery of Safe Water. Water-borne diseases, especially cholera and diarrheal disease, remain significant health risks in Mozambique contributing to four percent of annual deaths. Anecdotal evidence suggests that water supplied by PWP owners is generally safe because they often use groundwater as their source and their piped networks are relatively new. However, ensuring the continued delivery of safe water requires a commitment to both water treatment and periodic water testing to identify potential issues.

- **Improving water treatment:** In the South, many PWP's manually add chlorine to the water they distribute. This approach could be improved through the use automatic chlorinators to ensure consistent levels of chlorine in the water, but the equipment is expensive.
- **Improving testing and monitoring:** In terms of water testing and monitoring water quality, the Ministry of Health (MISAU) requires approved water providers – both public and private – to submit water samples for periodic testing to ensure it is safe for human consumption. In Maputo, PWP owners submit water samples each quarter. Owners complained that the cost of laboratory analysis of water samples had increased from 250 MZN to 1,500 MZN per sample, and it can take several months to receive a copy of the sample results, if they receive a report at all. In contrast, the PWP's interviewed in Nampula and Cabo Delgado do not submit water

samples for testing while in Sofala, and the PWPs indicated that the District Health Services tests for water quality at least one time per year. PWPs that do not test for quality stated that they often rely on taste and customer complaints to identify issues with water quality.

Given the importance of water quality to public health, improving water chlorination and water testing services as well as enforcing requirements for periodic testing of water would help ensure that households receive safe water from their water service providers.

Accessing Financial Services. Most PWPs reported self-financing the construction and expansion of their water systems. Commercial finance is a challenge for PWPs in Mozambique for a number of reasons – interest rates are prohibitively high, loan tenor is too short, and unlicensed businesses without requisite collateral cannot access bank loans. According to two senior bankers, most PWP businesses do not qualify for bank financing because:

- They are **unregistered and unlicensed** as water companies by the government. Banks see the lack of license as a significant risk as the government could force the PWP to close the business before the loan is repaid;
- They lack at least two years of **financial information** that banks can examine to determine that the water business generates sufficient positive cash flow to repay a loan; and
- The water business cannot offer sufficient suitable **collateral** to back the loan. Banks specifically look for collateral that can be liquidated, if necessary, to repay the loan. This presents a significant challenge for many water businesses because most of their assets are underground.

While many PWPs would like to see more capital available for water system construction or expansion, the above bank requirements combined with the current terms of the Mozambican financial market - high interest rates and relatively short repayment periods (less than 5 years) – make the use of commercial financing for water systems development very challenging. Other forms of financing, such as supplier credit from hardware stores or solar panel manufacturers also appear very limited in Mozambique. The global USAID WASH Financing (WASH-FIN) project recently expanded to include Mozambique. This project may be able to use in-depth analysis and examples from other countries to engage the GoM and donors in creating guarantees and/or the blending of public and private capital to create a financing window that can offer more attractive financing terms for PWP growth.

NEAR TERM OPPORTUNITIES TO STIMULATE MARKET SYSTEM CHANGE

Opportunities to stimulate market system change in the water supply sector in USAID’s geographic focus area include supporting existing PWPs in the North to become more business and growth oriented and helping lower barriers that constrain the expansion of successful PWPs into new regions. Based on interviews with PWP owners/operators in the South and Central regions, several expressed interest in expanding their businesses to new regions. Opportunities to promote this growth include:

Improve access to existing information on water services. DNAAS annually collects data on the location of successful/unsuccessful boreholes, status of public fountains (standpipes) and pumps, and the status of AIAS and FIPAG networks that could be used by PWPs to target future investments in areas with poor access to safe water. Most of this information is housed in the National Information System for Water and Sanitation (SINAS) that presently offers only limited public access. DNAAS could improve PWP access to potential market information by:

- Making the information in SINAS more accessible to the public through online system upgrades and public forums and investment seminars.
- Incorporating up-to-date information on FIPAG, AIAS and registered PWP networks into SINAS.
- Seeking support from donor-funded programs such as SPEED+ to build capacity at CRA to develop and disseminate additional useful information such as water service coverage maps, consumer demand mapping, and willingness to pay surveys.
- Partnering with donor-funded programs to build the capacity of AFORAMO to organize exploratory market visits to the Central and Northern regions for advanced PWPs, as well as involve current operators of AIAS systems to collect and share data and information.

Involve local governments and the private sector in planning and investing to achieve universal access. PWPs have demonstrated their willingness and ability to deliver water services in areas not served by FIPAG or AIAS. The GoM could spur PWP investment in developing and expanding water networks to unserved populations through annual regional or provincial public-private planning forums that:

- Provide updated information on plans by FIPAG and AIAS for short-term to medium-term plans for new water networks and upgrades/expansions of existing networks.
- Enable city and district governments to identify their priorities for expanding water systems to underserved citizens.
- Enlist support from donor-funded programs such as SPEED+ to assist DNAAS, FIPAG, AIAS, CRA and local governments to develop competitive invitations for investment in new water systems that would provide safe water to unserved or underserved geographic areas, using full cost recovery tariffs.
- Support existing platforms such as the PLAMA to create opportunities for greater public-private coordination and investment in water services provision.

Clarify and strengthen guarantees for private water service providers. The licenses issued to PWPs under Decree 51/2015 offer a five-year operating period and uncertainty in terms of compensation should FIPAG or AIAS develop a new network or expand an existing water network into areas already served by licensed PWPs. Several PWP owners indicated that these two issues strongly influenced their decisions to invest/not invest in higher quality pipes, meters, or off-grid energy generation solutions. Their concern that a license would not protect their businesses led many to only undertake investments they could recoup within a two to three-year period. DNAAS could reduce this uncertainty and spur greater PWP investment by:

- Extend the licensing period from 5 to 10 years to enable PWPs more time to recoup investments.
- Clarify terms of compensation should a PWP lose its business during its license period due to investments by FIPAG or AIAS in new or extended public water networks.
- Establish a mechanism or process for dispute resolution for licensed PWPs.

Expand delegated management to include non-functional or poorly functioning AIAS water systems. AIAS already delegates the management of operating public water networks to private operators. Broadening this relationship to include the repair, expansion, and rehabilitation of non-functioning networks could spur additional private investment provided:

- Operators can charge tariffs that enable them to recoup their capital investments in repairs, and operating and maintenance costs, and make a reasonable profit.

- The delegated management periods are sufficiently long to encourage continued capital investments in service improvements and system expansion.
- Mechanisms for the review of tariffs and dispute resolution are clarified to provide potential investors/operators with greater confidence that they can turn non or poorly functioning water systems into viable businesses.

Strengthen technical capacity and professionalization of Water Service Providers. Most PWPs were inexperienced in water system management prior to launching their business and have developed technical expertise through on-the-job learning while FIPAG and AIAS staff have benefited from considerable donor technical support over the years. As the sector continues to develop, both PWPs and public water system operators will need access to continued opportunities to strengthen the technical and administrative capacity of staff and use of tools and technology that lead to continued improvements in water system operations and services. In the near term, the team identified the following potential opportunities:

- **Improve PWP access to domestic technical expertise.** Currently, many PWP owners/operators face challenges accessing appropriate technical expertise for the design and construction and operation of their water networks. Some hardware and equipment companies will recommend technical experts that can assist PWPs with system design, construction and troubleshooting problems. USAID could support efforts to catalyze marketing strategies that target PWPs by supporting focused market assessments to show equipment/construction companies and technical experts that PWPs represent a market opportunity. AFORAMO also could play an important role by working with their members to create a database of proven, qualified local technical experts and service providers (e.g. well drillers, plumbers, electricians). AFORAMO could develop a rating system that its members could use to rate local providers of technical support, and make this information available to its membership online, through newsletters and at member meetings. Such a system would assist AFORAMO members locate capable and trustworthy experts in specific geographic areas.
- **Strengthen the capacity of AFORAMO to design and deliver technical and administrative training programs to water operators.** Currently, PWP owners/operators learn about managing water systems on-the-job while public system operators have received more training through donor-sponsored programs. With technical support, AFORAMO could become a domestic provider of technical training programs for water operators, adapt/translate training programs that already exist and delivering these on a fee-for-service basis. AFORAMO would need considerable support to take on this role, but it would a business activity that would support AFORAMO's growth.
- **Support twinning programs that strengthen the capacity of Mozambican water services institutions.** Many water service providers have benefited from twinning with other more experienced water service providers through the Water Operators Partnership network sponsored by UN-Habitat. Similarly, associations such as AFORAMO have benefited from twinning with similar organizations from other countries. While limited in scope, participating organizations have drawn from the experience and guidance of their partner to undertake improvements in strategic planning, operations, finances and customer/member services.
- **Promote the use of tools and technology that enable improved operations and management.** Most PWPs use few ICT tools and technologies to improve the management and operation of their water systems. The following describe some tools and technologies that could help improve PWP operations:

