Perspectives, challenges and opportunities for water supply management in Rustenburg: A case study of Tlhabane township

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Abstract

Water is perceived to be one of the precious resources that should not be denied to any person; however, without the knowledge and attitude of how to sustain it, water will continue to be in short supply. This study aimed to contribute more knowledge about the perspectives on, the challenges of and the opportunities for water supply management in the Rustenburg Local Municipality, specifically in the township of Tlhabane, a small suburb of the municipality situated in North West province, South Africa. The problems leading to poor water supply and management that are experienced by various local communities were explored, with particular reference to Tlhabane township. A descriptive research design was used in this study and the researcher applied the qualitative research method because the two approaches are best used concurrently. The target population identified to respond to the research questions of this study were the community members of Tlhabane who have been facing great water-supply challenges. A probability sampling method was chosen in this study due to its ability to give every person an equal chance of being selected. A systematic random sampling technique was also used in this study, the researcher having determined a sample size of 300 as being sufficient to represent a subset of the Tlhabane community. The data were gathered by distributing open- and close-ended questionnaires to the community members. In addition, five unstructured interviews were conducted with the municipal staff members in the Directorate of Technical and Infrastructure (the Water Supply Unit). The study's key findings reveal that the community members of Tlhabane expressed frustration at having unreliable access to water. This has led to a growing reliance on self-supply methods. An ageing water infrastructure (eg, asbestos-cement pipes) has led to frequent pipe leaks and bursts. High levels of water loss have been caused by inadequate pipeline maintenance, leading to community protests as a result of persistent water shortages. Limited financial resources have also hindered water infrastructure

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maintenance and upgrades. The water distribution infrastructure must be upgraded to reduce leaks and wastage. Public–private partnerships must be strengthened for better water management, community participation must be encouraged in water conservation efforts and alternative water sources such as recycled water and sustainable water-supply strategies must be leveraged. Recommendations are made that can be adopted to ensure good service delivery of water to the Tlhabane community. Once these measures are implemented, it is believed the water-supply problems will be overcome. These recommendations are meant to help the municipality to improve its water services to the community by eradicating water shortages. This will serve to ensure that there is economic well-being, employment, peace and stability in the area.

Keywords: water supply, Rustenburg Local Municipality, technical infrastructure, Tlhabane township

1. Introduction and problem statement

Water is a vital resource that should not be denied to any person. According to section 27 of the Constitution of the Republic of South Africa (1996), everyone has the right to have full access to sufficient water. No one can survive absolutely without water; however, in Tlhabane township, a reliable water supply is a major challenge. One of the functions of the local municipality, as the water service-provider, includes the provision of water to all the people who live within the municipal jurisdiction, the purification of raw water from dams and other sources, and supplying it to all its residents. However, this is not happening at a rate that should be expected. This challenge with the water supply has caused the community members to lose hope and to constantly protest to demand that they be supplied with water continuously. This research differs from existing research on water governance because that research has produced findings only on what municipalities have failed to achieve. Many researchers have not focused their research specifically on growing mining townships or communities such as Tlhabane in the Rustenburg municipality. This research digs deeper to unravel information about the perspectives of community members in Tlhabane regarding the water-supply problems they are faced with. In this way it identifies the challenges that the municipality is facing which prevent it from producing an adequate water supply to the community of Tlhabane. And it reveals the opportunities that exist to improve the water supply in the community. Previous municipal interventions have failed, just as the local municipality has been failing to resolve the issue of the vandalisation of the water infrastructure, an aged water infrastructure, the mismanagement of funds, a faster-growing population and the failure to appoint the correct or appropriately qualified municipal management and service-providers. This study intends to contribute

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greater knowledge about this problem and its resolution and to make recommendations that will serve as models to help the Rustenburg Local Municipality to supply adequate water to the community members of Tlhabane township.

2. Literature review

Water is a source of life that is so precious and essential that it is a universally accepted truism that no one can live without it. Du Plessis (2017: 4) states that water is one substance that is broadly distributed and found in the natural environment which contains the Earth's oceans, rivers and underground water sources. Water is very important for sustaining human health, even that of some animals too, who cannot survive without drinking this important element. Water is a prerequisite to one's survival as an individual and also to promoting personal hygiene. It is always used for household activities, including but not limited to cooking, washing up, cleaning and laundering. Water has been acknowledged as a universal fundamental human right. In South Africa, the Constitution of 1996 recognises water as a human basic right that no individual should be denied.

