



REPUBLIC OF MOZAMBIQUE  
MINISTRY OF PUBLIC WORKS, HOUSING  
AND WATER RESOURCES

# SURVEY OF PRIVATE WATER PROVIDER'S SYSTEMS

Supporting the Policy Environment for  
Economic Development (SPEED+)

FINAL REPORT

November 2018

Final



DNAAS

National Directorate of Water Supply and Sanitation



**USAID**  
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# ACKNOWLEDGEMENTS

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# ACRONYMS

AIAS – Administration of Infrastructures for Water Supply and Sanitation

ARA – Regional Water Administration

CRA – Water Regulation Council

CTB – Belgian Technical Cooperation

DNAAS – National Directorate of Water Supply and Sanitation

DP – Planning Department

DPOPHRH – Provincial Directorate of Public Works, Housing and Water Resources

FIPAG – Water Supply Investment and Assets Fund

GD – District Government

INE – National Institute of Statistics

PWP – Private Water Providers

WSS – Water Supply Systems

SDPI – District Services of Planning and Infrastructure

SIG/GIS – Geographic Information System

SINAS – National Water Supply and Sanitation Information System

SPEED – Supporting the Policy Environment for Economic Development (USAID Project)

SUWASA – Sustainable Water and Sanitation in Africa (USAID Project)

USAID – United States Agency for International Development

## EXECUTIVE SUMMARY

This report presents the results of the Private Water Providers survey carried out throughout the country under the SPEED + Program. The program supports the efforts of the water supply sector to implement Decree 51/2015, the Licensing Regulation for the Supply of Drinkable Water by Private Providers. This survey constitutes an important step in this direction.

The survey was carried out across the country between May and August 2018, using tablets that allowed for the collection of reliable information. Where possible, data depending on PWP records and responses were triangulated so as to generate information as close to reality as possible. All data collected were organized into a database (the main product of this survey) and analysed, taking into account the main objectives of the study. A set of outputs has been produced, including maps representing the various important aspects of the current situation of PWP throughout the country.

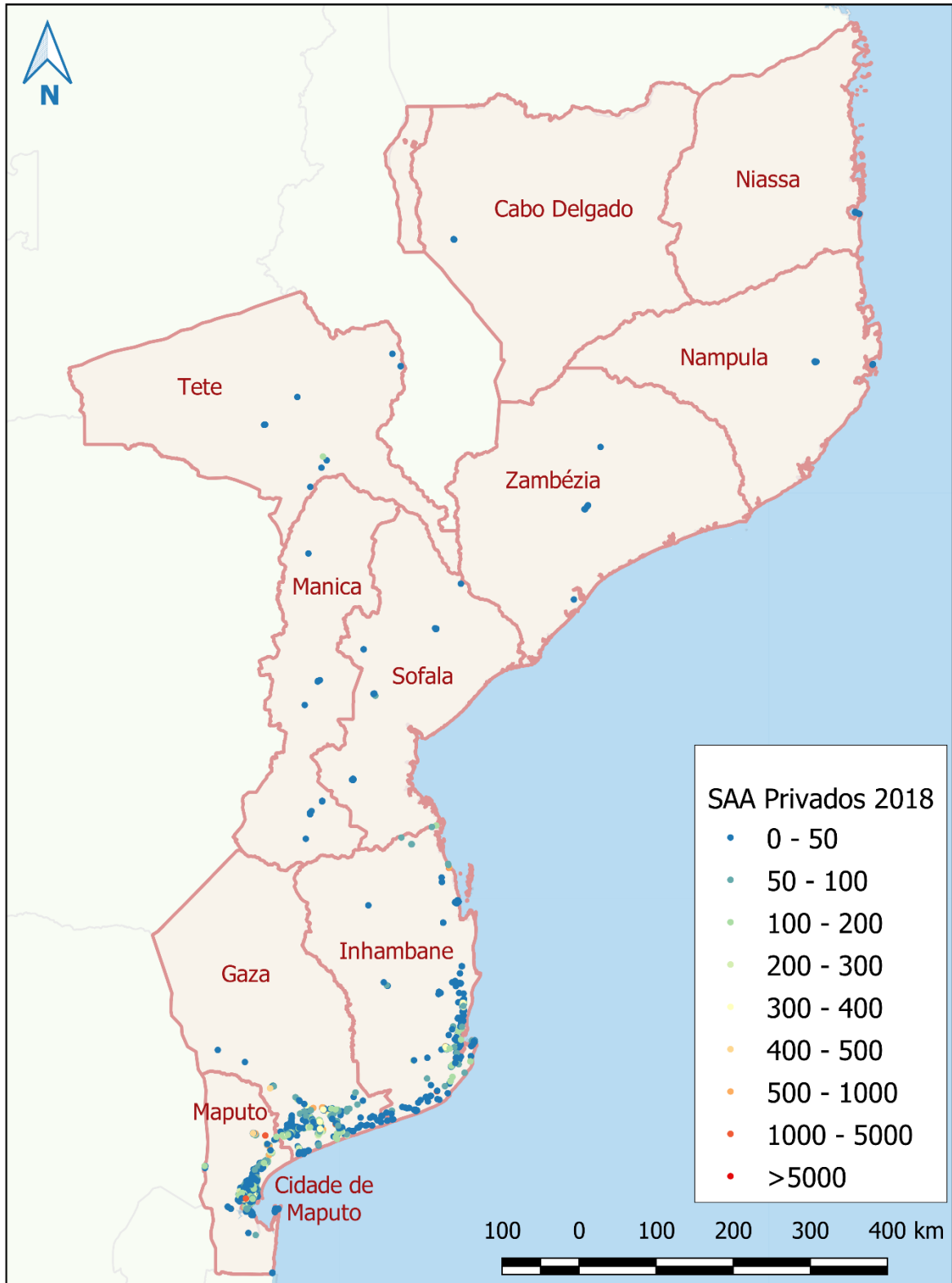
To enable all PWP to be covered, the survey was conducted in close collaboration with Government institutions and local authorities at provincial, district, administrative post and locality levels. Also established were contacts with supplier associations, local organizations, projects, partners at various levels and community leaderships, with a view to gaining more systemic and accurate information.

One of the main shortcomings of the survey is the fact that local governments outside the cities of Maputo and Matola have little knowledge of the existence of PWP, which is why some of them may have been excluded from this survey. However, other actors have been consulted extensively in order to largely redress this constraint. In addition, the PWP had difficulties in providing reliable information on investments, revenues, expenses, quantity of water produced and sold, as well as on the actual number of home connections. This problem is partly due to a lack of awareness of the importance of providing this information, but also to their poor capacity in terms of information management.

A total of 1.503 Private Water Providers and a total of 1.830 private water supply systems have been registered in the 11 provinces (Map 1). 1.734 systems were registered in the country's southern provinces (95%), 61 in the centre provinces (3%) and 35 in the northern provinces (2%). The 1.503 PWP supply about 1.762.560 consumers by means of 352.512 home connections. About 99% of the consumers are to be found in the country's southern provinces. Apart from the home connections there are 818 standpipes supplying around 14.000 people nationwide. The number of consumers per standpipe cannot be considered very reliable because users are not systematically registered and it is not possible to make a reliable extrapolation based on the national parameter of 300 persons per standpipe. Based on this extrapolation (300 persons per standpipe), the number of consumers served by PWPs including standpipes is around 2.000.000.

A web map was produced with the main data from the surveyed private WSS, accessible at the following address:

<https://kc.humanitarianresponse.info/castelo/forms/aaKzbudmy4qLQrvMJWEVC8/map>



Map I- Private Water Supply Systems Mapped in 2018

Of the 1.503 PWP in the country, about 15% are of women, showing their active participation in investment in this sector. In addition, PWP across the country employ approximately 2.640 workers, 20% of whom are women.

The main source for funding investments are the own resources of the owners of the system. In fact, 90% of the investments have been made using own funds, 4% used bank loans and about 5% took recourse to other financing mechanisms, mostly investments by philanthropic institutions and some by the District Development Fund (FDD).

Only 19% of all private WSS in the country have some type of license. Of these, 4% have a water exploitation license issued by local water resource management authorities, in particular the Regional Water Administrations (ARAs), while the remaining 15% have licenses issued by local (provincial, district, municipal) governments. A large part of the exploration licenses has been issued to WSS in the south, mainly in the province and the city of Maputo, while a significant part of these licenses has already expired. The licensing process under Decree 51/2015 has not yet begun and few WSS are aware of its necessity. At the time of the survey, the sector authorities were starting a process to widely disseminate information concerning the need of obtaining licenses.

The main water source for private WSS is groundwater, produced through boreholes and a small percentage of wells. In fact, about 99.6% of all private WSS have boreholes as a water source. Another very small proportion uses protected springs. In terms of energy sources, the main source used by private WSS is electricity from the national grid provided by EDM. In fact, 89% of private WSS use energy supplied by EDM, 9% use generators and only 2% use solar panels.

In general, the water provided is of good quality. In fact, about 99% of the private WSS supply water that is within the salinity parameter recommended by the World Health Organization (WHO) of 0 to 1.500 mS/cm (milliSiemens per centimeter). However, 27% of private WSS did not carry out any water quality tests at the start of supplying and also not during the supply process. On the other hand, 5% of the private WSS in the cities of Maputo and Matola are possibly affected by sources of water contamination, mainly latrines constructed upstream of the boreholes. Water is only treated by 27% of private WSS, with the most common form of treatment being chlorination (carried out by 97% of WSS who reported doing some kind of water treatment).

Only 36% of the PWP are members of associations, which corresponds to 662 providers. Of these, about 97% are members of AFORAMO, a national association currently only representing providers in the southern part of the country, while the remaining 3% are members of small associations such as AMATI, UNIFOPA and the Manhiça Providers Association.

The quality of the information on system management is poor, and a reliable analysis of the situation is not possible. During the survey, it was not possible to contact the owners of the systems (mainly in the provinces of Maputo, Gaza and Inhambane) because they were not present. Management records are very limited and in many cases, were not made available by managers.

The main recommendations of the survey are the following:

- Make the PWP database available to each district/municipality and promote trainings so that the technicians at these levels can systematically update the information. The current database is complicated and therefore one should consider simplifying it, i.e. leaving only aspects that are relevant to local licensing decisions.
- Promote a broad awareness campaign for PWP, focusing on the importance of licensing their activities and on the need to test water quality on a regular basis.



- Promote management capacity building. This should be seen from a long-term perspective, according to which the licensed PWP should be taxed on the basis of their revenue. At the same time, and within the context of private sector development, capacity building is of the utmost importance in that it can strengthen the capacity to deliver services and, in certain cases, lead to more efficiency in the operation and reduce costs for the end consumer.
- Promote associativism among the PWPs. Under the present circumstances it is difficult to approach the PWP problematic in a comprehensive way because they are separate private entities. Within the scope of the survey, it was clear how useful associations are in mobilizing and identifying members.

# I INTRODUCTION

The Program for Supporting the Policy Environment for Economic Development (SPEED+), AID-656-TO-16-00005, was signed on 24 August 2016. SPEED+ is a four-year program aimed at supporting economic and structural policy reforms through four main components: (1) Agriculture, (2) Trade and Business Environment, (3) Energy and Water, and (4) Biodiversity Conservation. Within Component 3, Energy and Water, and being part of the first year of its work plan, SPEED+ is working with the National Directorate for Water Supply and Sanitation (DNAAS) to implement the Licensing Regulation for Drinking Water Supply by Private Suppliers (Decree 51/2015).