- Automate billing and use of online/cellular payment technologies to reduce staff time associated with door to door billing and payment collection.
- Offer pre-payment options similar to the system used by EDM to improve cash flow;
- In collaboration with AFORAMO, create a performance monitoring system that is similar to the system used by CRA to assist PWP owners/operators identify weaknesses and track improvements in their operations over time. Several performance monitoring/benchmarking systems already exist and could be adapted by AFORAMO for use by its members. Ideally, these systems are used by the owners/operators to identify and target weaknesses in financial, technical and customer service operations that over time will professionalize and strengthen system operations and finances.

Encourage the use of solar energy to power water system operations. Only 39 PWPs have invested in solar energy systems despite the high cost of electricity and problems of electricity quality provided by EDM. This is likely due to the large up-front investment required to install a solar system capable of powering water pumps and related equipment. However, anecdotal results show that transitioning to solar energy can lead to significant monthly electricity cost savings and reduce equipment failure caused by power fluctuations and surges common in the national electric grid. PWPs offer a potential market opportunity for vendors of solar equipment, but solar companies must be able and willing to provide technical guidance and recommend installation services to ensure the solar equipment purchased matches the PWP’s electricity generating needs. AFORAMO could play a key role in facilitating linkages between vendors of solar equipment and its members, and the government could support greater use of solar energy in water supply by reducing tariffs on imported solar panels and related equipment.

Improve periodic water quality testing. PWPs recognize the importance of water testing services to ensure their water is safe and meets national quality standards. However, the public testing laboratories have limited capacity and the private laboratory testing services are very expensive. One possible short-term solution to this challenge would be for MISAU to require PWPs to self-test and report on water being distributed using approved water quality testing kits. Such kits test for bacteria, heavy metals and pesticides as well as pH, water hardness and minerals. PWPs also could use the test results to provide their customers with water quality updates.

RAPID SANITATION SECTOR ASSESSMENT

OVERVIEW OF SANITATION SECTOR

The sanitation sector is very underdeveloped compared to water supply. While the national government has taken the lead in water supply development through FIPAG and AIAS, municipal governments have the primary responsibility for sanitation planning and development. To date, only two urban areas, Maputo and Beira, have limited piped sewage networks connected to waste treatment facilities. In Maputo, Beira and other cities, most households rely on septic tanks and/or latrines for waste containment, minimal treatment and disposal (see Table 3). Of the total wastes generated each day in Maputo, only three percent is processed at the sewage treatment center. In the North, the city of Nampula has no sewage collection or treatment infrastructure. About 67 percent of households rely on latrines and seven percent have indoor sanitation connected to a septic tank. More concerning is how many households, particularly in the Central and Northern regions still lack even basic latrines. Poverty, lack of awareness, social norms and other household priorities contribute to this situation which poses significant public health, environmental and economic risks, especially in the rapidly urbanizing areas where data show that one-quarter of all

households lack any sanitation facility. It also poses a market opportunity for affordable sanitation options.

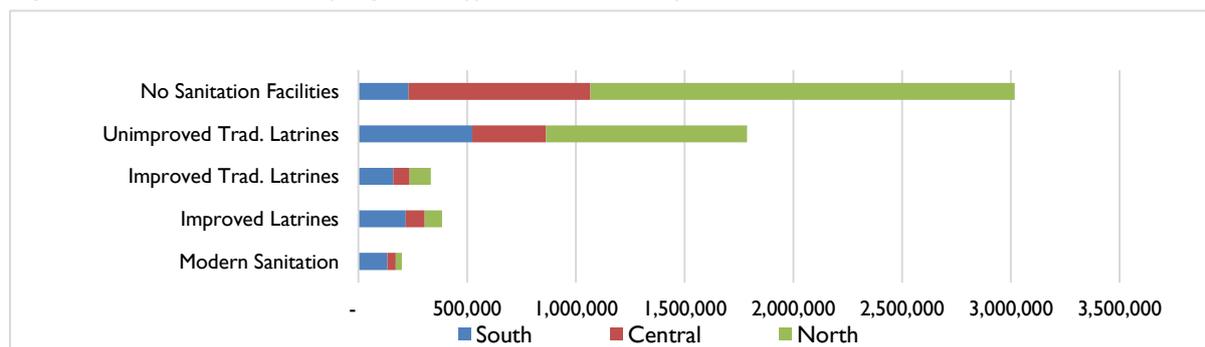
Table 3: Type of Household Sanitation in Cities and Regions of Mozambique

Type of Household Sanitation	Maputo City (% HHs)	Beira City (% HHs)	Nampula City (%HHs)	South Region (% HHs)	Central Region (% HHs)	North Region (%HHs)
In-house toilet connected to a septic tank or sewage network	31	17	7	11	3	1
Improved Latrine	37	33	19	18	7	2
Improved Traditional Latrine	14	7	11	12	6	4
Unimproved Traditional Latrine	17	14	37	40	24	38
No Sanitation Facilities	1.5	29	25	19	60	55

Source: Instituto Nacional de Estatística, November 2013

Translating the above statistics into actual household numbers offers additional insights into how households manage daily sanitation needs (See Figure 4 below). According to national statistics, about three million households across Mozambique have no sanitation facilities and another 1.8 million households rely on the most basic, and often unsanitary latrines. The majority of these are concentrated in the poorer and more rural Northern and Central regions, while more households in the South have access to safer and more modern sanitation options.

Figure 4: Number of Households by Region and Type of Sanitation Facility



Source: Instituto Nacional de Estatística, November 2013

DRIVERS OF HOUSEHOLD INVESTMENT IN SANITATION

Given the state of sanitation in Mozambique, the assessment focused most attention on what can be done to increase household investment in sanitation as a first and essential step towards improving sanitation coverage in Mozambique. Based on market studies carried out in other countries, we know that the poorest households in rural, peri-urban and urban areas are often the least satisfied with their current sanitation options, but also cannot afford or lack motivation to invest in improved sanitation options, especially if they do not own their home. This desire for better sanitation represents a market opportunity for low cost sanitation options that enable poor households to

transition from open defecation to an effective pit latrine and eventually to septic tanks/sewage network connections.

Based on experiences of other African and Asian countries, we know that several factors besides cost drive household decisions about sanitation. These include:

- **Limited sanitation options.** The choice households often face is between open defecation and constructing a traditional (and often unsanitary) pit latrine covered by a wood and/or earthen floor or cement pit cover (Figure 5). Consumers currently have few options beyond these basic options. Cement or pre-fabricated pit latrine covers offer a more sanitary option to wood or earthen floors, but these are not well suited to all soil types.
- **Public awareness and education.** Consumer demand will rise in response to CLTS efforts and more widespread sanitation education campaigns carried out in schools and health clinics. These campaigns will improve consumer understanding about the linkage between open defecation and poor sanitation habits and household health driving interest in better sanitation options.
- **Sanitation product innovation.** Sanitation products across Africa are evolving with the emphasis on improving options that are easier to construct, offer greater value for money and include features that meet with international health standards and meet low-income consumer preferences.