All living organisms, including human beings, need water for all their activities to be sustained. According to the Human Development Report (2006: 5), not having access to water and sanitation is a polite euphemism for a form of deprivation that threatens life, destroys opportunities and undermines human dignity. For instance, when water is not available, small businesses suffer the most, especially those that have, for instance, opened car washes or small restaurants, which constantly have to use water. Their opportunities to conduct business are automatically jeopardised or even destroyed when they are deprived of water. Moreover, the struggles of developing countries such as South Africa are compounded by their fast-growing population, which poses the serious threat that the country might face regarding the supply of water to its citizens in all localities. This trend implies that future generations will continue to experience challenges of access to water.

According to Cliver and Woodhouse (2011), the Millennium Development Goals (MDGs) embodied a plan and a wish to see the total number of people without access to proper water and sanitation halved by the year 2015. This goal has not been met: to date, access to improved water and sanitation is still a problem in many areas of the world, especially in Africa. According to Akinboade et al (2013), the national-level database shows enormous improvements in basic service delivery in South Africa as a result of the Reconstruction and Development Programme (RDP) commitment made in 1994; however, local municipalities are currently experiencing strong service-delivery protests. This is because, to the present, many households have not

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had access to clean potable water. The majority of these protests have become violent, with some criminals seeing an opportunity in such situations and exploiting then for their own purposes. These protests result because local government departments are unable to provide basic services, including basic water services, to all who require them. The majority of these protests are common in informal settlements, whether in urban or rural communities. Data collected from community wards have indicated that these protest-plagued communities have extremely high levels of unemployment and low levels of access to basic services (Municipal IQ, 2010). These are some of the reasons why communities continue to engage in protest action.

In many rural areas, access to clean potable water is not really a problem compared to urban areas. Access to improved water and sanitation in many urban areas remains an issue that needs to be solved. Sometimes the water is accessible; however, the quality is often very bad. Cliver and Woodhouse (2011) state further that, in South Africa, the local municipalities are always the ones entrusted with confronting problems related to providing improved water infrastructure and also to supplying adequate clean water to their local communities. This has been the root cause of failure as the local municipalities are perpetually considered to be extremely incompetent and under-resourced. This arises from their failure to confront problems related to providing improved access to water and sanitation, for instance. It is crucially important that water should be effectively managed, used prudently and supplied in accordance with the maximum international quality standards.

2.1 Empirical review

First, in a study by Elimelech and Montgomery (2007), it was discovered that many developing nations, including South Africa, experience financial resource challenges that later constrain the maintenance and servicing of the water infrastructure. In addition, according to Elimelech and Montgomery (2007), corruption, vandalism, inefficient management and a lack of accountability are the root causes that deny local authorities the ability to improve water services to the community at large. In many developing countries where there were enforced standards to improve water quality and supply, challenges remain with monitoring water distribution and the political will to ensure that those standards are enforced as they should be. Elimelech and Montgomery (2007) add that simply increasing funding to improve water quality and supply is not the solution. This is because the mismanagement of funds, corruption, vandalism and a lack of political will would continue to hinder the proper use of funds meant to provide local communities with the water supply and standards they deserve.

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Second, in a study by Nicollier et al (2022), it was revealed that governance failures were the root causes of problems faced by Brazilian municipalities in the management of water resources. According to Nicollier et al (2022), good governance is required in municipalities, which means that accountability, transparency, public participation and efficiency must exercised at all times. The main reason why many municipalities fail to deliver water services to the required standards is that there is no accountability, which costs them the ability to dismiss employees who are not fulfilling their roles as they should.

Third, in a study by Alm et al (2021) it was discovered that municipalities experience a rapidly growing maintenance debt in connection with critical and ageing water infrastructure. According to Alm et al (2021), many municipalities in welfare states also face challenges in providing good public services, including water, due to a critically ageing water infrastructure that is prone to breaking down. The high cost of identifying and replacing an aged water infrastructure has proved to be a significant challenge that needs to be resolved in many municipalities.

Finally, in a study by Chuene (2012), it was discovered that the water service supply is a significant concern in South African municipalities that needs to be resolved. According to Chuene (2012), municipalities need to secure and finance their water services infrastructure by identifying donors and involving the private sector where necessary. This indicates that the cost of ensuring an adequate water supply and maintaining an ageing water infrastructure is a major challenge that requires substantial financial resources if it is to be resolved.