To support the implementation of Decree 51/2015, SPEED+ is working with DNAAS to develop a mapping using Geographic Information Systems (GIS) and a database containing an inventory of private providers in Mozambique, which is needed to support the government in obtaining the information necessary for issuing licenses within the scope of the implementation of the Regulation.

Although institutions of the water supply and sanitation sector in Mozambique, such as DNAAS, have in the past registered and listed private providers (within the SUWASA Project in 2013), the existing data are outdated and incomplete: new water providers entered the market, thus there are new systems to be surveyed and integrated into the National Water Supply and Sanitation Information System (SINAS). In order for private providers to formalize their activities and obtain licenses, a thorough survey is required to obtain information and data that will provide the licensing authorities with all information necessary for deciding whether or not to issue licenses.

This report presents the results of the survey of the Water Supply Systems of Private Water Suppliers, carried out throughout the country, as a corollary of the contract signed between UMC Consultores, Lda. and DAI, under the USAID SPEED+ Program. The report was prepared by UMC Consultores and is the final output to be provided within the scope of this consultancy.

## 2 OBJECTIVE AND SCOPE OF THE CONSULTANCY

According to the Terms of Reference (see Annex 1), the main objective of this consultancy is to conduct a survey of private water providers operating in different parts of Mozambique, with a view to collect relevant data that will provide all information required by the licensing authorities for issuing licenses under Decree 51/2015.

Specifically, the consultancy pursues the following objectives:

- Analyse the database developed by SUWASA in 2013 and the database developed by other institutions such as ARA-Sul, municipalities and by associations of existing PWP in the country, to verify the type of information that has been collected, its availability and additional information requirements;
- Analyse and make recommendations for improving the questionnaire developed by DNAAS and SPEED+ for the survey of the water supply systems of private providers;
- Contact the private providers associations (e.g. AFORAMO, AMATI) to ensure their collaboration by providing information to their members about the importance of the survey, and by providing the contacts of the suppliers to be surveyed;
- Develop a complete list of providers to be surveyed, based on the information provided by DNAAS, ARA-Sul, municipalities, donors, other government agencies and company contacts;
- Conduct a survey of data from private water providers throughout the country;
- Produce an electronic database of PWP respondents. The database should allow for filtering using different criteria;
- Recommend the web mapping platforms that allow for the mapping of geographical coordinates and other PWP information in the surveyed areas;
- Produce a GIS map visualizing the existing PWP (and selected PWP information) in selected areas of the survey. Web mapping software, if necessary, may not be open source (e.g. ArcGIS) provided that the output data is in a format that allows its use by any other systems;
- Deliver the database to DNAAS and ensure that DNAAS technicians know how to use and update it, the information it contains, the software and any other necessary update of the database;
- Produce an electronic database of PWP respondents. The database should allow for filtering using different criteria.

The information to be collected in the survey will be integrated in an electronic database and linked with a map indicating the geographical coordinates of the Private Water Providers (PWP) in Mozambique.

The main products of this consultancy are the following:

- a. An initial report containing a detailed analysis of the questionnaire and existing PWP databases and defining the methodology and work plan for the collection of national data, including the final proposal of the questionnaire and the database for this survey;

- b. A complete electronic database and associated maps. The database should include all information and data per item described in the PWP questionnaire in the selected areas;
- c. A final report presenting the main findings and recommendations of the survey and the analyses of the existing instruments (database and questionnaires).

## 3 METHODOLOGY

### 3.1 GENERAL METHODOLOGY

The main aspects of the methodology used for the survey of private WSS throughout the country are the following:

- Consultation with key stakeholders at central, provincial and district levels - to collect relevant information on private WSS, including their existence, organization and the main aspects to be taken into account in the mapping;
- Review of existing PWP documentation - to gain insight into the context (legal, strategic, and situational). The collected and analysed information includes relevant legislation and strategies concerning private sector participation in water supply approved in recent years, previous surveys and other documentation that systematically addresses water supply by private operators. Also analysed were the questionnaire and the database of the SUWASA project - on the basis of this information the necessary adjustments were made to respond to the terms of reference of this consultancy;
- Data collection - nationwide and taking into account the preliminary information on the existence of PWP in the country's districts and municipalities. Data were collected by a team of interviewers using technologies and methodologies that allow for the gathering of reliable information from all sides. Where possible, data that depended on the records and responses of private WSS were triangulated so as to obtain information as accurate as possible;
- Data analysis and output production - all data collected were organized into a database and analysed, taking into account the main objectives of the study. A set of outputs has been produced, including maps representing the various main aspects of the current situation of PWP and WSS throughout the country;
- Presentation of results and products - all data analysed and outputs produced were compiled into reports that have been discussed with the client. The results of all comments are compiled into a final report to be delivered to the client (the present draft of the final report is part of this process). In addition to the report, the complete database of private WSS and all produced maps are presented to the client.

### 3.2 DATA COLLECTION METHODS

#### 3.2.1 Organization of data collection

The Terms of Reference estimated that there are about 3.500 Water Supply Systems of Private Water Providers nationwide, with 2.000 located in the country's southern provinces, 750 in the centre provinces and 750 in the northern provinces. The data were collected simultaneously in the three regions, and involved about 12 interviewers distributed in 4 teams, 2 of which in the south, 1 in the centre and 1 in the north.

In operational terms, and in order to allow for all PWP to be covered, the work was carried out by contacting local government institutions and authorities at provincial, district, administrative post and locality levels. Contacts with local organizations, projects and partners at different levels were also established in order to obtain more systemic and accurate information. These contacts enabled the supervisors to compare preliminary data on the existence of PWP with local authorities on the ground prior to the start of the survey.

At provincial level the teams introduced themselves to the Provincial Directorates of Public Works, Housing and Water Resources, ARAs, Municipal Councils and PWP Associations, where these exist, and provided a detailed explanation of the purpose of the survey and, where necessary, received authorization at these levels to pursue their work. While meeting these institutions information was shared on preliminary data concerning the existence of PWP.

At district level, the teams also introduced themselves to the DGs/SDPIs, administrative posts and localities where preliminary data indicated the existence of an PWP. At this level the initial data were also presented and more information were obtained so that all private water suppliers could be registered.

Prior to the start of the survey, the interviewers and supervisors received a 3-day training from 30 April to 02 May 2018 in Maputo, in order to ensure the uniformity of expertise of and approach to data collection. Data were collected nationwide from 14 May to 08 August 2018.

### **3.2.2. Data collection using smartphones and linked to the data base**

An online platform for data collection, using tablets, was used. The data collected by the interviewers were automatically submitted and stored in a database, and automatically verified based on criteria pre-established daily by the authorized manager. At that point, possible data losses were eliminated and corrected to reduce errors to its minimum values in the field.

The data were sent on a daily basis to the data-viewing platform winners, which allowed for follow-up and sending feedback to the interviewers with possible errors of information input; this platform was updated and finally generated a database in CSV format that can be converted into any statistical data analysis package.

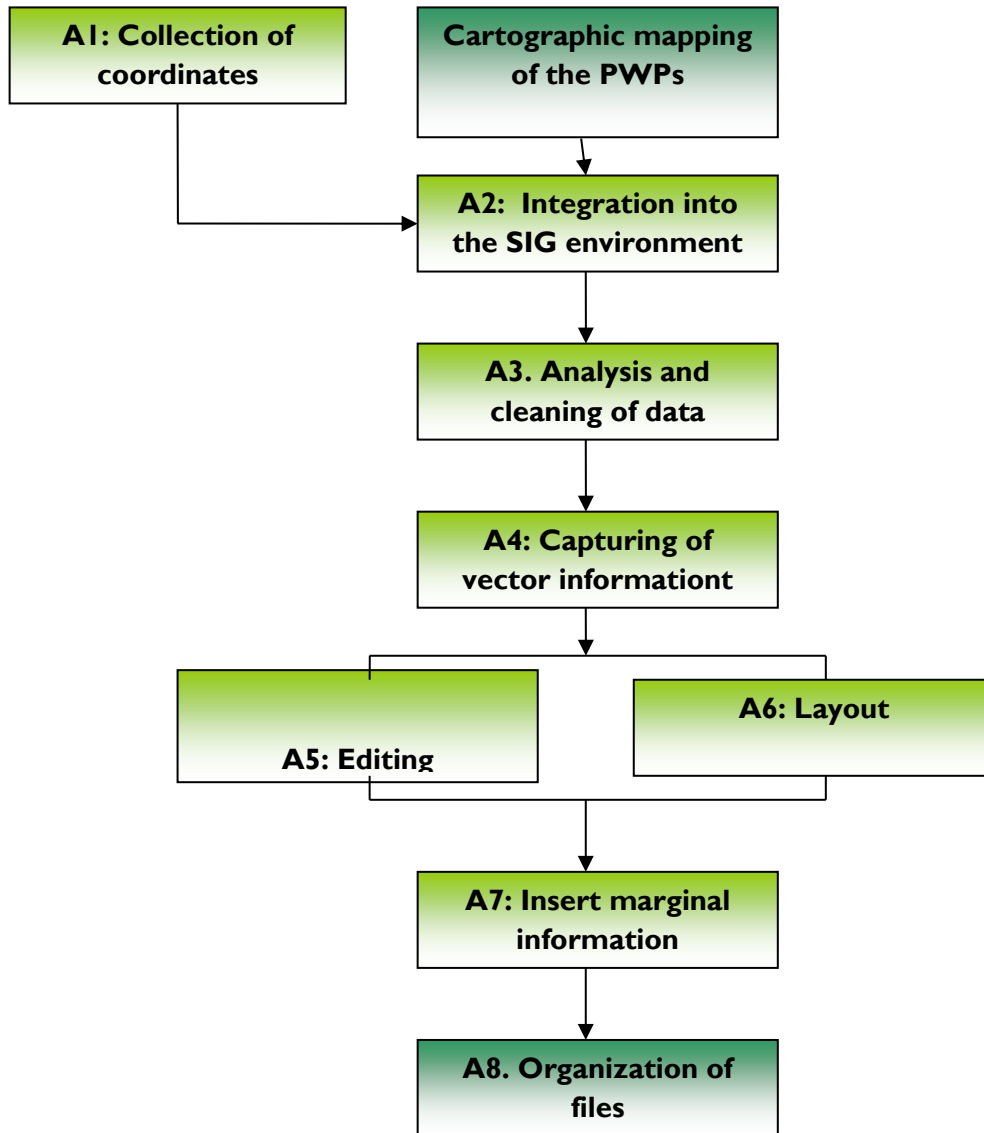
For the present survey the data were analysed and processed in SPSS and Excel to generate the tables and graphs that are part of this report.

### **3.2.3. Collection of geographical coordinates for the mapping**

Well-known conventional methods were used based on the field survey using the Global Positioning System (GPS) and a tablet.

The coordinates were obtained directly from the geographic coordinate system for the WGS84 ellipsoid, based on the Tete *datum* in use in Mozambique. The methodology used is described in the diagram below. The methodology considers a series of phases, each with concrete technical specifications that are part of the activities coordinated and oriented towards guaranteeing a product with the desired characteristics and accuracy.