Figure 5: Common rural household latrine



SANITATION MARKET SYSTEM IN MOZAMBIQUE

Annexes 3, 4 and 6 illustrate our understanding of the current sanitation market systems for Maputo, Nampula and Cabo Delgado. The systems are composed of three main groups – national and sub-national government agencies; donors and development partners; and the private sector. The center of this diagram depicts the household as the primary point for containing and separating fecal wastes from the environment and the primary market for sanitation options. The other elements of the sanitation market consist of collection/transport, treatment and final disposal or safe reuse. Waste treatment only occurs in Maputo and Beira on a very limited scale. In terms of waste disposal, septage or fecal sludge collected from septic tanks and latrines is often buried nearby, dumped on fields or in nearby waterways. The dotted lines indicate a connection or organization responsibility that should exist but does not in the current system.

National and Sub-national Government Organizations. At the national government level, four ministries have significant roles in improving sanitation.

- **MOPHRH** focuses on infrastructure planning and implementation. MOPHRH, through the DNAAS is responsible for developing policies and plans for improving access to safe sanitation. AIAS under MOPHRH leads and/or supports the development of sanitation infrastructure such as sewer networks and wastewater treatment facilities in all urban areas including large cities. In addition, AIAS uses private contractors to manage decentralized wastewater treatment plants in Maputo City, including the system in the Zimpeto expansion area that covers the Olympic village and national stadium.
- **Ministry of Public Administration (MAEFP)** is responsible for setting policies, defining

strategy, and regulating the administration of public services. In the sanitation sector they supervise the municipalities who implement sanitation programs.

- **Ministry of Education (MINED)** is responsible for ensuring that schools have adequate sanitation and handwashing facilities and promoting sanitation and hygiene to students.
- **MISAU** leads and supports improved sanitation and hygiene advocacy and education through its network of subnational health offices, hospitals and rural health clinics.
- **Provincial Directorates of Public Works, Housing, and Water Resources (DPOPHRHs)** oversee the implementation of MOPHRH's rural sanitation investment programs through their Water and Sanitation Departments (DAS).
- **Water Regulation Council** under MOPHRH regulates sanitation services and tariffs.
- **District Services for Planning and Infrastructure (SDPIs)** are part of the municipal government and oversee the construction of public latrines. In addition to SDPIs, various district-level WASH-related activities are implemented under the authority of the District Secretaries (SDs) which are not water and sanitation-specific institutions but still play an important role in the sector.
- **City and Municipal governments** have responsibility for licensing sludge collectors, enforcing local sanitation regulations and for participating in plans and implementation of waste water/sludge treatment facilities. Municipal governments sometimes either directly or in partnership with donor-funded programs undertake sanitation improvements in slums, public markets and other public places. Cities are partnering with donor programs to construct public toilets (operated by individuals or communities) in markets and other public places. In Maputo, the city council plans to pilot a program in which FIPAG collects a joint water and sanitation fee for piped sewage customers and transfers the sanitation fee to the city government to pay for operating the sewage collection and treatment system.

In spite of a number of government agencies engaged in various aspects of sanitation, what the diagram shows is that very few of these have any direct influence on household sanitation decisions nor how fecal waste is collected and treated.

Donors and Development Partners. Donors and development partners such as NGOs play key roles in financing, promoting and supporting national and provincial efforts to reduce open defecation and improve sanitation. For the past several years, donors have funded as much as 80 percent of national expenditures in water supply and sanitation, channeling funds through two broad mechanisms: (1) The multi-donor Common Fund for water and sanitation - PRONASAR; and (2) bilateral projects. Bilateral projects are usually coordinated between the donor and one or more national government agencies such as the MOPHRH, with implementation led by:

- A national government agency or a joint partner-government arrangement; or
- Partner and/or third-party (i.e. grantee or contractor).

International NGOs and such as World Vision, CARE, Water and Sanitation or the Urban Poor (WSUP) and contractors such as SNV are often hired by donors to work with national and local government agencies to support WASH improvement programs in urban and rural areas. The selection of international organizations to lead and/or support the implementation of donor-funded programs is often based on a combination of factors: (1) recognition that national and local partners

need additional skills and capacity to meet the donor's reporting and accountability requirements; and (2) desire to test one or more new approaches for achieving specific outcomes. For example, WSUP is using donor funds to facilitate the construction of community block toilets and shared toilets in eleven poor neighborhoods of Maputo. They have partnered with the municipal government and local community organizations to mobilize matching funding for toilet construction and community engagement in toilet management and maintenance. This innovative approach is leading to significant improvements in community sanitation in very congested neighborhoods where households do not have the space nor resources to construct their own sanitation facilities. In more rural areas, NGOs have played a significant role in supporting the GoM's CLTS advocacy efforts, often employing CLTS promoters that engage local communities in mapping, community sanitation behaviors, conducting sanitation education and advocacy, and providing training and assistance to local artisans in latrine construction

Sanitation Services Supply Chain Organizations. Supply chain organizations that service the sanitation market can be divided into five broad groups:

- Manufacturers and their market distribution channels through regional and local hardware stores that sell sanitation equipment and related building materials. These include companies such as PLASTEX that manufacture plastic septic tanks for households and manufacturers of plastic latrine slabs in Beira and Chimoio;
- Retailers of sanitation fixtures and related building products. These include both large-scale chains such as Construa/Build-It that have regional and provincial retail outlets and smaller independent hardware stores that sell the pipe, cement and brick needed for latrine construction.
- Construction companies and local artisans that households employ to build sanitation facilities; and
- Companies that de-sludge latrines and septic tanks and dispose of wastes. These companies operate mainly in the urban areas.
- Waste treatment facilities/operators. These are limited at this time to Maputo and Beira.

CONSTRAINTS AND ENTRY POINTS

Manufacturers and hardware importers produce and/or import and distribute products to regional retail outlets and directly to large builders such as Nassar Construction. The large retailers channel products through their networks of stores and sell to smaller retail hardware shops in secondary towns and villages. The challenges posed by these existing market channels in terms of reaching the poor household market include:

- **Limited product availability.** Manufacturers currently make products targeted for the middle and upper-class markets. There are few sanitation products in the market for lower income households. In addition, consumers have very limited access to information on sanitation options besides a basic pit latrine covered by a wood/dirt floor or concrete slab.
- **Pricing.** Price often poses a significant barrier to owning an improved latrine. However, approximately 50 percent of poor households in the Northern and Central regions own radios and/or bicycles. This implies that households have some disposable income and potentially could afford an affordable improved latrine if available in the market.

- **Convenience.** Constructing a latrine with a concrete slab is currently the only alternative to a traditional latrine design. While the cost of the materials to produce a concrete slab may be \$10 to \$20, household must also arrange for the transport of the raw materials or slab and often hire a skilled mason to produce the slab – significantly increasing the cost. Some retailers, such as Construa/Build-It will recommend individuals that can install purchased equipment, but customers still must arrange for the transport of equipment and materials and installation. Having other low-cost options and services available that make it easier for households to secure an improved latrine would help address both the cost and convenience challenges.
- **Very limited marketing.** Manufacturers, distributors and retailers do not conduct market research nor actively market specific sanitation products. They rely on existing customer knowledge and word of mouth to drive customer demand.
- **Lack of financing for consumer purchases.** Neither large nor small retailers are linked with financial firms that can offer consumer financing to facilitate the purchase of sanitation equipment or materials. In some villages, women have formed village savings associations where households pool their savings to facilitate large purchases such as latrines.
- **Lack of alternative market channels.** Based on our limited conversations, there does not appear to be alternative channels for households to secure improvements in sanitation. In other countries such as Kenya and Indonesia, suppliers of sanitation products are linking with micro-finance institutions to facilitate household purchases of improved sanitation products.

NEAR TERM OPPORTUNITIES TO STIMULATE MARKET SYSTEM CHANGE

Countries that have achieved significant improvement in household sanitation have employed strategies that include one or more of the following elements:

Support effective advocacy and sanitation education that specifically targets women and children on how sanitation and hygiene behaviors impact household and community health. The GoM has adopted CLTS approach that is being effectively implemented in many other countries. CLTS starts by sensitizing communities to the risks posed by open defecation followed by community and mobilizing household commitments to construct latrines. Anecdotal information from groups active in sanitation in Mozambique suggests that many households revert back to open defecation unless there is continued advocacy through community health workers (APEs), schools and health clinics. There are opportunities to pilot new approaches to advocacy and education that:

- **Reinforce CLTS messaging** through health clinics, community health workers and schools to reduce household regression back to open defecation.
- **Include financial literacy in CLTS messaging** to help households understand how poor sanitation translates into higher health costs and lost income.
- **Assess the local media landscape and messaging** to understand if and how various consumers receive information and from which media outlets to identify opportunities for improving behavior change messages and message delivery.