To summarise these studies, a critical and ageing water infrastructure poses a significant threat in many local municipalities in South Africa. This includes the Rustenburg Local Municipality, the Mafikeng Local Municipality and the Madibeng Local Municipality. The lack of accountability, the absence of political will to ensure the enforcement of water standards, corruption, vandalism and the failure to implement monitoring and evaluation tools continue to affect proper service standards by South African local municipalities.

Lester and Birkett (1999) defined pollution as the introduction of substances or energy by human beings into the environment that cause danger to human lives and health and result in harm to living resources and ecological systems. Drawing inspiration from Lester and Birkett's (1999) definition of pollution, water pollution can therefore be defined as hazardous substances released by human activities into water bodies such as dams or lakes which in turn affect human health and ecological systems. In many countries where water regulation laws were absent or were not implemented or monitored as required, water pollution contributed to the depletion of freshwater supplies too.

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In addition, polluting surface and groundwater severely limited the quality of the water supplied to local communities.

In many countries across the globe, sewage is discharged directly into water bodies, polluting freshwater sources that could have been supplied to surrounding areas and communities. Discharging untreated sewage into local lakes has also occurred in highly developed countries such as the United States. An estimated per centage of approximately 37% of all lakes in the United States were found to be unfit for swimming as a result of this type of pollution (UN, 2003; Cassardo & Jones, 2011; Ribolzi et al 2011). According to Liu et al (2008:11), both water pollution and water scarcity in China were significant problems for the Chinese government, posing threats to China's food security, quality of life and economic development. In some areas of China, high instances of cancer were reported which were caused by organic water pollution. Finally, in this highly populated country, ecological cases of water pollution had become so severe that there was a possibility that they might have driven some rare species of aquatic animal to the brink of extinction.

As a preliminary solution to the water crises and demand, many households in South Africa practise water harvesting as a method of storing water for days when it would be scarce or inaccessible (Mareddy, 2017). According to Mareddy (2017), many households have relied on rainwater harvesting for centuries to supply water for domestic, landscaping, livestock and agricultural use. Rainwater harvesting has proved to be key because it could serve as a water resource, especially in areas with significant rainfall or even in areas with less rainall. During rainy periods, large quantities of rainwater collected from rooftops need to be stored. In many parts of the world, especially in urban areas, water from rooftops is often not collected due to the inadequate design of traditional or modern houses and this hinders effective rainwater harvesting. As a result, much water had been wasted that could have been stored for use during dry spells. Accordingly, it has become imperative for many rural and urban households to be encouraged to engage in rainwater harvesting. This method helps significantly to store water for periods when local municipalities face challenges in supplying it to communities. Although rainwater harvesting is not expensive, the accumulated water could make a significant difference, particularly when rainfall is infrequent.

Rainwater harvesting is recognised as an optimal strategy that contributes greatly to meeting current and future water needs and improving the state of water resources (Abdi & Edalat, 2018). Consequently, rainwater harvesting has become essential for many households to fulfil their water demands, as rainwater can be stored directly in tanks by running rainwater into them from rooftops. According to Abdi and Edalat (2018), there has been a surge of

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interest and publicity regarding water harvesting in various European countries in recent years, highlighting the fact that capturing rain from rooftops makes sense from both an economic and an environmental perspective.

This researcher has identified a significant gap in the existing body of literature regarding specific aspects of water-supply services that warrant further exploration. First, there is a lack of investigation into the way in which community members articulate their frustrations about the water-supply services they receive. Second, the direct challenges faced by municipalities, which impede their ability to provide adequate service standards to community members, remain largely unexamined. Instead, existing studies tend to attribute the failure to deliver satisfactory water services to corruption and a lack of accountability in local municipalities. Finally, there has been insufficient focus on the potential opportunities available for municipalities to enhance their water service provision. This study therefore presents a unique and relevant contribution to the field, differentiating itself from prior research by examining community perspectives on water services, the challenges confronted by local municipalities in delivering effective water management and the opportunities for upgrading water infrastructure and services in Tlhabane township.

Water is an essential resource, one universally recognised as a fundamental human right. The South African Constitution 1996 explicitly acknowledges access to water as a basic human right that should not be denied to any individual. The denial of access to water and sanitation represents a severe form of deprivation that threatens life, undermines opportunities and diminishes human dignity. If developing countries, including South Africa, continue to struggle to provide an adequate water supply to their citizens amid significant population growth, the repercussions for future generations may be dire. This situation suggests that subsequent generations will probably encounter persistent challenges in accessing reliable water resources.