Methodology Chart



### 3.3.4 Preparation and Representation of the Cartographic Documents

The cartographic documents were prepared by integrating the data in the GIS (**Geographic Information System**) environment through a set of ArcGis and/or Quantum GIS software tools, the latter being open source.

Cartographic documents do not have any vector information overload, only a minimum of annotations and inscriptions, namely: name of the district/municipality/city, administrative post, grid of coordinates, logo, graphical scale, indication of projection and of ellipsoid reference as stated in the terms of reference. All master data collected were kept for future use.

### 3.2.5 Guarantee of data quality

*Supervision:* each team of interviewers had a supervisor who ensured both time management and the quality of the data. Supervisors were responsible for the collection of qualitative data and also for the coordination of the information flow and the continuous verification of the data in the questionnaires.

*Data management:* the database was generated automatically during the design of the questionnaire on the platform. The platform also incorporated the verification of data quality.

### 3.3 DATA ANALYSIS

The data were analysed taking into account all the relevant aspects that are intended to be touched upon in the survey, in particular to respond to the most important aspects constituting the main objective of this exercise from the point of view of the sector.

The collected data were preliminarily checked for consistency and whether the geographical coordinates correspond to the area or location where they were collected, and subsequently it was verified whether all technical data were correctly captured (digit verification, parameter units and their significance). Subsequently the data were analysed using the Geographic Information System (GIS) and SPSS so as to offer rapid analyses of the key indicators and to produce the necessary outputs.

The maps were produced as indicated in section 3.2.3 and they complied with all relevant technical specifications. The different aspects were represented through predetermined polygons and colours, taking into account the different aspects to be represented. Clear and concise headings guide the effective reading of the maps. The maps also included the logos of the institutions in question.

A web map was produced with the main data of the surveyed private WSS, to be accessed from the address: <https://kc.humanitarianresponse.info/castelo/forms/aaKzbudmy4qLQrvMJWEVC8/map>



## 4 MAIN CONSIDERATIONS OF THE SURVEY

### 4.1 QUALITY OF THE DATA

The survey process includes data that can be considered highly reliable while others are less reliable. All data relating to finance (investments, expenditure, revenue) and to technical aspects (type of piping, network diameter etc.) belong to the category of poor reliability data. Table I below provides details on the level of reliability of the data collected.

**Table: Quality of the collected data**

Description	Level	Comments
<b>Number of existing WSS and PWP</b>	High reliability	A large part of the WSS and PWP are registered and known by the authorities at all levels, including at community level.
<b>Location data</b>	High reliability	The collected geographic coordinates are reliable and have a maximum error margin of 10 meters.
<b>Technical information of the WSS</b>	Poor reliability	The people found in the WSS had little technical knowledge and knew little of the quantities used.
<b>Number of beneficiaries of the systems</b>	Reasonable reliability	There was a tendency to hide data because these are linked to income.
<b>Quantity of the water produced</b>	Poor reliability	A large part of the WSS does not have meters to quantify the water produced and distributed.
<b>Quantity of the water delivered</b>		
<b>Water quality</b>	High reliability	Conductivity and pH were tested and the data can be considered reliable.
<b>Investment costs and revenue</b>	Poor reliability	PWP had difficulties in providing financial data.
<b>Geographic coverage of the WSS (4 points, boreholes, deposits)</b>	High reliability	Where it was possible to collect the coordinates, these are reliable.

### 4.2 MAIN CONSTRAINTS IN THE MAPPING PROCESS

During the field work some constraints were found, among which the following stand out:

- ✓ Local government's (province, district, municipality) poor knowledge of reality, which may have contributed to some private WSS being left out of the survey. Meanwhile, the survey team made every effort to obtain comprehensive information, having contacted all relevant actors at all levels.
- ✓ The mapping process involved the DPOPHRH, SDPIs, municipalities, local authorities and influential people at all levels. However, even with authorized interviewers accompanied by local leaders, 11 (eleven) PWPs declined to provide the data for registration.

- ✓ Absence of owners that could provide data forced the team to complete some data using the telephone; however, in some cases it was impossible to completely obtain relevant data on financial matters;
- ✓ Poor mastery of financial information concerning expenses and revenue of private WSS by the managers;
- ✓ Many systems that in the past were independent today are interlinked. Multiple boreholes to provide a single system; this happens in the cities of Maputo and Matola;
- ✓ Some Private Providers failed to provide water due to the expansion of the FIPAG network, This concerns 10 PWP, 4 in the neighbourhood Liberdade and 6 in Sikuama. On the other hand, 8 WSS of Private Providers in the Magoanine neighbourhood were damaged by floods.
- ✓ In a significant part of the systems it was impossible to obtain the coordinates of the four most distant points, due to various factors, among them: (i) the customers' layout does not allow for 4 points, (ii) systems without home connections and only one standpipe, (iii) the owners did not allow these coordinates to be registered.

## 5 PRESENTATION OF THE RESULTS

### 5.1 NUMBER OF WSS AND ESTIMATE OF CONSUMERS

A total of 1.830 private water supply systems were registered in 11 provinces nationwide. Of this total 1.734 systems were registered in the country's southern provinces, 61 in the centre provinces and 35 in the northern provinces.

Data from the survey indicate that the 1.830 WSS supply about 1.762.560 consumers by means of 352.512 home connections. Apart from the home connections there are 818 standpipes supplying around 14.000 people nationwide. The number of consumers per standpipe cannot be considered very reliable because users are not systematically registered and it is not possible to make a reliable extrapolation based on the national parameter of 300 persons per standpipe.

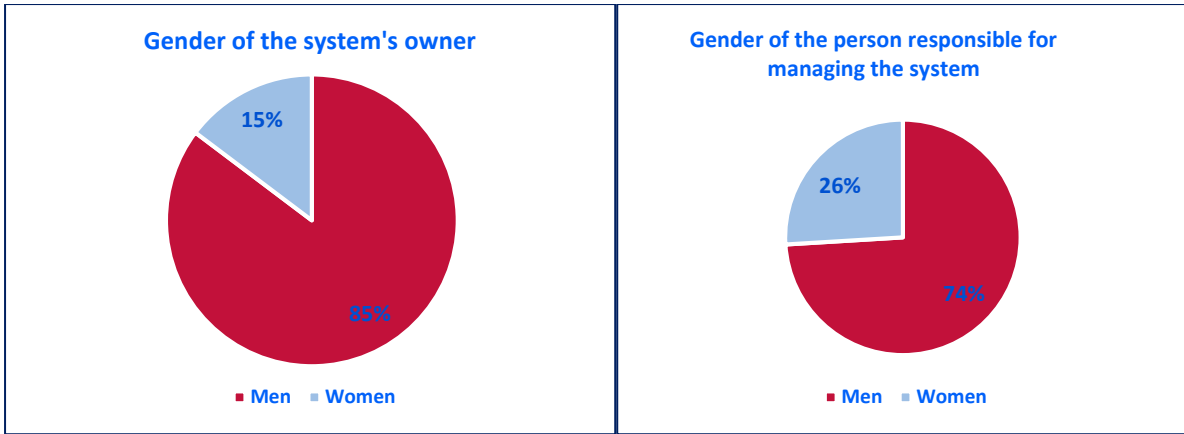
In terms of coverage, the country's southern provinces have a larger number of private WSS, representing 95% of the number of providers in the country, while the centre and the northern provinces represent 3% and 2%, respectively.

Overall, this number of private WSS is well below the estimates made in the Terms of Reference, which indicated 2.500 to 3.500 systems. The estimate of WSS existing in the central and northern regions is shown to be much higher than what actually exists. The estimate of 1.500 to 2.000 WSS in the south was practically confirmed.

**Table 2: Total number of registered WSS and beneficiaries per province**

Province	# of Districts with PWP	# of mapped WSSP	# of Home Connections	# of Standpipes	Estimate of consumers with household connection
Niassa	1	3	45	1	225
Cabo Delgado	1	21	8	19	40
Nampula	2	11	170	8	850
<b>Subtotal North</b>	<b>4</b>	<b>35</b>	<b>223</b>	<b>28</b>	<b>1 115</b>
Zambézia	3	8	2	9	10
Tete	5	13	155	13	775
Manica	4	17	140	19	700
Sofala	5	23	82	31	410
<b>Subtotal Centre</b>	<b>17</b>	<b>61</b>	<b>379</b>	<b>72</b>	<b>1 895</b>
Inhambane	13	281	20 942	230	104 710
Gaza	9	399	39 625	234	198 125
Province of Maputo	7	746	177 982	169	889 910
City of Maputo	5	308	113 361	85	566 805
<b>Subtotal South</b>	<b>34</b>	<b>1 734</b>	<b>351 910</b>	<b>718</b>	<b>1 759 550</b>
<b>Total</b>	<b>55</b>	<b>1 830</b>	<b>352 512</b>	<b>818</b>	<b>1 762 560</b>

In terms of gender, 85% of the WSS are owned by men and 15% by women, showing the considerable intervention of women in water sector investments. With regard to managers, women represent 26% of these, as against 74% by men.



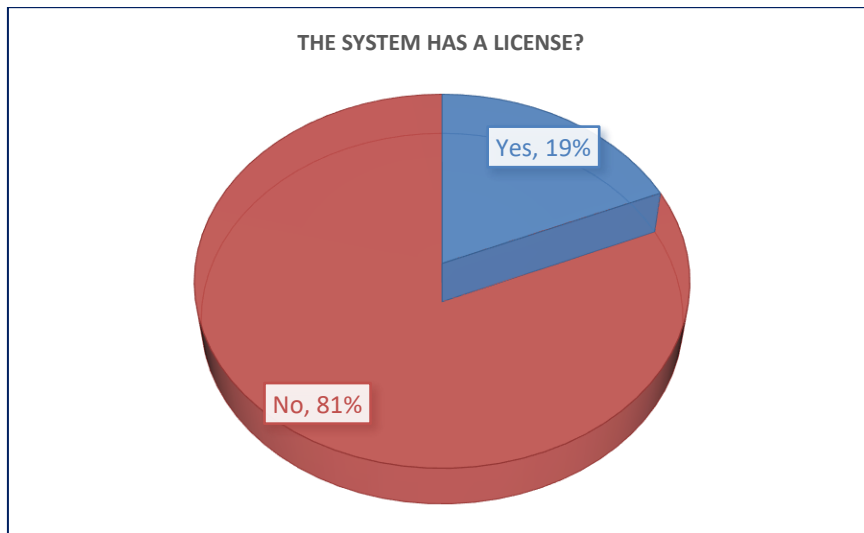
**Figure 1: Gender of the owner and of the person responsible for managing the system**

The total number of PWP in the country is 1.503, of which 18% are women. Only the provinces of Nampula and Zambézia do not have PWP that are women. Niassa, Cabo Delgado and Tete have one female PWP each, Manica has 7, Sofala 5, Inhambane 45, Gaza 51, the city of Maputo 67 and finally the province of Maputo has 95 PWP that are women, totalling 270.

The total number of people employed by PWP is 3.316 workers, 2.638 of whom are men and 678 women. Women account for about 20.5% of the total number of workers involved in the private water supply business.

## 5.2 NUMBER OF LICENSED PRIVATE WSS

Only 19% of all private WSS in the country indicated having a license. Of these, 4% have a water exploitation license issued by local water resource management authorities, in particular the Regional Water Administrations (ARAs), while the remaining 15% have licenses issued by various local (provincial, district, municipal) governments. A large part of the exploration licenses is to be found in the south, mainly in the province and the city of Maputo, while a significant part of these licenses has already expired.