Support the development of new affordable sanitation products and designs. Too often CLTS stops with advocacy and the initial community triggering that leaves households to figure out

how to construct a suitable latrine. Research in different countries has identified common features that households want in a latrine and also what factors motivate household investments in a new or upgraded latrine (see Table 4).

Table 4: Features and motivators of household investments in latrines

Most Desired Latrine Features	Top Motivators for Building a Latrine
<ul style="list-style-type: none"> ▪ Easy to Clean ▪ No smell ▪ Affordable ▪ Modern/Good style ▪ Easy to construct 	<ul style="list-style-type: none"> ▪ Improved hygiene and household health ▪ More privacy ▪ Greater safety ▪ More comfort ▪ Increased convenience/saves time

Poor households, and particularly poor rural households, face significant challenges locating, purchasing and transporting the materials and hiring an artisan to construct an improved safe latrine. Worldwide experience shows that most successful initiatives combine CLTS advocacy with links to local builders, artisans and/or suppliers that can deliver household sanitation solutions that are affordable, desirable, accessible and immediately actionable.

In Mozambique, many artisans have received training in basic latrine construction. Some artisans even have molds for latrine covers that they sell to households. However, slow progress indicates that just training artisans and giving them molds is insufficient to significantly advance improvements in sanitation, particularly in the Central and Northern regions. Other country experience suggests that in addition to advocacy, two other factors can help expand household sanitation investments:

- **Offering an affordable and complete sanitation solution.** Currently, there is not a complete latrine option in Mozambique. Local hardware outlets only sell the different products and materials needed to construct a latrine. The market lacks a complete latrine kit that includes both pit liner and cover that is easy to install and easy to clean. In Cambodia, the introduction of the “Easy Latrine” kit developed by IDEO (a San Francisco-based company that specializes in human centered design) that local artisans could build, sell and install for \$30 - \$50 accelerated the adoption of improved sanitation by poor rural households. Local manufacturers such as PLASTEX might be encouraged to develop a low-cost plastic version of a latrine kit if some portion of its development and market testing costs could be covered.
- **Engage other groups in promoting household sanitation investments.** Most artisans that received training in latrine construction and molds for pre-fabricated latrine covers do not actively market their skills and products. Instead, they rely on households coming to them for help constructing a latrine. Experience from other countries shows that linking artisans or latrine installers with other people or organizations that can benefit from sanitation promotion can accelerate household investments in improved sanitation. For example, in Cambodia, USAID supported a model that successfully linked sanitation artisans with community health workers (similar to APEs in Mozambique) to serve as rural sales agents, promoting latrine sales in conjunction with community CLTS triggering events. The local latrine manufacturers paid the health workers a commission for every latrine sold, resulting in rapid sales of latrines. In Indonesia, latrine builders/installers linked with micro-credit institutions that promoted financing for household sanitation investments. Sanitation promotion by these credit institutions propelled household latrine purchases. In both cases, expanding the market system to include other actors

significantly increased sales of improved sanitation products. These models would require initial support from USAID to train regional artisans (or their retailers) and APEs in rural marketing and sales tactics that incorporate education and advocacy.

Develop systems for the collection, transport and treatment of wastes in cities.

A complete sanitation system goes beyond waste containment at the household or enterprise level and includes effective/safe waste collection, transport and treatment. Cities and municipal governments often take the lead in developing the treatment/disposal infrastructure while the private sector often carries out waste collection and transport. Municipal governments are empowered to license companies to empty household and business latrines and septic tanks (and in coastal ports, fecal wastes from ships) and transport those wastes to a treatment facility. However, keeping those wastes contained and effectively treated often requires:

- **Associated regulations and penalties for improper emptying, transport and disposal** to ensure that people are not put at risks of disease and wastes get transported to the treatment facility; and
- **A fee structures for waste collection/transport and treatment that generates sufficient income** to motivate investment and action by public or private sector organizations. Many cities around the world have struggled to develop such systems. Their experience provides a rich source of information that Mozambique can draw on to develop its own approach. The World Bank and JICA have engaged local pit emptiers in Maputo, and would be a good resource for support in this area.

STAKEHOLDER PRIORITIES FROM THE CONSULTATION WORKSHOPS

SPEED+ organized and hosted a series of three participatory stakeholder workshops in Nampula, Pemba and Maputo to gather relevant information from water and sanitation market actors and further unpack the market relationships and dynamics at play in the sector. The workshops served to ground truth the market system maps and their underlying assumptions. Feedback from participants has been incorporated into this report. Additionally, participants in the workshops were provided with drafted versions of proposed opportunities to stimulate market systems change. Participants were prompted to discuss the potential impact, additional considerations, risks, and donor support required for each opportunity. This enabled the consultants to finalize recommendations and determine from the market actors the feasibility of the opportunities and priority actions moving forward. The following outlines what the stakeholders saw as additional considerations, potential risks, and required support to stimulate market systems change outlined above to ensure that priority actions effectively address constraints and spur greater investment to improve access to safe water and basic sanitation.

- **Ensure mechanisms for disseminating information on investment opportunities are regionally tailored.** Stakeholders recommended tailoring dissemination strategies to regional communication preferences, engaging community radio, local media, newspapers, and internet media as appropriate. They also recommended involving AFORAMO, PLAMA and/or the Confederation of Economic Associations (CTA) and the CTA Provincial Councils (CEPs) to lend credibility and validity to the information being disseminated.
- **Monitor transparency, fairness, and inclusivity of public-private strategic planning platforms.** Whether expanding the capacity of an existing public-private platform

such as PLAMA or creating a new public-private platform for strategic planning, donor support is needed to ensure broad and fair public-private participation and facilitate transparent information exchange. A successful strategy will require addressing stakeholders' expressed concerns about power dynamics, transparency, and the lack of trust in joint public-private initiatives.

- **Facilitate coordination, information sharing, and transparency between government organizations.** In all three workshops, participants highlighted the lack of coordination among government organizations and its impact in terms of asymmetrical access to information among water market actors, high license transaction costs due to dealing with multiple agencies in different locations, and a lack of leadership/ownership of the licensing process. To address these challenges, participants:
 - Urged DNAAS to clarify the roles and responsibilities among the various government organizations involved in licensing PWWs, setting tariffs and enforcing business regulations;
 - Requested support to assist municipal councils in establishing transparent licensing procedures and improving the dissemination of information on licensing benefits and guarantees; and
 - Recommended holding quarterly licensing days where all involved government parties would convene in one place to facilitate PWW license processing.
- **Continue support for access to quality local technical support.** Both the public and private water services providers stressed the need for access to qualified technical expertise and technologies. While equipment suppliers and trained experts will become future sources of both technology and expertise, in the interim, the participants saw the need for donor-funded programs to continue providing technical support while also strengthening the local technical capacity of a growing water and sanitation service industry.
- **Coordinate and fund pilots of ICT solutions for water and sanitation service providers.** Participants acknowledged their limited knowledge in how to select and implement ICT technologies and solutions that could improve their business operations; however, adopting such technologies present business and financial risks to many PWW owners. Participants suggested that donors could help lower these risks by partnering with technology vendors, piloting testing solutions and demonstrating the result to PWW owners and operators so they can decide whether or not to pursue specific technology solutions.
- **Reduce the cost of investment capital.** PWW owners highlighted the challenges they have faced accessing the capital needed to start up their water businesses. Water and sanitation businesses require significant up-front investments in infrastructure that has a lifespan of 20 years or more. Having access to more affordable capital with longer loan term periods would stimulate greater private investment in water and sanitation services.
- **Mitigate market distortion from the Government's Delegated Management models.** Many participants expressed concern with the GoM's current models for delegating the management of public water systems to private companies. Key concerns included:
 - Uncertain legal protections for the operators and contractual terms,
 - Interference by other operators or local officials in business operations,

- Tariff rates too low to sustain the business operations, much less system maintenance or expansion,
- Lack of transparency in the selection of companies to receive delegated management contracts; and
- Lack of available information about operating costs and income from renovated AIAS systems.