In South Africa, local municipalities are currently grappling with severe service delivery challenges, particularly regarding the provision of water to communities, which has resulted in widespread and often violent protests. In contrast to urban areas, many rural regions experience relatively fewer problems regarding access to clean potable water. However, the inadequacy of the improved water and sanitation infrastructure remains a significant challenge in urban settings. Local municipalities are entrusted with the responsibility of redressing these challenges; however, their perceived incompetence and lack of resources have hindered their ability to deliver improved water services effectively.

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Globally, both underground and surface water sources can be accessed for various purposes, including agricultural, industrial, mining, energy, domestic, recreational and environmental uses. The agricultural sector is the largest consumer of water and is essential to ensuring food security for both human beings and livestock. Following agriculture, the industrial sector is the second largest water user, comprising industries such as mining, oil refineries, manufacturing plants and energy installations – all of which require substantial quantities of water for cooling and operational processes. The third largest category of water consumption encompasses domestic, recreational and environmental activities.

Water pollution remains the pre-eminent environmental concern worldwide, contributing to various environmental, social and economic challenges. The ubiquity of water pollution has rendered it a global issue, necessitating the formulation and implementation of stringent water resource policies to combat this problem effectively. In regions lacking adequate water regulation laws or enforcement, water pollution has emerged as a principal factor in the depletion of freshwater supplies. Contaminated surface and groundwater significantly compromises the quality of the water available to local communities.

In South Africa, water quality in numerous areas is adversely affected by both anthropogenic activities and natural processes. There is an imperative need for effective water quality management strategies to protect the remaining natural water resources. Without such measures being in place, activities such as mining and agriculture, which may involve the use of hazardous substances, will continue to degrade the limited water available for use. Implementing robust water management practices is therefore crucial to ensuring sustainable water use and maintenance.

Statistics indicate that future water demands are rising significantly, particularly in densely populated areas where the challenges related to insufficient water supply are anticipated to intensify (Flörke et al, 2018). The occurrence of water-related conflicts is becoming evident through protests and strikes, highlighting the escalating scarcity of water and its inefficient use across various sectors. Water recycling therefore emerges as a vital solution to meeting both environmental and economic needs. This is because the use of recycled water can significantly reduce the overall consumption of fresh water, which may otherwise be ineffectively allocated to irrigation and industrial, mining and domestic applications. Key impediments to the sustainable use of water resources include an ageing infrastructure, an increasing human population and a rapid surge in water demand. Therefore, maintenance of the water infrastructure must be prioritised as an essential practice.

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3. Research methodology

According to Dewantoro et al (2018: 181), research is a study conducted over a certain period to provide answers and explanations about a studied phenomenon. In this study, the researcher presented a plan for the way the objectives of the study would be achieved. The different types of research design were discussed. The study had its own target group as far as the population was concerned: the community members of Tlhabane township, who share common attributes or characteristics that needed to be focused on.

3.1 Research design

According to Kumar (2011), the types of research design include descriptive, exploratory, correlational and explanatory design. This researcher chose a descriptive research design. Nassaji (2015: 129) states that the descriptive and qualitative research methods of collecting data have always been best and were common procedures for conducting research in various disciplines, including Social Science. The reason for selecting the descriptive research design in this instance was that it studies a phenomenon in its natural occurrence and does not manipulate variables. In this investigation, the researcher sought and managed to obtain information from the community members of Tlhabane. These community members were able to describe to the researcher how they were affected by the water problems in their township. Descriptive and qualitative research approaches proved best to use concurrently due to the fact that descriptive research as a data-collection tool describes a phenomenon to its maximum and qualitative research uses different data-collection methods to gain a deep understanding of a phenomenon.