**Figure 2: PWP with some kind of license**

### 5.3 PWP THAT ARE MEMBER OF AN ASSOCIATION

Only 36% of the PWP are members of associations, which corresponds to 662 providers. Of these, about 97% are members of AFORAMO, a national association that currently represents only providers in the southern part of the country.

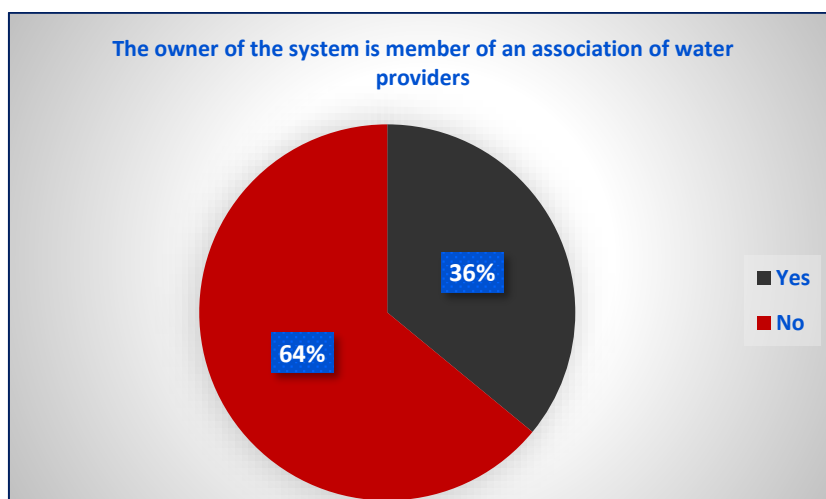


Figure 3: Association membership

### 5.4 MAIN WATER SOURCE FOR PRIVATE WSS

The main water source for the WSS is groundwater, produced through boreholes and a small percentage of wells (in Sofala, Zambézia and Inhambane some systems were found whose sources are protected wells). In fact, about 99.6% of all WSS from private suppliers have boreholes as a water source. A very small proportion uses protected springs (in Ressano Garcia, Province of Maputo).

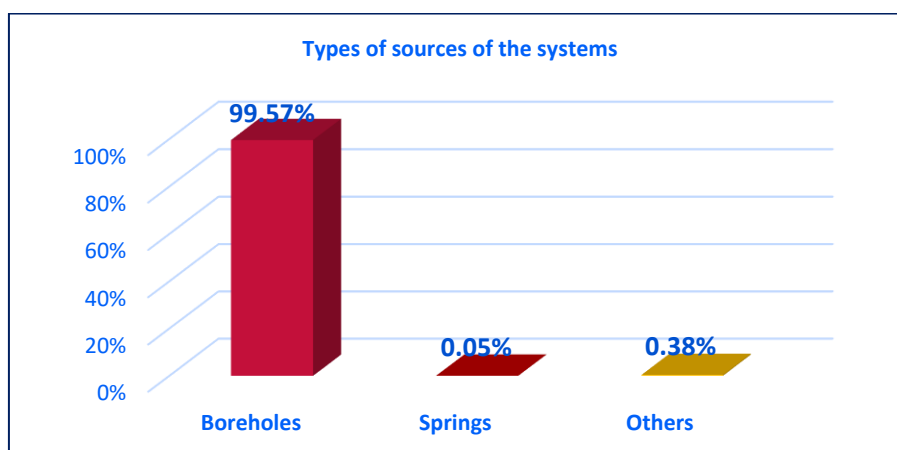


Figure 4: Type of water source of the systems

#### 5.4.1 Which are the largest PWP (by number of clients)?

The following table presents the 10 largest PWP in the country, by number of clients. All these PWP are located in the province and city of Maputo.

Name of the PWP	# of WSS	Total number of home connections	Number of active home connections
Macharque Ussene Mussagy Ali	10	76,825	70,975
Gawat	33	9,036	8,703
Nelson Ernesto Cumaio	4	8,336	6,756
Pedro Samuel Muholove	1	6,000	5,200
João Cabo	6	5,118	4,787
Hermenegildo Viriato	6	5,025	4,482
Leonardo Sainda Mudaula	4	4,650	3,500
Calmo Alberto Mwalane	15	4,419	3,688
Serafim Albano Maposse	1	4,000	2,500
Eduardo Silva Cabo	2	3,800	3,000

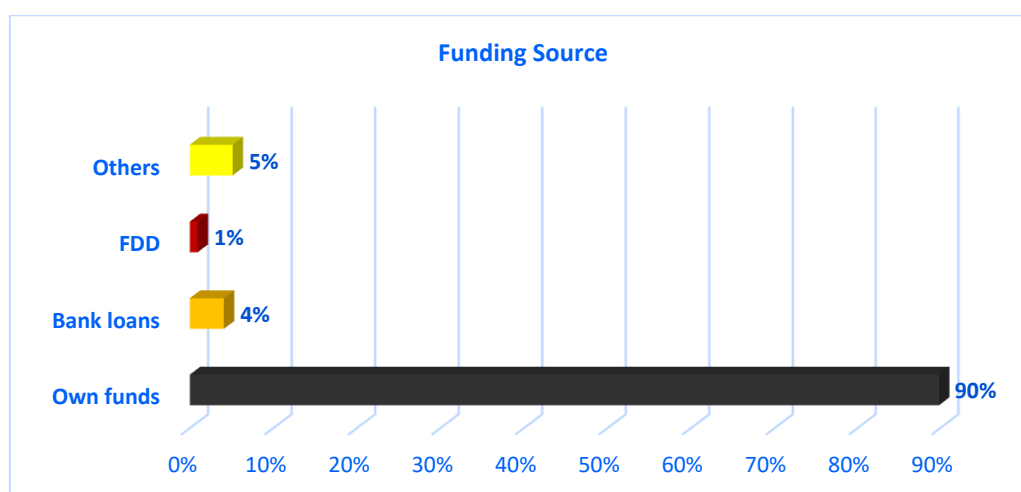
**Table 3: The 10 largest PWP of the country, by number of home connections**

The analysis of the available information shows that, although the PWP Macharque Ali has the largest number of home connections, the supplier GAWAT may, in total, have a larger number of consumers (clients). Its investments mainly cover direct pumping systems and standpipes, and neighbourhoods without other alternatives. This PWP should deserve more scrutiny, given that the information about its activities is not very reliable.

## 5.5 FUNDING SOURCES FOR INVESTMENTS

The main source of investment financing consists of the system owners' own resources. In fact, 90% of the investments have been made using own funds, 4% used bank loans and about 5% used other financing mechanisms, which mostly include investments made by philanthropic institutions.

An important aspect to take into account is that the District Development Fund (FDD) has also supported the funding of some PWP, that is, public resources have been made available to the private sector to develop local businesses.



**Figure 5: Funding source for the initial investment**

## 5.6 WATER QUALITY

Water quality tests have been carried out in practically all WSS, focusing on two parameters: electrical conductivity and pH.

Overall, the water provided is of good quality. In fact, about 99% of the systems provide water that is within the salinity parameter (0 to 1,500 mS/cm) recommended by the World Health Organization (WHO).

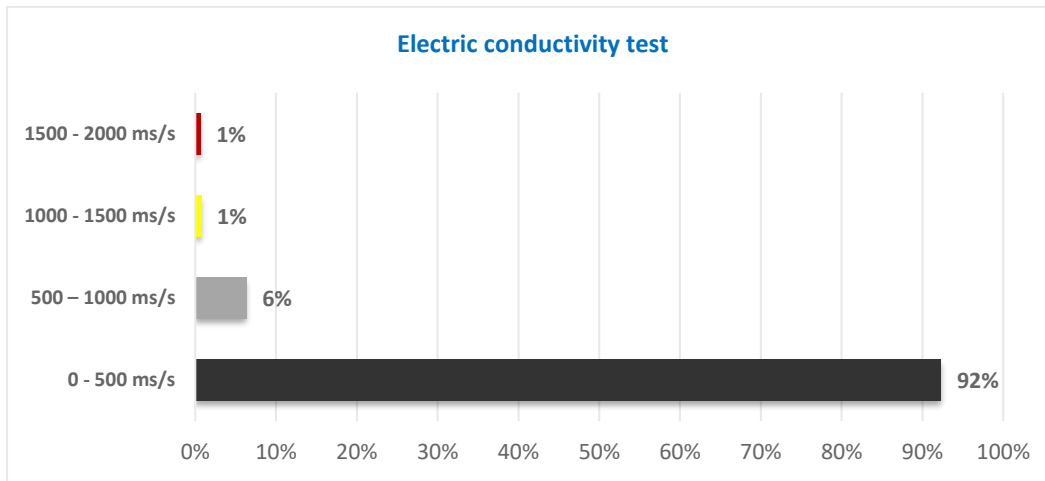


Figure 6: Water quality (electric conductivity)

As far as pH is concerned, the results of the water tests are presented in the figure below.

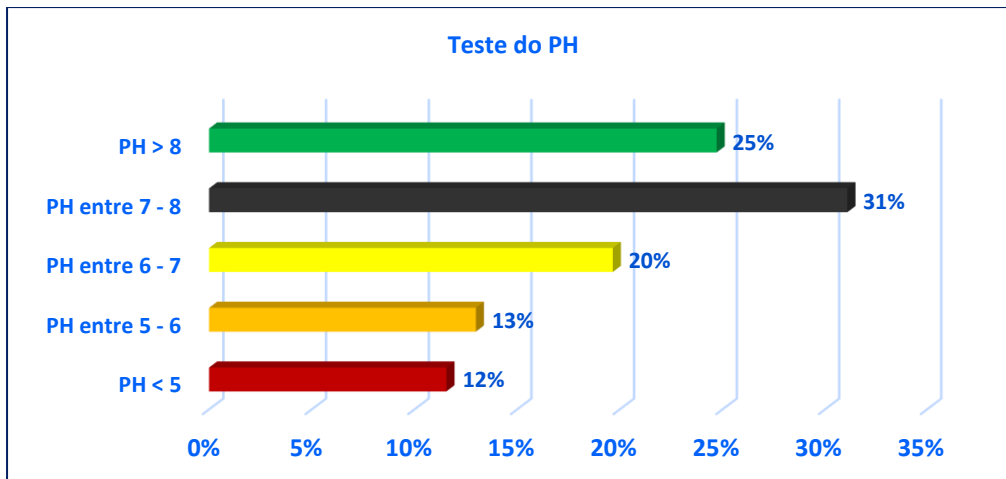


Figura 7: Qualidade de água (pH)

Much of the water provided by the private WSS is of good quality in terms of acidity/alkalinity levels. According to the WHO water quality standards, good quality water should have a pH between 6 and 9.2.

## 5.7 MAIN ENERGY SOURCE USED IN PRIVATE WSS

The main energy source used by private WSS in the country is electricity from the national grid, provided by EDM. In fact, 89% of private WSS use energy supplied by EDM, 9% use generators and only 2% use solar panels.