Combined, these factors create significant risks that discourage private interest and investment in operating public water systems under delegated management contracts. Stimulating more interest will require significant changes in the current models, or a new model altogether.

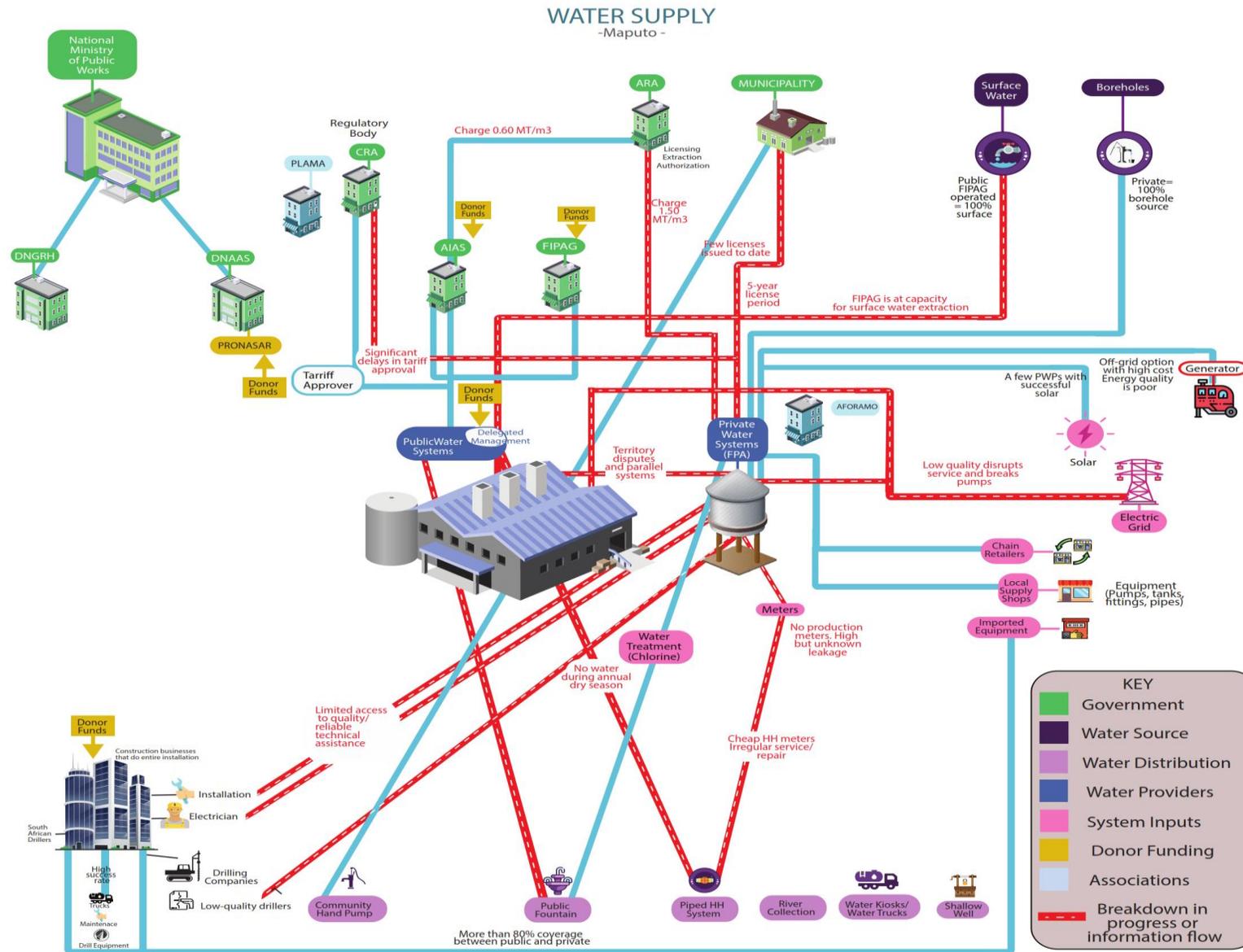
- **Facilitate donor coordination to strengthen sanitation marketing and tailor strategies for centralized versus de-centralized systems.** Participants highlighted the need to differentiate between de-centralized sanitation (largely rural) and centralized sanitation (Maputo and Beira), and agreed with the report's main findings and opportunities.