3.2 Research approach

According to Mwita (2022: 535), the research approach could include qualitative, quantitative and mixed-methods approaches. The researcher chose the qualitative research method to ensure that data with regard to the research topic are gathered successfully. Another reason for selecting the qualitative research method is that it has many advantages. These include allowing the researcher to document the subjective points of view of the community members of Tlhabane as to how they were they affected by the unreliable supply of water provided by the Rustenburg Local Municipality. Brinkmann and Kvale (2006: 157) argue that a qualitative research method is helpful in that it is able to assist the researcher to probe where necessary, in this way producing the required information about human existence at its core. Adopting this approach, the researcher was able to produce

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rich information on how and why community members of Tlhabane experience challenges with water access. The researcher was aware that water was supplied by the local municipality; however, its state and quality were not at the level they were supposed to be. The data that were elicited from the research participants, who were community members of Tlhabane (through closed and open-ended questionnaires) and five Rustenburg Local Municipality officials (through unstructured interviews), was able to produce sufficient information based on their personal subjective experiences of water issues in Tlhabane township. The researcher was then able to provide answers that were trustworthy as they were based on people's daily lived experiences.

In the process of applying the qualitative research method, the researcher noted that it was important to always conduct research morally and ethically. Brinkmann and Kvale (2006: 160) point out that this is due to the fact that a qualitative researcher, at some point in time, has to perceive and judge their research participants' private lives. This could be done correctly only while engaging in precise moral and ethical conduct rather than following universal rules. If conducted properly, qualitative research is the best method that one can apply to produce more information about the daily challenges a human being faces in the world.

3.3 Target population

According to Etikan and Babatope (2019), a target population is a group of individuals with common attributes or characteristics whom a researcher wants to collect data from. In addition, Taherdoost (2016: 19) perceives a target population as being the total number of people or individuals living or residing in a particular country or area in which a researcher intends to collect data and draw conclusions from them. For this study, the target population identified to answer the research questions of the study was the community members of Tlhabane township in the Rustenburg Local Municipality (North West province) who were facing severe water-supply challenges. Many parts of North West province were experiencing water-supply problems; however, the researcher chose an area which he was familiar with and where he believed that good research findings and recommendations would be drawn from, namely, Tlhabane township (specifically units 1, B and 3).

3.4 Sample

Etikan and Babatope (2019) define a sample as the representatives of a population or a subset of a population. Another definition has been offered by Masuku and Singh (2014: 3), who perceive sampling as the selection of individuals from a certain population group to estimate

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the characteristics of the whole population. Acharya et al (2013: 330) point out that a sample is a subset of the population selected to be representative of the larger population. It is imperative for a researcher to sample a subset of a population, because it would be difficult to study the whole population, taking into consideration the time that would have to be spent on obtaining information and the resources that might be required to complete the data-collection phase. In the case of the present study, sampling assisted with the reduction of costs and time as it targeted a certain group of people from the entire population they represented.

Etikan and Babatope (2019) point out that there are two methods of sampling: probability and non-probability. Walliman (2011: 96) distinguishes between them by stating that probability sampling methods provide the most reliable and trustworthy representation of the whole population, whereas non-probability sampling methods depend greatly on the judgement and perceptions of the researcher and cannot be used to make generalisations about the whole population.

The probability sampling method was chosen in this study due to its ability to give every person in the community of Tlhabane an equal chance of being selected. The researcher did not want to use a biased sampling method which is based on subjectivity due to the fact that the data produced might not represent what the community members of Tlhabane were facing with regard to the water challenges they face. The researcher believed that choosing the probability sampling method would reduce the resources and time needed as it allowed them to select a subset of research participants to represent the population of Tlhabane as a whole. It was going to be difficult to study the whole population, hence the need to sample and use the probability sampling method as it was the most reliable and trustworthy representation of the community being studied.

3.5 Sampling technique

According to Masuku and Singh (2014: 3), a sampling technique is a method adopted to select research participants for the purpose of acquiring information. Sampling techniques are used to select individuals from a certain population in order for the researcher to collect data and answer the research questions. A systematic sampling technique within the probability sampling method was chosen for this study due to its ability to give the researcher an advantage to sample every fifth house in the community, starting from every corner house and moving from the left to the right. The researcher distributed questionnaires until the identified sample size of 300 was reached. If the identified research participants refused to participate in this study, the researcher documented them as refusals, then the

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next house on the sample would follow. According to the researcher, this was a fair sampling method that was relatively easy to conduct and did not require many resources to implement. Another advantage of using this sampling technique was that this selection procedure gave everyone in the community an equal opportunity to be selected. One disadvantage of using the systematic sampling technique was that it required the researcher to pay full attention when sampling as it was easy to make mistakes while trying to sample every fifth house, starting from the first corner house and proceeding to the right.