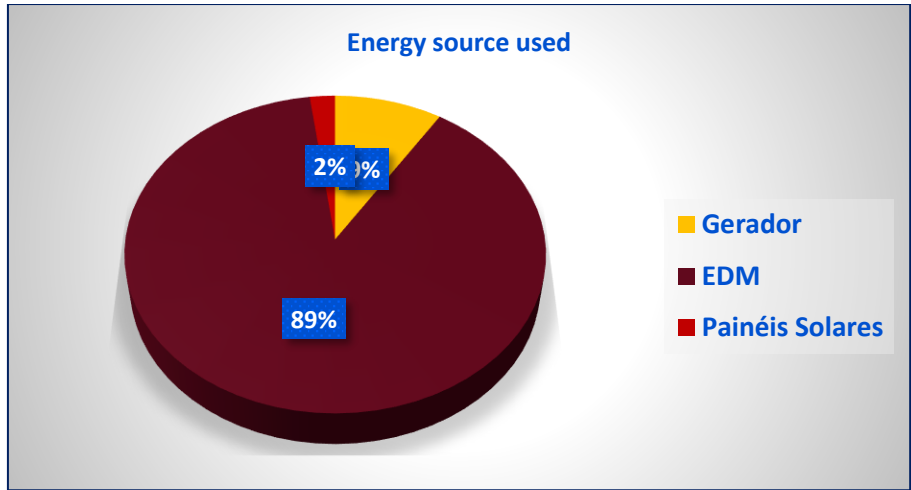


Figure 8: Energy source used

### 5.8 TYPE OF PIPING USED BY THE PWP (PIPES AND DISTRIBUTION NETWORK)

56% of the providers use copolene for the water intake pipe while 41% use PVC. For the distribution network the PWP use copolene (72%) and PVC (17%) pipes. A significant percentage of WSS (11%) use other types of piping. As stated in the survey report, technical information about the systems has a low level of reliability. Respondents did not master these aspects and the information presented here should be viewed taking this into account.

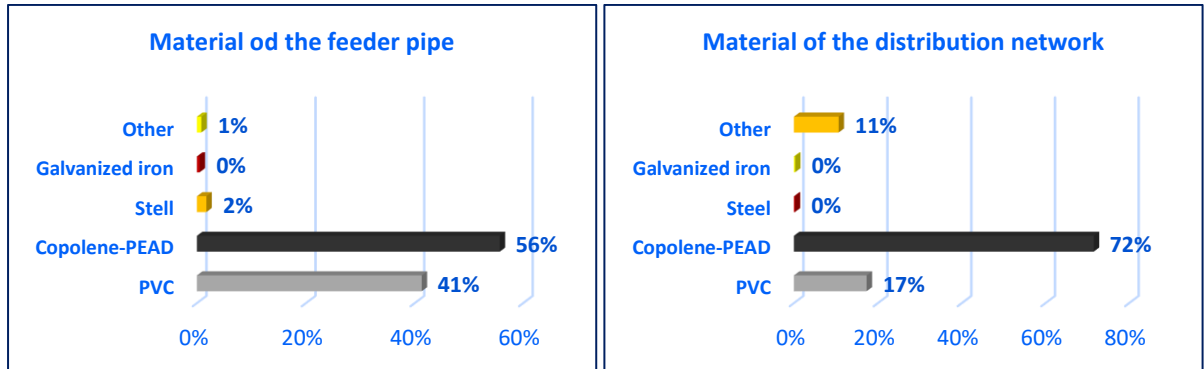


Figure 9: Material used for the feeder pipe and the distribution network

### 5.9 MATERIAL OF THE TANKS USED BY PRIVATE WSS

About 96% of the tanks used by private WSS are made of plastic and 4% of concrete. This technical information can be considered reliable since it is collected mostly through observation.



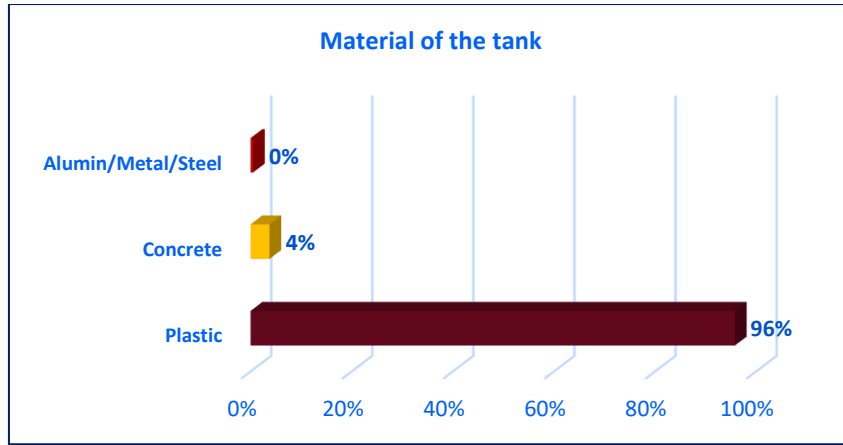


Figure 10: Material used for the tanks

5.10 MANAGEMENT OF THE WSS

Information about the management of systems is of very limited quality and a reliable analysis of the situation is not possible. During the survey, it was not possible to contact the owners of the systems (in particular in the provinces of Maputo, Gaza and Inhambane) because they were not present. Management records are very limited and in many cases, were not made available by managers.

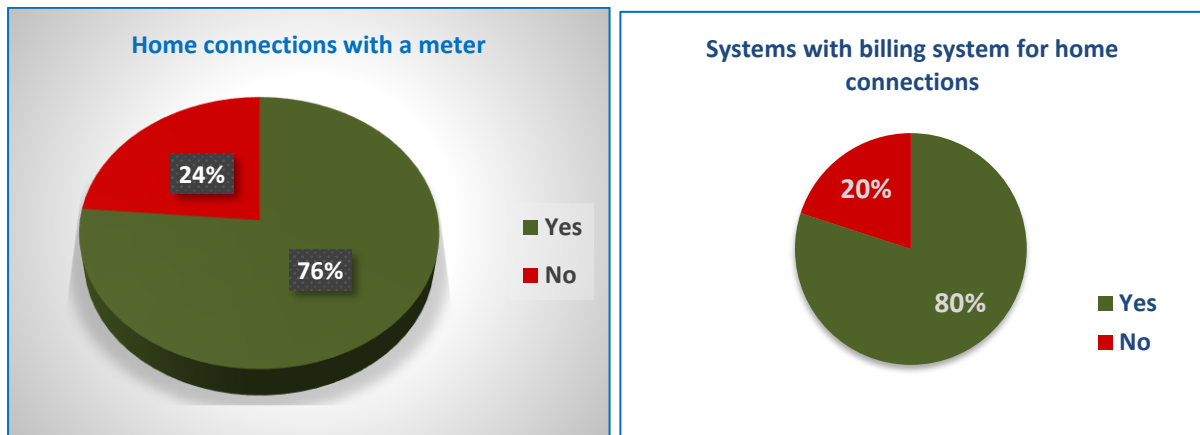


Figure 11: State of affairs concerning the meters and the billing system of private WSS

However, 76% of all existing home connections have a meter and 80% of the systems have a billing system for their customers.

Supply times for private WSS vary substantially, but a significant majority of the systems (more than 80%) supply more than 12 hours per day. There have been supply restrictions in about 20% of private WSS, the main causes of which relate to low storage capacity, restrictions on the supply of electricity and on production capacity (little water available from the sources).

## 6 PRESENTATION OF THE RESULTS BY MEANS OF MAPS

Within the scope of this study a set of maps was produced, as requested by the client. The main maps produced are the following, which are attached to this report:

### **Map of the country**

- Location of private WSS, including the boundaries of provinces and districts.

### **Maps of the regions (south, centre and north)**

- Location of private WSS, including the boundaries of provinces and districts.
- Identification of licensed and unlicensed private WSS.
- Identification of licensed private WSS with and without water quality problems for the measurement parameters.

### **Maps of the provinces**

- Location of private WSS, including the boundaries of districts and administrative posts.
- Identification of licensed and unlicensed private WSS.
- Identification of licensed private WSS with and without water quality problems for the measurement parameters.

### **Maps of the districts**

- Location of private WSS, including the boundaries of administrative posts and localities.
- Identification of licensed and unlicensed private WSS.
- Identification of licensed private WSS with and without water quality problems for the measurement parameters.

### **Web map**

- Location of private WSS with the main private WSS data collected, accessible from:

<https://kc.humanitarianresponse.info/castelo/forms/aaKzbudmy4qLQrvMJWEVC8/map>

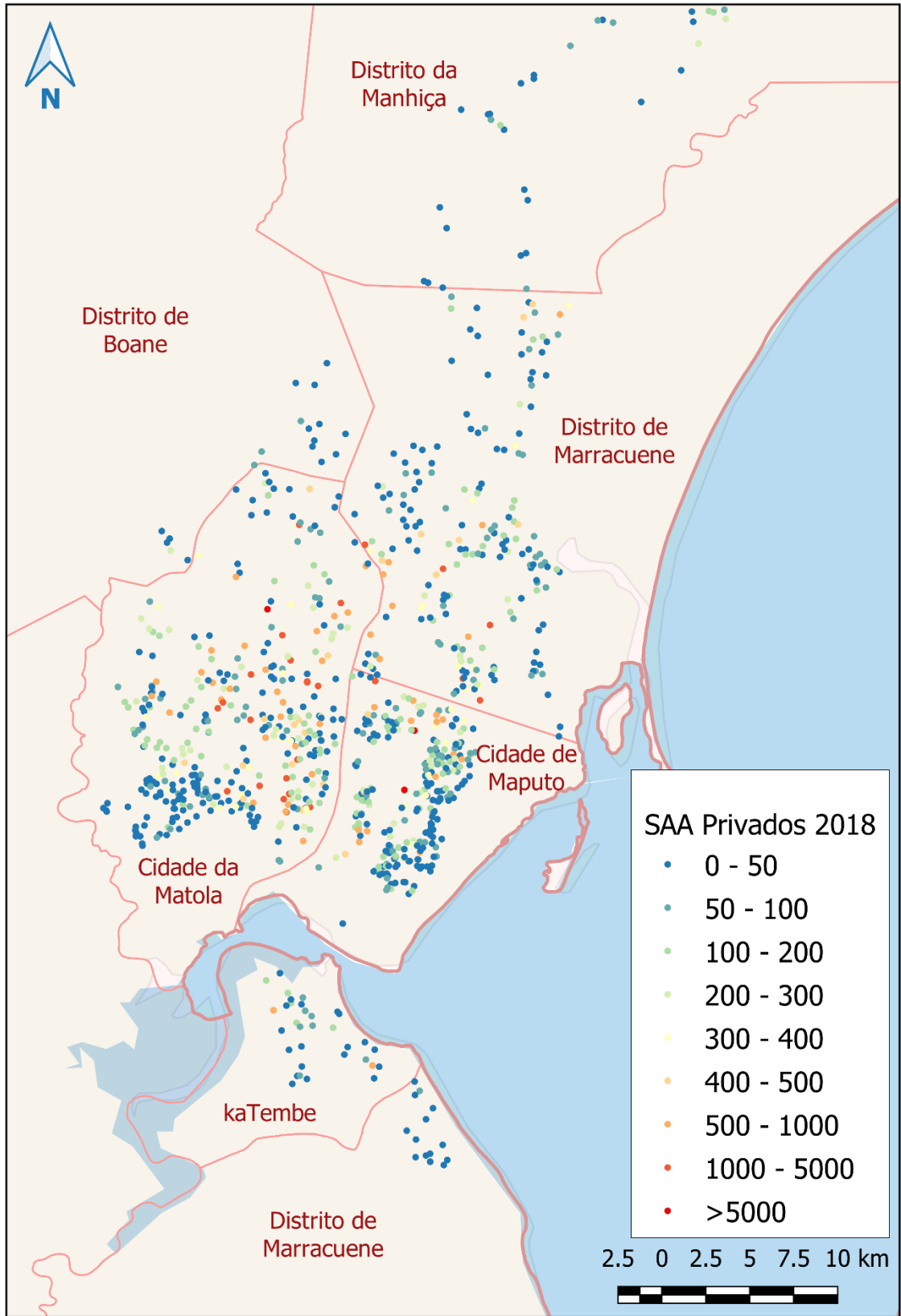
## 6.1 NATIONAL MAP SHOWING THE LOCATION OF PRIVATE WSS

Most private WSS are located in the country's south and along the coast. The main cities and towns in the south, where the majority of the population is concentrated, are located along the coast.