ANNEXES

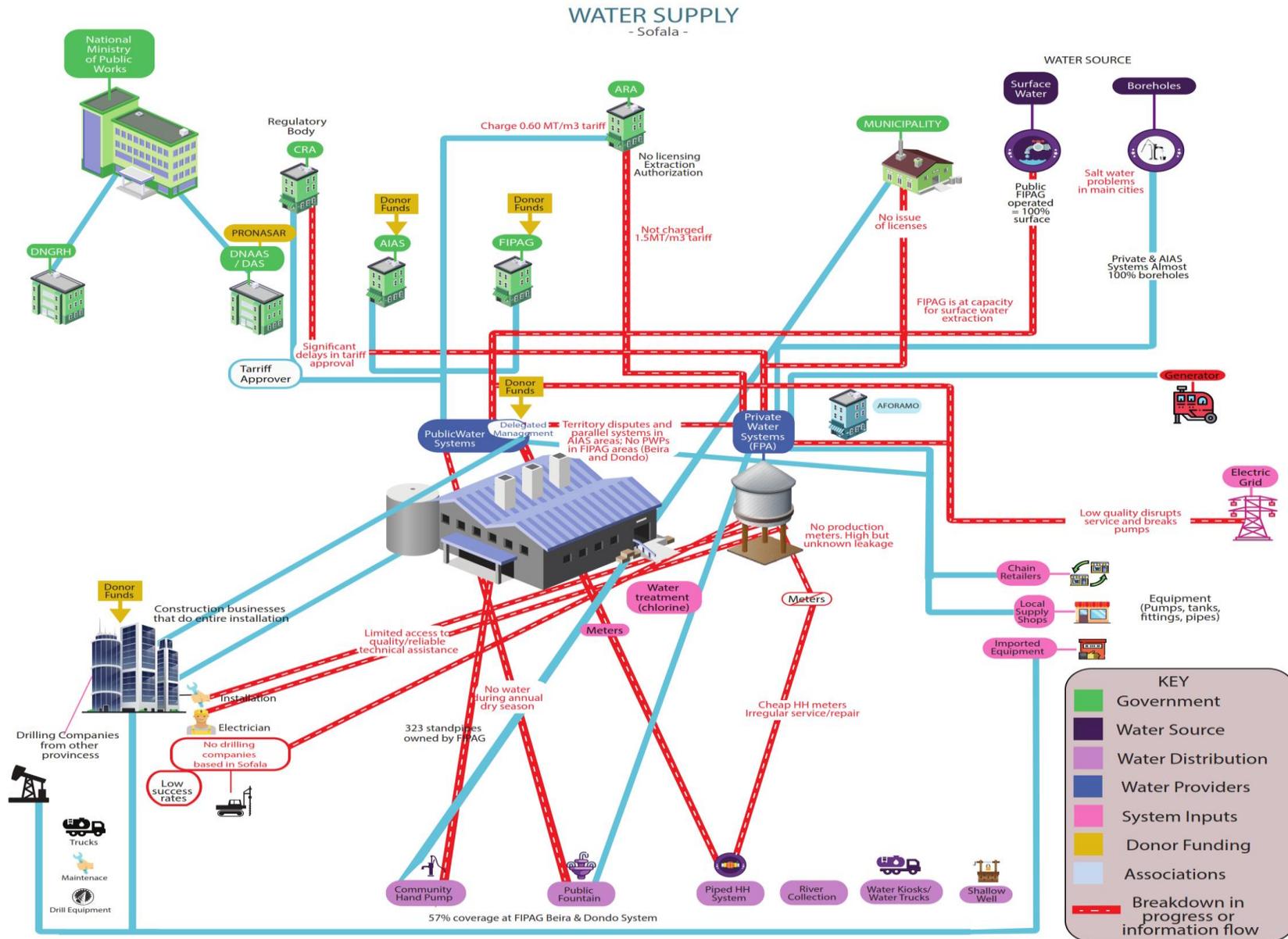
ANNEX 1: Market System Maps

ANNEX 2: Key Market Contacts

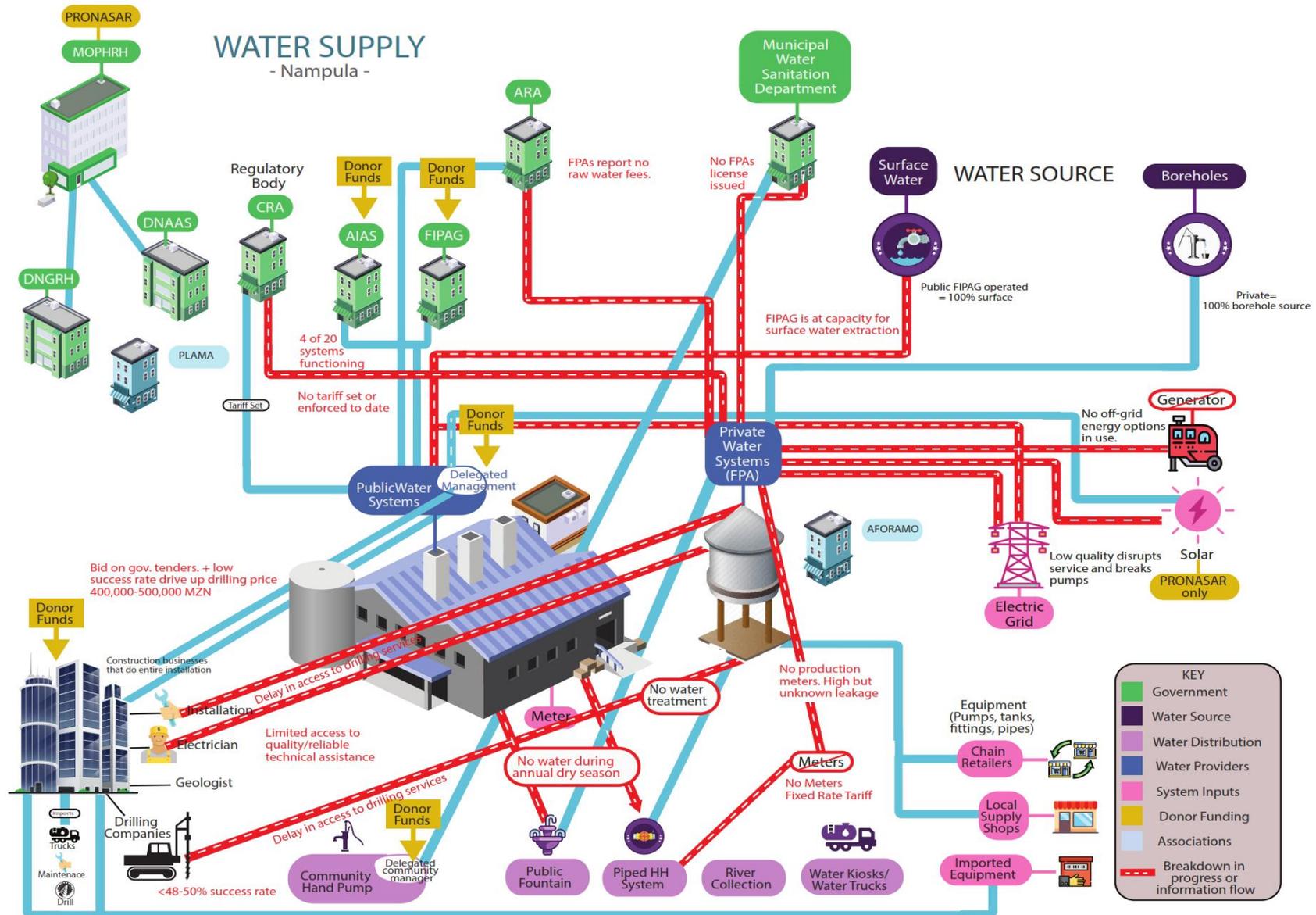
ANNEX IA: WATER MARKET SYSTEM MAP FOR MAPUTO



ANNEX 1B: WATER MARKET SYSTEM MAP FOR SOFALA

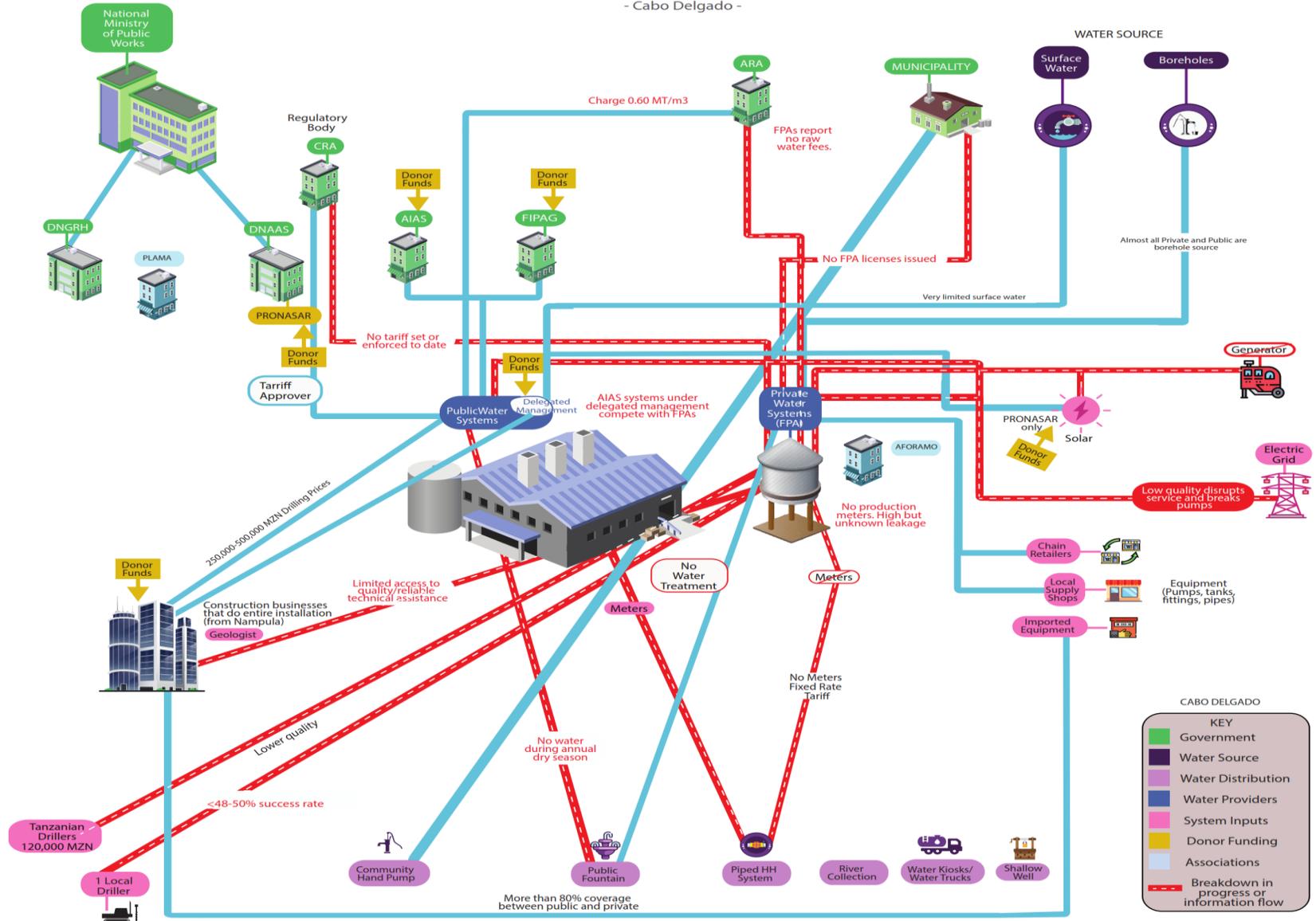


ANNEX 1C: WATER MARKET SYSTEM MAP FOR NAMPULA

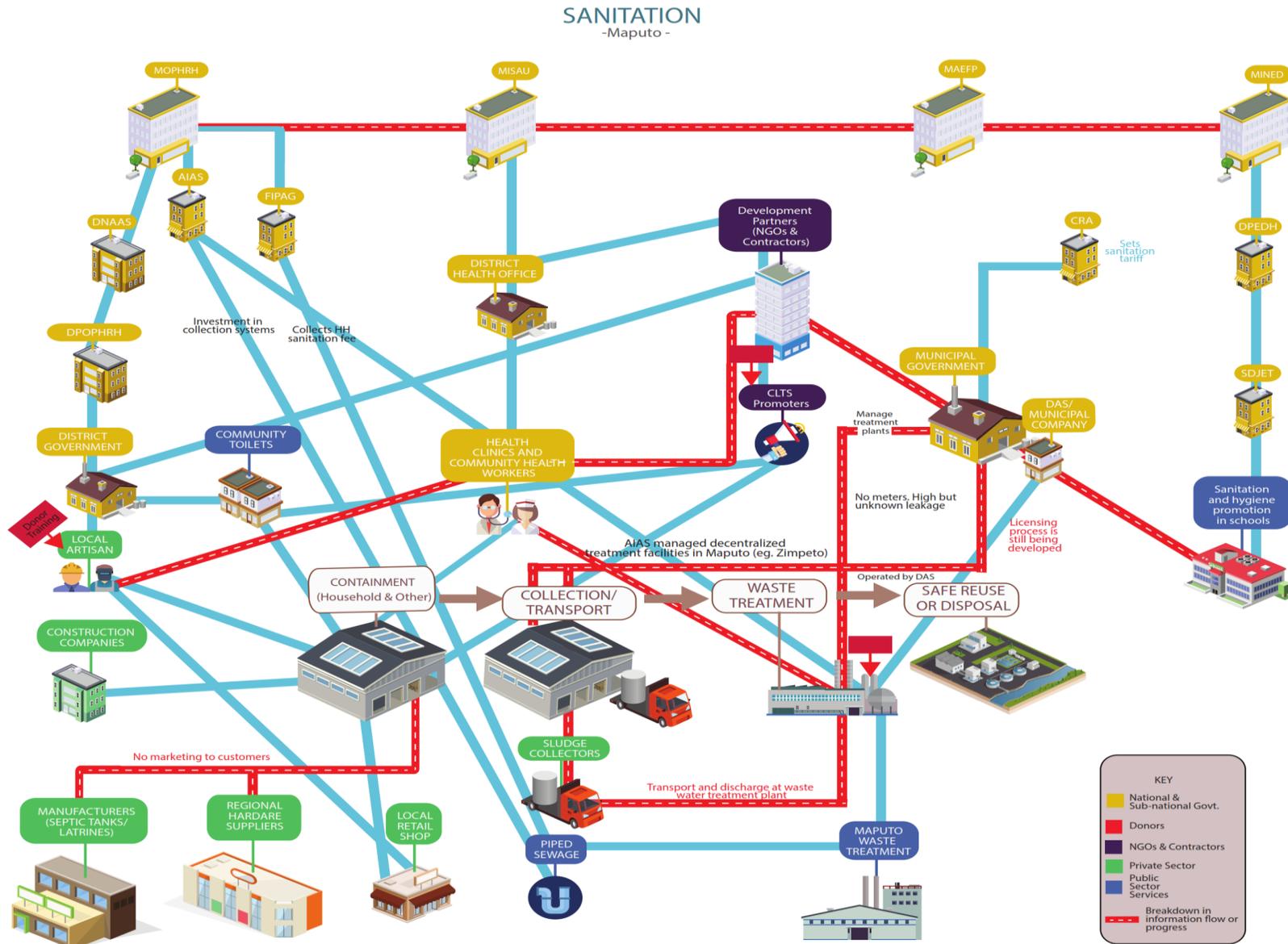