The sample selection could also be compromised in the process. The researcher therefore paid full attention to ensure that no mistakes were made while sampling and that no-response errors were avoided, so that the best research findings could be obtained. According to Draugalis and Plaza (2009: 1), a non-response error is defined as a situation that occurs when data are or information is absolutely not collected from every research participant of the chosen sample. The researcher believed that the systematic sampling technique would assist him in striving to obtain a 100 per cent response rate from the sample size, being aware that non-response errors could lead to inaccurate conclusions and recommendations. The researcher did his best to continue distributing questionnaires to every fifth house in the community of Tlhabane until the sample target was met. He also ensured that no individual would be forced to participate in the study.

3.6 Sample size

According to Kothari (2004), a sample size is the total number of items or individuals to be selected from the universe to constitute a sample. Mwita (2022: 534) defines a sample size as the total number of people a research study intends to collect data from. These are people whom a researcher has identified and wants to elicit information from so as to answer the research questions. According to Omair (2014: 143) and Ezhumalai (2017: 41), it is important for a sample to be of the required size in order to answer the research questions, obtain accurate results and identify the required information about the study population. If a researcher selects a larger sample size than required, this could deplete the researcher's funds or even waste time. If the researcher chooses a smaller sample size than required, it could jeopardise the outcomes of the study due to the fact that the collected information may not inadequately represent the population parameters, be informative or produce accurate results that could be transferable.

The researcher chose a sample size of 300, which represented 10 per cent of the community members of Tlhabane comprising more than 3 000. The researcher made it a top priority that the research sample size was carefully fixed and selected so that valid conclusions and

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recommendations could be drawn. The sample size of 300 was neither too large nor too small, but average enough to represent a subset of Tlhabane's community that would be more than enough to produce valid and reliable generalisations about the study population.

3.7 Data-collection methods

Mwita (2022: 532) defines data collection as a method, technique or approach that the researcher uses to collect data. According to Busetto et al (2020) and Hennink et al (2019), there are many kinds of data-collection method, but the researcher has to choose one that is best suited to answering the research questions. Yin (2011) states that the process of collecting data is popularly known to be conducted in the field and that the data-collection methods have different strengths and weaknesses; should a researcher fail to select a method that was appropriate, it would negatively affect the information that could have been produced accurately. Most of the time, the data collected using the wrong techniques were perceived as invalid and not credible.

Data can be classified into two categories: primary and secondary. Mwita (2022: 534) states that primary data are those that are collected for the first time from research respondents, while secondary data will already have been collected by other researchers before. Dewantoro et al (2018: 182) point out that primary data are defined as the main source of information, while secondary data are defined as information collected from existing sources, including books, archives and published and unpublished. In other words, primary data are data that has never been collected by other researchers before. Kothari (2004) asserts that primary data are collected through a survey or an experiment, but in the case of a survey they are collected through telephone and personal interviews and by distributing questionnaires.

It was very important for this researcher to select the appropriate data-collection method, taking into consideration the financial costs, the scope of the study and the accuracy of the research results needed. In the light of the above, the researcher chose primary data as a method of data collection and used this type of data-collection method by distributing questionnaires to the community members of Tlhabane in Rustenburg. In addition to this, he also conducted five interviews with the Rustenburg Local Municipality staff members who resort under the Directorate of Technical and Infrastructure (the Water Supply Unit). The reason for not using secondary data was that the documents published previously by other researchers were not appropriate to answering the identified research questions. This then required the researcher to go into the field and acquire more knowledge about the research topic, which was the primary data route. In the process of using the primary data-collection method, the researcher was aware

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that gaining direct access to the targeted research participants' areas could be a challenge and that data could somehow be compromised in the process. In the researcher's situation, the data that were being sought were located near to the researcher's area of residence; he was guaranteed the convenience of collecting these types of data.

An interview approach as a method of primary data collection was selected by the researcher to collect data from five Rustenburg Local Municipality officials under the Directorate of Technical and Infrastructure (Water Supply Unit). Dewantoro et al (2018: 182) pointed out that an interview as a main source of data collection is defined as dialogues conducted through a procedure and systematic steps where the selected participants have the freedom and opportunity to express their thoughts or views about a studied phenomenon. Mwita (2022: 533) defines an interview as a method of data collection that can be conducted face-to-face or using technologies such as telephones or Skype. The main aim of an interview is to collect data in response to the researcher's probing questions from the research respondents in order to be able to answer the research questions.