Map 2 – Location of private water supply systems in the country

The cities of Maputo and Matola account for about 60% of all PWP in the country. The PWP practically overlap one another, that is, they are concentrated practically in the same neighbourhoods or in the same villages. On the other hand, it is possible to find overlapping networks in some neighbourhoods and villages pertaining to public and private providers.

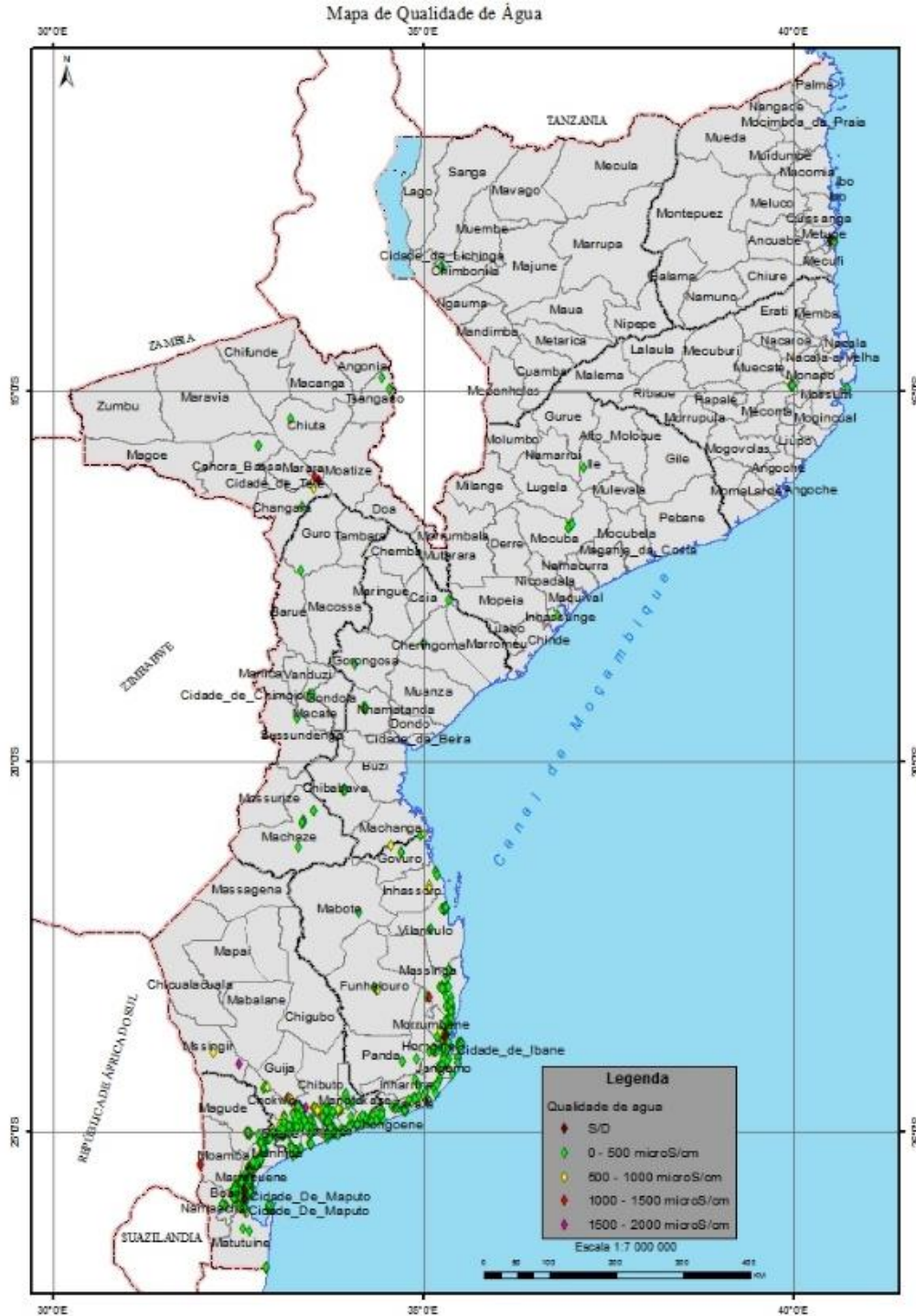


**Map 3 – Location of private water supply systems in the Maputo Region by number of connections**

## 6.2 NATIONAL MAP SHOWING WATER QUALITY

Water quality was analysed with respect to two parameters, namely electrical conductivity and pH. The map shows the water quality results with respect to the electrical conductivity parameter.

In terms of this parameter the water provided by private WSS is in general of good quality. However, 27% of private WSS did not carry out any water quality tests at the start of the supply and did not do so during the supply process. On the other hand, it was found that possible sources of water contamination affect 5% of the private WSS in the cities of Maputo and Matola, mainly caused by latrines constructed upstream of the water boreholes.

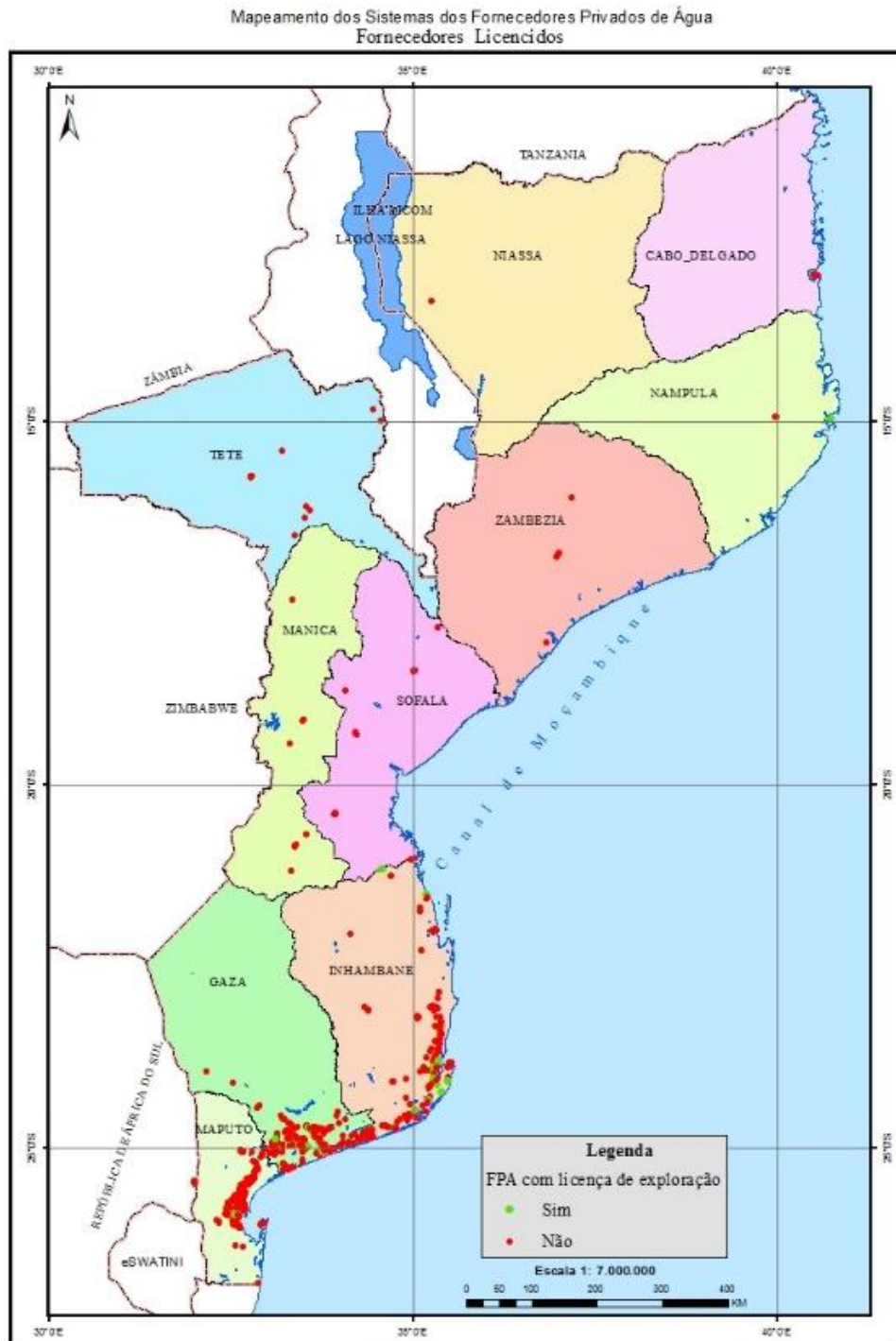


Map 4 – Water quality in private water supply systems (electric conductivity parameter – salinity indicator)

### 6.3 NATIONAL MAP SHOWING LICENSED PRIVATE WSS

Only 19% of private WSS stated to have some sort of license. Of these, 4% were issued by ARAs (Water Exploration Licenses) and the remaining (15%) by other local entities (provincial, district and municipal governments). Of those claiming to have a license, many were unable to present the relevant documentation. Most of the licenses that actually were presented turned out to be expired and the WSS in question have not yet renewed them or are in the process of renewing them.

In short, a large part of private WSS is operating without a water exploration license issued by the competent authorities. This is an important aspect to be taken into account in the planned licensing process.