ANNEX ID: WATER MARKET SYSTEM MAP FOR CABO DELGADO

WATER SUPPLY
- Cabo Delgado -

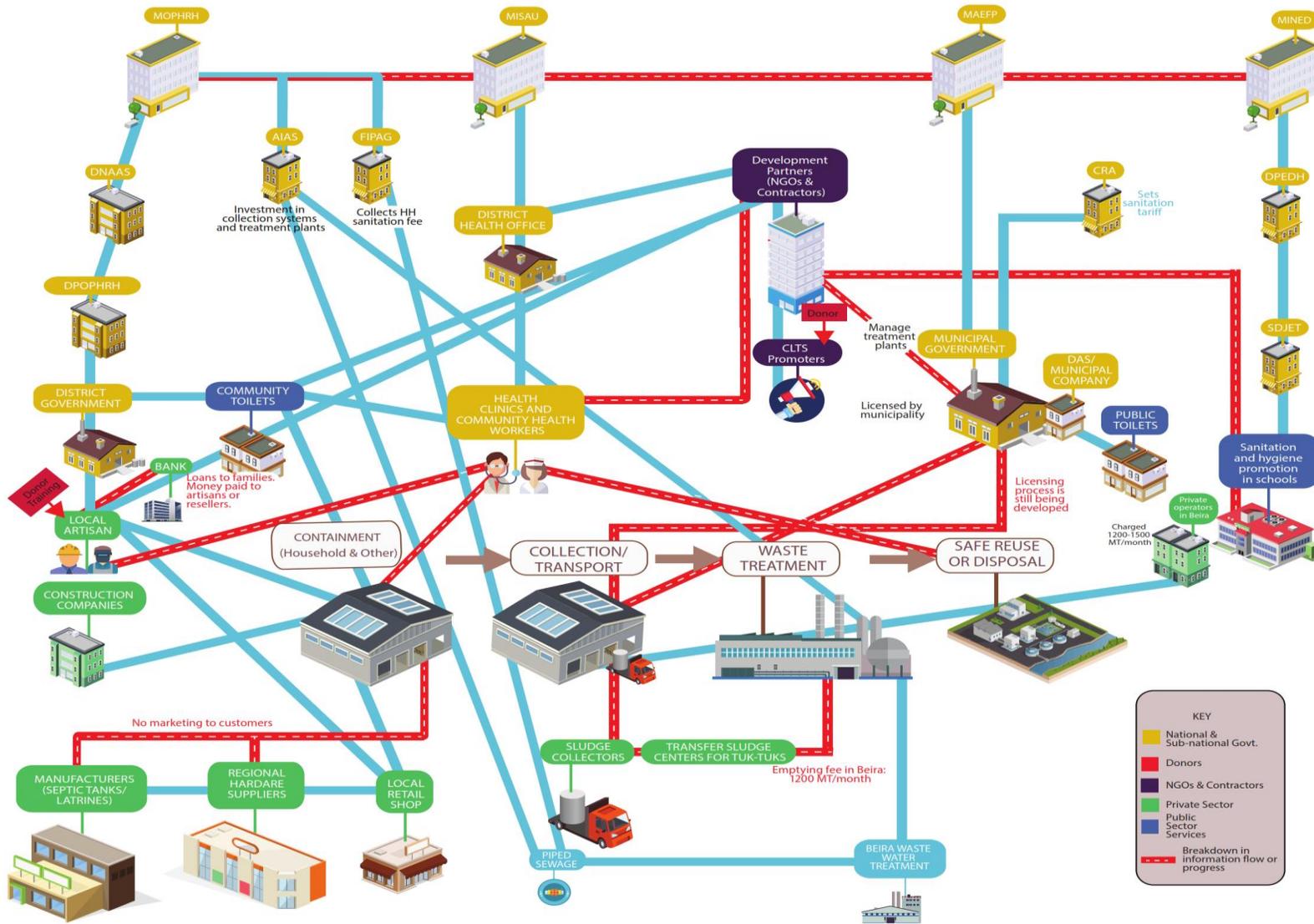


ANNEX 1E: SANITATION MARKET SYSTEM FOR MAPUTO



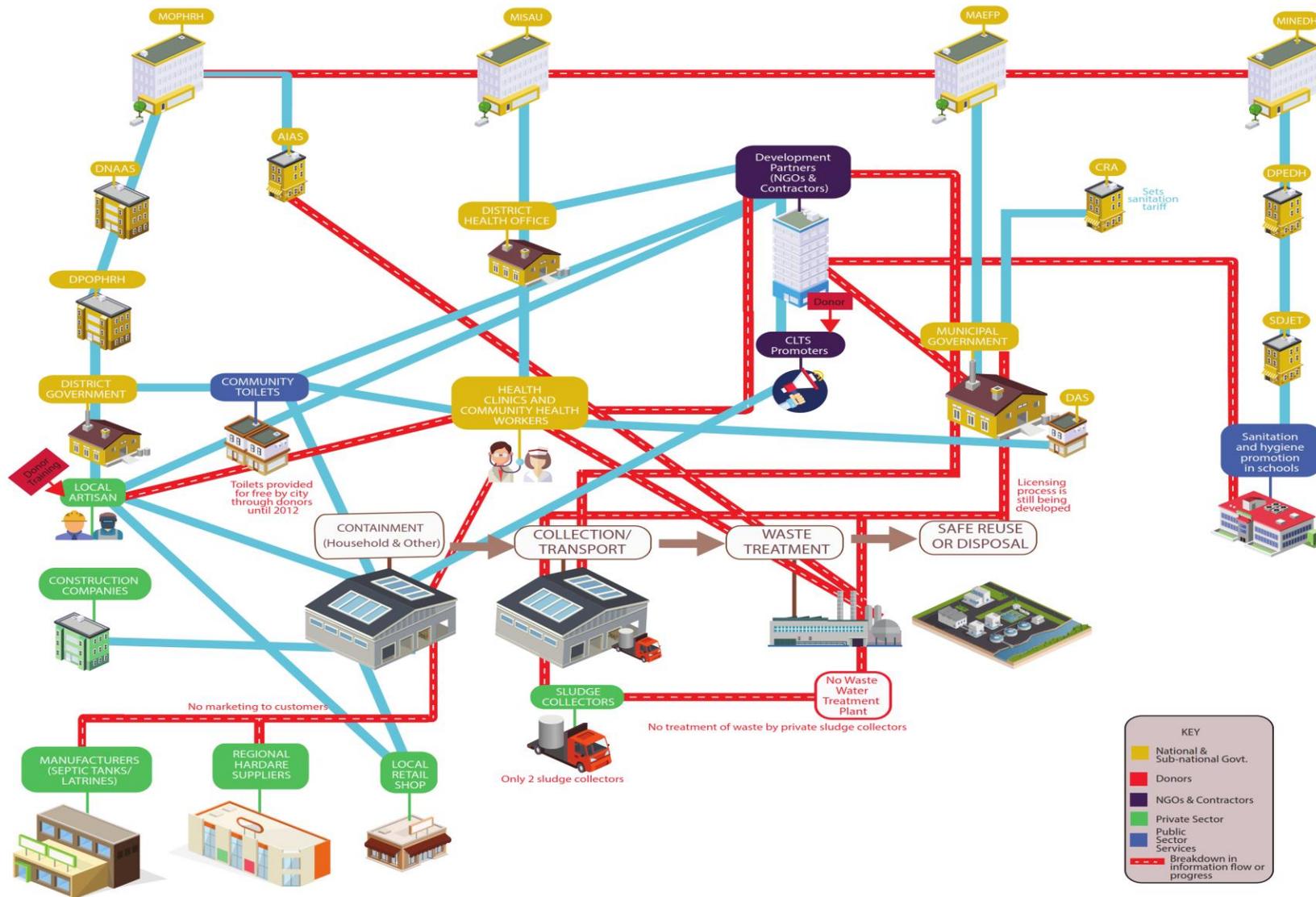
ANNEX 1F: SANITATION MARKET SYSTEM FOR SOFALA

SANITATION
- Sofala -



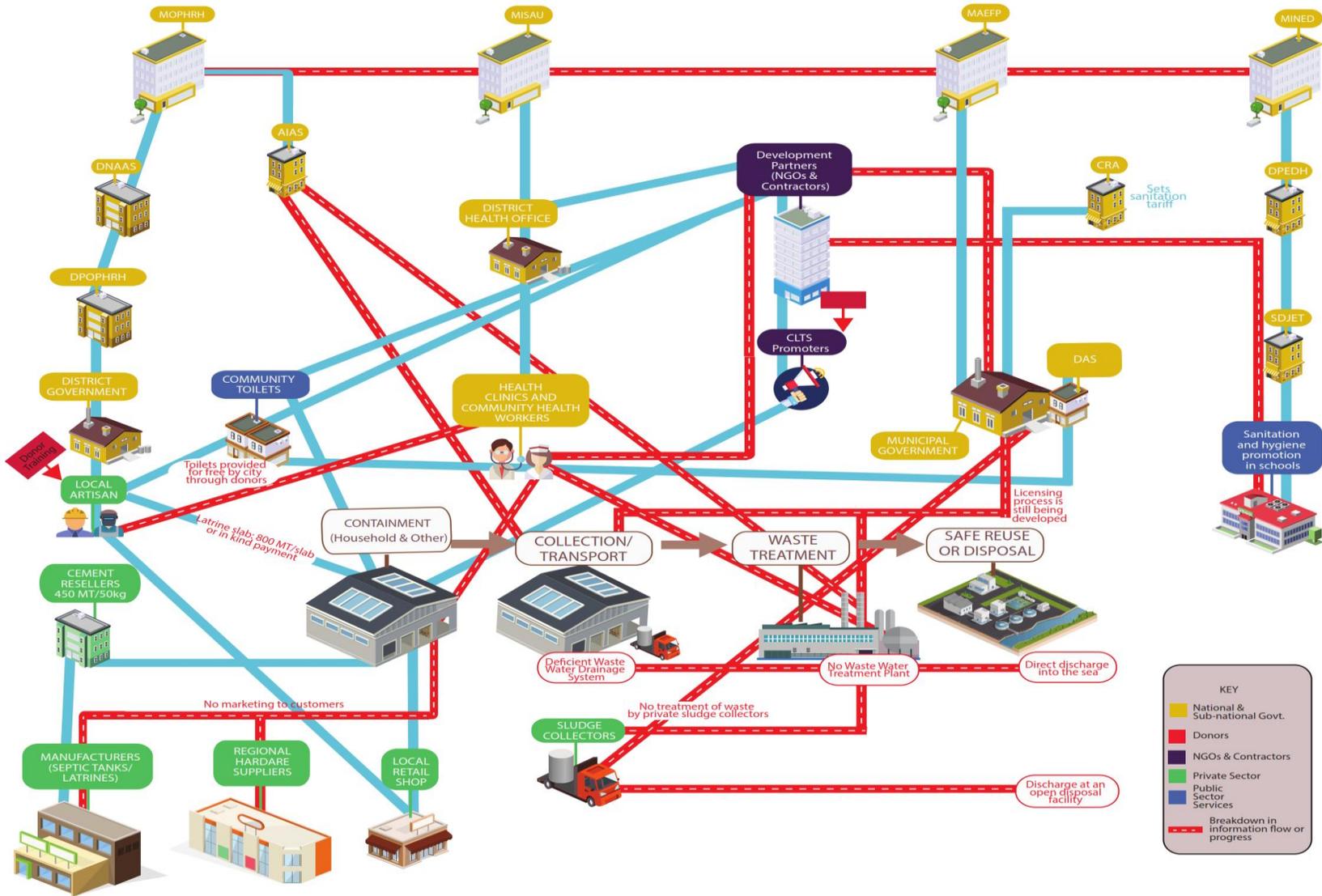
ANNEX 1G: SANITATION MARKET SYSTEM FOR NAMPULA

SANITATION
-Nampula -



ANNEX 1H: SANITATION MARKET SYSTEM MAP FOR CABO DELGADO

SANITATION
- Cabo Delgado -



KEY

- Yellow box: National & Sub-national Govt.
- Red box: Donors
- Dark Blue box: NGOs & Contractors
- Green box: Private Sector
- Light Blue box: Public Sector Services
- Dashed red line: Breakdown in information flow or progress

ANNEX 2: KEY MARKET CONTACTS

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