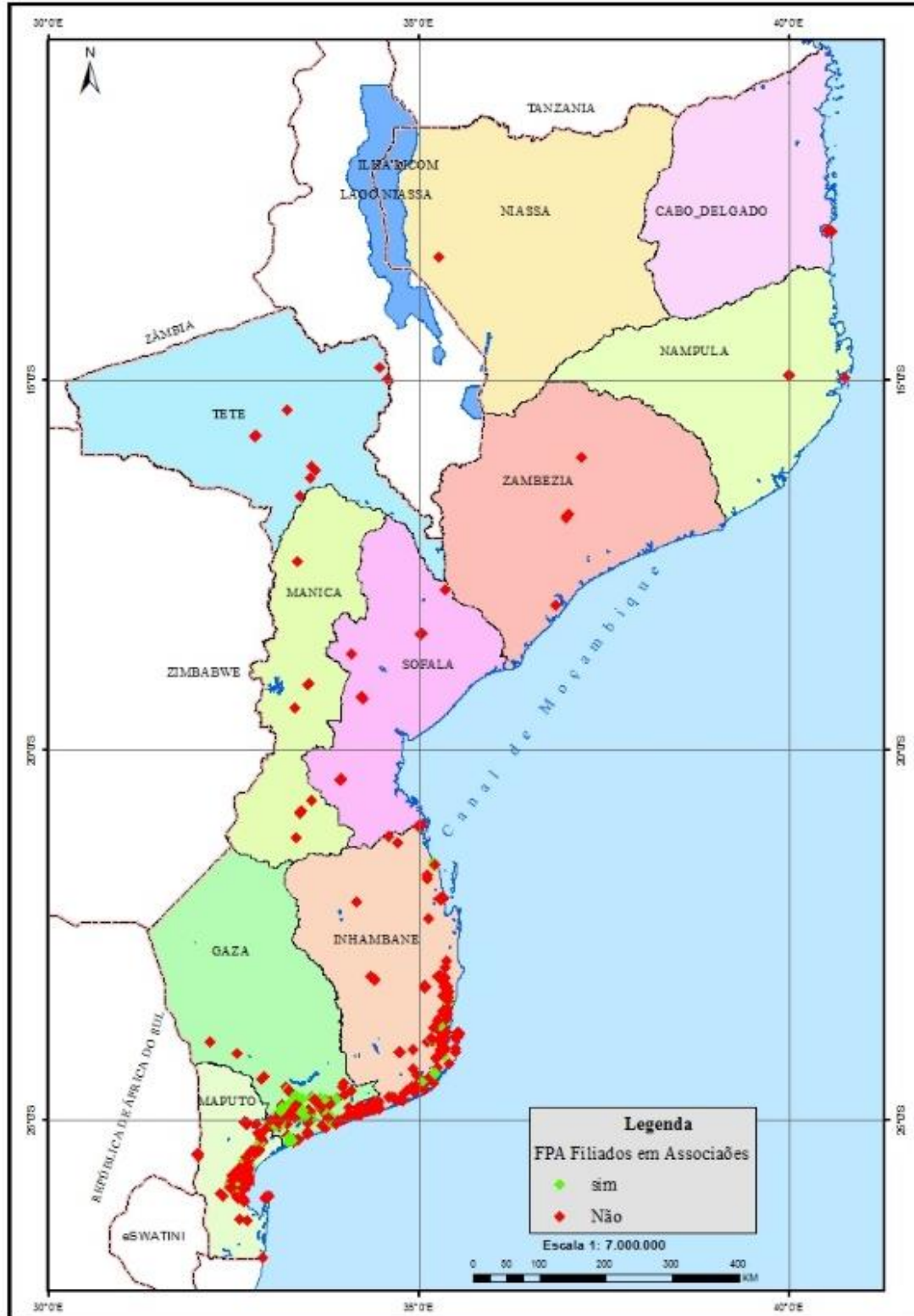
**Map 5 – Licensed water supply systems throughout the country (red dots – without licensen, green dots – with license)**

#### 6.4 NATIONAL MAP SHOWING PWPS MEMBER OF AN ASSOCIATION

Membership of associations among PWP is still something to be developed. Only 36% of the PWP are affiliated to some association, the most by far being member of AFORAMO. AFORAMO is a national association, but at present it is only represented in the country's southern provinces.



Mapeamento dos Sistemas dos Fornecedores Privados de Água  
Fornecedores Filiados Em Associações



Map 6 – Location of private water supply systems of PWP member of an association (green dots – affiliated, red dots – non affiliated)

## 7 CONCLUSIONS AND RECOMMENDATIONS

### 7.1 CONCLUSIONS

Nationwide a total of 1.503 Private Water Providers operating 1.830 private water supply systems were registered in 11 provinces. 1.745 of these private WSS were registered in the country's southern provinces (95%), 61 in the centre provinces (3%) and 35 in the northern provinces (2%). The 1,503 PWP supply about 1.762.560 consumers by means of 352.512 home connections. About 99% of the consumers are to be found in the country's southern provinces. Apart from the home connections there are 818 standpipes supplying around 14.000 people nationwide. The number of consumers per standpipe cannot be considered very reliable because users are not systematically registered and it is not possible to make a reliable extrapolation based on the national parameter of 300 persons per standpipe.

The PWP across the country employ about 2.640 workers, 20% of whom are women. As far as gender is concerned, 82% of the owners are men and 18% are women.

The main source for funding investments are the own resources of the owners of the system. In fact, 90% of the investments have been made using own funds, 4% used bank loans and about 5% took recourse to other financing mechanisms, mostly investments by philanthropic institutions.

Only 19% of all private WSS in the country have some sort of license. Of these, 4% have a water exploration license issued by local water resource management authorities, in particular the Regional Water Administrations (ARAs), while the remaining 15% have licenses issued by local (provincial, district, municipal) governments. A large part of the exploration licenses has been issued to WSS in the south, mainly in the province and the city of Maputo, while a significant part of these licenses has already expired. The licensing process under Decree 51/2015 has not yet begun and few WSS are aware of its necessity. At the time of the survey, the sector authorities were starting a process to widely disseminate information concerning the need of obtaining licenses.

The main water source for the WSS is groundwater, produced through boreholes and a small percentage of wells. In fact, about 99.6% of all private WSS have boreholes as a water source. Another very small proportion uses protected springs. The main energy source used by private WSS is electricity from the national grid, provided by EDM. In fact, 89% of private WSS use energy supplied by EDM, 9% use generators and only 2% use solar panels.

In general, the water provided is of good quality. As a matter of fact, about 99% of the private WSS supply water that is within the salinity parameter recommended by the World Health Organization (WHO) of 0 to 1.500 mS/cm<sup>3</sup>). However, 27% of private WSS did not carry out any water quality tests at the start of supplying and also not during the supply process. On the other hand, 5% of the private WSS in the cities of Maputo and Matola are possibly affected by sources of water contamination, mainly latrines constructed upstream of the boreholes. Water is only treated by 27% of private WSS, with the most common form of treatment being chlorination (carried out by 97% of WSS who reported doing some kind of water treatment).

Only 36% of the PWP are members of associations, which corresponds to 662 suppliers. Of these, about 97% are members of AFORAMO, a national association currently only representing suppliers in the country's southern provinces, while the remaining 3% are members of small associations such as AMATI, UNIFOPA and the Manhiça Suppliers Association.

The quality of the information on system management is poor, and a reliable analysis of the situation is not possible. During the survey, it was not possible to contact the owners of the systems (mainly in the provinces of Maputo, Gaza and Inhambane) because they were not present. Management records are very limited and in many cases, were not made available by managers.

## 7.2 RECOMMENDATIONS

This is the first comprehensive survey of Private Water Supply Systems throughout the country and therefore should be considered as a baseline for its systematic updating. At the same time, local (provincial, district and municipal) governments still have a poor understanding of the reality of water supply by private water providers in their areas of jurisdiction. Therefore, the following actions are recommended:

- Make the PWP database available to each district/municipality and promote trainings so that the technicians at these levels can systematically update the information. The current database is complicated and therefore one should consider simplifying it, i.e. leaving only aspects that are relevant to local licensing decisions.
- Promote a broad awareness campaign for PWP, focusing on the importance of licensing their activities and on the need to test water quality on a regular basis.
- Promote management capacity building. This should be seen from a long-term perspective, according to which the licensed PWP should be taxed on the basis of their revenue. At the same time, and within the context of private sector development, capacity building is of the utmost importance in that it can strengthen the capacity to deliver services and, in certain cases, lead to more efficiency in the operation and reduce costs for the end consumer.
- Promote associativism among the PWP. Under the present circumstances it is difficult to approach the PWP problematic in a comprehensive way because they are separate private entities. Within the scope of the survey, it was clear how useful associations are in mobilizing and identifying members.

## 8 ANNEXES

### Annex I: Terms of Reference

#### **TERMS OF REFERENCE** **Supporting the Policy Environment for Economic Development (SPEED+)**

**Position:** Mapping of Drinking Water Supply Systems of Private Suppliers

**Place of Operations:** Mozambique

**Contract Number:** AID-656-TO-16-00005

**Implementation period:** 1 October 2017 – 31 March 2018

**Level of effort:** N/A

#### **1. Contextualization and Scope of Work**

The Program for Supporting the Policy Environment for Economic Development (SPEED+), AID-656-TO-16-00005, was signed on 24 August 2016. SPEED+ is a four-year program aimed at supporting economic and structural policy reforms through four main components: (1) Agriculture, (2) Trade and Business Environment, (3) Energy and Water, and (4) Biodiversity Conservation. Within Component 3, Energy and Water, and being part of the first year of its work plan, SPEED+ is working with the National Directorate for Water Supply and Sanitation (DNAAS) to implement the Licensing Regulation for Drinking Water Supply by Private Suppliers (Decree 51/2015).

To support the implementation of Decree 51/2015, SPEED+ is working with DNAAS to develop a mapping using Geographic Information Systems (GIS) and a database containing an inventory of private suppliers in Mozambique, which is needed to support the government in obtaining the information necessary for issuing licenses within the scope of implementation of the Licensing Regulation for the Supply of Drinkable Water by Private Suppliers (Decree 51/2015). Although institutions of the water supply and sanitation sector in Mozambique, such as DNAAS, have in the past registered and listed private providers (within the SUWASA Project in 2013), the existing data are outdated and incomplete: new water suppliers entered the market, therefore there are new systems to be surveyed and integrated into the National Water Supply and Sanitation Information System (SINAS). In order for private providers to formalize their activities and obtain licenses, a thorough survey is required to obtain information and data that will provide the licensing authorities with all information necessary for deciding whether or not to issue licenses.

#### **2. Objectives of the Consultancy**

The main objective of this consultancy is to carry out a survey of private water providers operating in different parts of Mozambique in order to collect relevant data (such as size of the investment, number of workers etc. defined in the specific tasks for Phase I below), which will provide all information required by the licensing authorities for the issuance of licenses. The information to be collected in the survey will be integrated in an electronic database and linked with a map indicating the geographical coordinates of the Private Water Providers (PWP) in Mozambique.

#### **3. Specific activities**

This work will cover the following regions:

- I. Southern Region: city of Maputo, provinces of Maputo, Gaza and Inhambane, with 1500 to 2000 PWP;
- II. Central Region: provinces of Sofala, Manica, Tete and Zambézia, with 500 to 750 PWP;

III. Northern Region: provinces of Nampula, Cabo Delgado and Niassa, with 500 to 750 PWP.

The work will be divided in two phases:

#### **Phase 1 – Initial survey**

1. Analyse the database developed by SUWASA in 2013, and the database developed by other institutions such as ARA-Sul, municipalities and by PWP associations in the country, in order to verify the type of information that has been collected, the available information and additional information needs.
2. Analyse and provide recommendations for the improvement of the questionnaire developed by DNAAS and SPEED+ for surveying water supply systems from private providers. The objective is to collect a comprehensive set of information to be included in the PWP database. The final survey instrument will be reviewed by DNAAS, SPEED+ and USAID, as well as by other donors prior to the start of the mapping to ensure that a complete set of information has been collected.

Apart from the existing questionnaires approved by DNAAS, additional information proposed by the company should include:

- a. most distant customer to the north, east, south and west for each PWP;
  - b. gender of the owner;
  - c. taxpayer number;
  - d. year of commencement of business (license issued, renewed, etc.);
  - e. province, district, administrative post, municipality; and
  - f. any other information that may be useful for licensing decisions.
3. Contact the associations of private suppliers (e.g. AFORAMO, AMATI) to ensure their collaboration, by providing information to its members on the importance of the survey, and in providing the contacts of the suppliers to be interviewed.
  4. Develop a complete list of suppliers to be surveyed based on information provided by DNAAS, ARA-Sul, municipalities, donors, other government agencies and personal company contacts.
  5. Present in the initial report the details for items 1 to 4. The initial report should also contain a work plan and timetable for the implementation of the survey, the compilation of the database and the mapping of the PWP. The initial report is to be approved by DNAAS, USAID and SPEED+ before moving on to Phase 2.

#### **Phase 2 – Implementation**

1. Conduct the survey to collect data from private water suppliers;
2. Produce an electronic database of PWP respondents. The database should allow for filtering using different criteria. The selected company shall submit various database options and include all costs for the licensing database in its recommendations (e.g. Excel, Google Sheets, SQL or other database specific software) to DNAAS, USAID and SPEED+ for decision prior to feeding the database.
3. Recommend web mapping platforms that allow for different levels of permissions to map geographic coordinates and other PWP information in the areas surveyed.
4. Produce a GIS map visualizing the existing PWP (and selected PWP information) in selected areas of the survey. Web mapping software, if necessary, may not be open source (e.g. ArcGIS) provided that the output data is in a format that allows its use by any other system;
5. Deliver the database to DNAAS and ensure that DNAAS technicians know how to use and update it, the information it contains, the software and any other necessary update of the database. The final report should also contain recommendations for future online platforms that can be used to maintain the database, such as assigning different user rights, how to connect to SINAS, and other

information to inform DNAAS so as to ensure the sustainability and functionality of the database and the mapping platform.

#### **4. Products**

- An initial report satisfying points 1 to 4 of Phase I described above.
- The survey of the PWP using the questionnaire agreed upon.
- A complete electronic database and associated maps. The database should include all information and data per point described in the questionnaire of the PWP in the selected areas. The information contained in the database must be in a format that may be used by the Government in its own database (e.g. SINAS) and by USAID or SPEED+ or any other party interested in developing maps via the Internet with permission to display the maps of PWP in Mozambique.
- A final report that fully responds to the comments made by SPEED+, DNAAS and other stakeholders.

#### **5. Working language**

The report and the database are to be presented in Portuguese.

## Annex 2: Survey Questionnaire

My name is ..... from UMC Consultores, a consultancy firm hired by DNAAS to carry out the SURVEY OF PRIVATE WATER SUPPLIERS (PWP) OPERATING IN THE COUNTRY. The government of Mozambique recognizes the importance of the private sector, especially of the PWPs, for their efforts in providing water to the population. This survey seeks to help the government and donors to develop programs aimed at improving the services offered by private providers.

The first step the government intends to take is to license all PWPs. The licensing process is important because it provides PWPs with a legal status and protects them in all aspects related to their activity once they are legally recognized. As you will know, in 2015 the Government approved a regulation for licensing this activity, which reflects the importance being given to the supply of water to the population.

Your WSS is part of the PWPs and is covered by this survey. Please feel free to give your answers to the questions that will be asked. Your answers and all data to be provided will be confidential. If you need any clarification before starting with the interview you can ask any questions and I will be happy to answer these.

TIME OF COMMENCEMENT OF THE INTERVIEW                      HOURS                      MINUTES

### A. DATA ON LOCATION

Province: _____	District / City: _____
Administrative Post: _____	Locality: _____
Community/Neighbourhood: _____	Quarter Nr.: _____
Code: _____	

### B. WSS DATA

1. Name of the system: _____	
2. Year of construction: _____	Building Contractor: _____
Supervisor: _____	
3. Total investment to date (in millions of Meticais): _____	
4. Financier: _____	5. The system has a water Exploration license? (Yes _____ / No _____) <span style="float: right;">If no !!</span>
Number of Licenses of the System: _____	
6. Date of issue of the license: _____	
7. Date of expiry of the license: _____	
8. Name of the system's owner: _____	
9. Gender of the system's owner: (M) _____ (F) _____	
10. Where does the system's owner live? Address: _____	
11. Phone number of owner: _____	
12. Address of the system (office): _____	
Location of the system's office:	13. Latitude: _____
	14. Longitude: _____
15. Name of the person in charge of managing the system: _____	

16. Gender of the person in charge of managing the system M \_\_\_\_\_ | F \_\_\_\_\_
17. Phone number of the person in charge of managing the system: \_\_\_\_\_
18. Number of workers of the system in the first year: \_\_\_\_\_ In the second year: \_\_\_\_\_  
Present number \_\_\_\_\_ 19. Men – Women \_\_\_\_\_

### C. TECHNICAL INFORMATION OF THE WSS

20. What kind of source is your system using? (Hole \_\_\_\_\_ spring \_\_\_\_\_) other? \_\_\_\_\_
21. Are there possible contamination sources? Yes \_\_\_\_\_ No \_\_\_\_\_
22. If yes, which? (latrines \_\_\_\_\_ industry \_\_\_\_\_ pasture \_\_\_\_\_ pesticides) other: \_\_\_\_\_
23. How many sources does the system have? \_\_\_\_\_
24. If these are holes, how deep is each hole? Hole 1 \_\_\_\_\_ Hole 2 \_\_\_\_\_ Hole 3 \_\_\_\_\_
25. Can you show the results of the water test carried out prior to starting the supply? (test results shown / Not shown); comments: \_\_\_\_\_
- Confirmed: \_\_\_\_\_ Test not realized: \_\_\_\_\_ Test realized but not available: \_\_\_\_\_

26. Water quality. Of each hole	0 – 500mS/cm <sup>3</sup>	500 – 1000mS/cm <sup>3</sup>	1000 – 1500mS/cm <sup>3</sup>	1500 – 2000mS/cm <sup>3</sup>	2000 – 2500mS/cm <sup>3</sup>
Hole 1					
Hole 2					
Hole 3					
Hole 4					

27. Material of feeder pipe: PVC: \_\_\_\_\_ Copolene-PEAD: \_\_\_\_\_ Steel: \_\_\_\_\_ Asbestos cement: \_\_\_\_\_ Galvanized iron: \_\_\_\_\_
28. Feeder pipe diameter: \_\_\_\_\_
29. Length of feeder pipe (in kms): \_\_\_\_\_
30. Network type: Mesh \_\_\_\_\_ Ramified \_\_\_\_\_ Mixed \_\_\_\_\_
31. Material of distribution network: PVC: \_\_\_\_\_ Copolene-PEAD: \_\_\_\_\_  
Steel: \_\_\_\_\_ Asbestos cement: \_\_\_\_\_ Galvanized iron: \_\_\_\_\_
32. Network diameter: \_\_\_\_\_
33. Length of distribution network (in kms): \_\_\_\_\_
34. Which energy is used?  
Generator: \_\_\_\_\_  
EDM/: \_\_\_\_\_  
Solar panels: \_\_\_\_\_  
Wind: \_\_\_\_\_

35. Pump type	36. Pump capacity (m <sup>3</sup> /h)	37. Pumping hours/day
Pump 1 (Submersible, vertical shaft, motor pump)		
Pump 2 (Submersible, vertical shaft, motor pump)		
Pump 3 (Submersible, vertical shaft, motor pump)		
Pump 4 (Submersible, vertical shaft, motor pump)		
Water produced per day (Total of water extracted in m <sup>3</sup> ): _____		38. Total of pumping hours: _____



39. Number of tanks: _____					
40. Type of Tank	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Raised					
Subterranean					
Semi-subterranean					
Supported					
Material of the tank	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Plastic					
Concrete					
Aluminium					
Other					

#### D. WATER AVAILABILITY

41. Quantity of water supplied per day (m<sup>3</sup>) \_\_\_\_\_
42. Hours of effective supply per day: \_\_\_\_\_
43. Have there been supply restrictions? Yes \_\_\_\_\_ No \_\_\_\_\_
44. If yes, which are the main reasons for these restrictions? a) Lack of energy: \_\_\_\_\_
- b) Insufficient storage capacity: \_\_\_\_\_ c) Poor pumping capacity: \_\_\_\_\_
- d) Insufficient water (source): \_\_\_\_\_ e) Other: specify: \_\_\_\_\_

#### E. COSTS AND PAYMENT FOR THE SERVICES

45. Number of home connections: _____		46. Active: _____		47. Dormant: _____					
48. Do the home connctions have a meter?		Yes _____		No _____					
49. Is there a billing system for the home connections?		Yes _____		No _____					
50. Do clients pay the same amount per m <sup>3</sup> ?		Yes _____		No _____					
If not, which are the intervals in m <sup>3</sup> ?		Till _____ m <sup>3</sup>		Amount _____ Mt					
		Till _____ m <sup>3</sup>		Amount _____ Mt					
		Till _____ m <sup>3</sup>		Amount _____ Mt					
		More than _____ m <sup>3</sup>		Amount _____ Mt					
51. Does the system have standpipes?			52. How many standpipes? _____						
53. How many people use the standpipes on average per day? _____			54. Hours of supply at the standpipes: _____						
55. What is the price per bucket (20 liters) at the standpipe? (Meticais)		1,00	1,5	2,00	3,00	4,00	5,00	10,00	20,00
					Yes _____		No _____		

56. Do the families with home connections have a contract? \_\_\_\_\_
57. What is the amount paid per contract entered into? \_\_\_\_\_
58. In case there is no meter, what is the fixed monthly amount: \_\_\_\_\_

## F. WATER QUALITY

59. Is the water being treated? Yes _____ No _____				
60. If yes, which type of treatment?	Chlorination	Filtration	Decantation _____	Other _____
61. Water test	PH	Hole 1	Hole 2	Hole 3
	Electric conductivity	Hole 1	Hole 2	Hole 3
62. What are the monthly costs?	Salaries of personnel	Energy	Communication	Maintenance
	MT	MT	MT	MT
	Water treatment		Purchase of other material for the management of the system	
	MT		MT	

## G. INVESTMENT COSTS AND REVENUE

63. Do you have to repay some loan?	Yes _____	No _____
64. If yes, how much do you pay per month to reimburse the loan?	MT	

65. On average, what is the total amount of sales (gross revenue) by means of water services?				
Home connections?	Day: _____	Week: _____	Month: _____	Other (specify): _____
Standpipes?	Day: _____	Week: _____	Month: _____	Other (specify): _____
66. Which percentage of the revenue is accounted for by:	Clients with home connection / tap in their yard?			
	Commercial / businesses?			
	Standpipes?			

67. Is the owner of the system member of a water supplier association?	Yes: _____ No: _____
If yes, what is the name of the association he/she is member of?	
Why did he/she join the association?	

## H. LOCATION OF INFRASTRUCTURE

Take four coordinates (of the most distant consumers at each of the cardinal points)	
	Latitude
	Longitude

North		
South		
East		
West		

Coordinates of all standpipes			
	Latitude	Longitude	Elevation
Standpipe 1			
Standpipe 2			
Standpipe 3			
Standpipe 4			

Coordinates of all tanks			
	Latitude	Longitude	Elevation
Tank 1			
Tank 2			
Tank 3			
Tank 4			
Tank 5			

**TIME OF ENDING THE INTERVIEW \_\_\_\_\_ HOURS \_\_\_\_\_ MINUTES**

*Thank the interviewee for the time spent and ensure him/her that the information collected will be used for the development of the Private Water Suppliers and that it will be treated with utmost secrecy!!!!*

Thank you!