According to Walliman (2011: 99), there are three types of interview: structured, unstructured and semi-structured. A structured interview, on the one hand, is one in which the interviewer reads out questions according to the interview guide or schedule or a prepared set of questions to ask the research respondents. Here, the researcher does not probe or ask other questions that are not on the prepared list. A semi-structured interview contains a combination of structured and unstructured questions, but the interviewee has to answer by providing their own views, not by responding to set provided. Semi-structured interviews are a set of questions the researcher has prepared in advance to obtain information from the research respondents; with this type of interview, the researcher has the advantage of asking more questions in the form of a discussion. An unstructured interview is one in which the interviewer reads out questions and probes, where possible, to gain more insights from the interviewee. In addition, it allows a researcher to ask questions that were not prepared in advance. In the case where a respondent might give an ambiguous answer, this interview type would allow the researcher to probe, where possible, to gain the information required to contribute to the research objectives.

Mwita (2022: 533) also argues that every research study conducted has its own goal or aim it intends to achieve. It was therefore important for the researcher to choose the right kind of interview structure to be employed to answer the outlined research objectives. Information collected from the research respondents using the wrong interview structures would definitely lead to inaccurate results and the research is then more likely to be considered invalid. Considering the above, the researcher chose a unstructured interview approach to

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interview five Rustenburg Local Municipality officials. The advantage of choosing an unstructured interview is that the researcher was able to judge how the participants were responding to the questions being asked. Another advantage was that if the respondents did not understand a question, the interviewer could repeat it and gain the best insight from the interviewee. The last advantage of collecting data using unstructured interviews is that such interviews could be conducted anywhere: in a restaurant, at home, in a park or even via Skype, Microsoft Teams or WhatsApp. The researcher then made an appointment with the five municipal officials and they shared with the interviewer which method was best suited to them. If they had chosen to conduct it by Skype, for instance, then the researcher would have done so. The most preferred method of conducting interviews was face to face, however, and this was agreed to because this is the best because the investigator and the participants meet once, openly, and are able to read the participants' body language more easily.

Questionnaires were another method of primary data collection adopted by the researcher to collect information from the community members of Tlhabane. A questionnaire is always convenient when a researcher has to collect data from a large population (Alizadeh et al, 2019). Mwita (2022: 533) defines a research questionnaire as a document that is distributed to the targeted research participants to enable them to respond to questions proposed before an encounter with them. A well-constructed questionnaire can comprise either closed or open-ended questions. Because this study required the community members to express their views and opinions about the study phenomenon, the open-ended question format was used mainly, although some questions were closed. It was also important for the researcher to use either the local language of the majority or basic English language so that the research respondents would be able to read the questionnaire with understanding and provide honest responses. It does not really matter how the questionnaires are distributed; what is important is to receive feedback from the respondents on time.

The role of the community members in Tlhabane was to fill in their responses to questions that appeared on the open-ended and close-ended questionnaires and to return the form once they had completed it. As the researcher, it was my responsibility to speak to every research participant – or at least to as many of them as possible. however, open-ended questionnaires did provide an advantage to the researcher by ensuring that he does not speak to every research participant. Finally, the respondents were allowed to take their time filling in their answers, but in fact it took them only 5–10 minutes to do so.

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3.8 Techniques of data analysis

According to Kothari (2004), data analysis is a step that comes after the researcher has collected the data and has to analyse them by creating codes and patterns for further analysis to ensure that the research questions are answered. There are many methods for analysing qualitative data, including rhetorical, discourse and narrative analysis, but also the 'thematic method'. This method is most commonly used method in qualitative research as it is good for capturing the complexities of meaning in a textual dataset. The researcher chose the thematic method of analysis and followed the six steps of Braun and Clarke (2006) to critically analyse the data and transform them into meaningful ideas.

According to Ibrahim (2012: 10), thematic analysis is a method of data analysis that uses classifications and presents themes and patterns that relate to the data studied. Expressed differently, thematic analysis is a basic qualitative research method that equips researchers with critical skills for conducting other kinds of analysis that deal with identifying patterns or themes within qualitative research. The main aim of qualitative research is to identify themes or patterns of interest to the researcher that enable them to go about answering the research questions. If a thematic method of analysis is applied properly, it should make sense as it is more than just summarising information. Thematic analysis is the best tool to use for any research that seeks to discover reality through interpretations (Ibrahim, 2012). This approach to analysis assists the researcher in determining relationships between various concepts and opinions, enabling them to compare these pieces of information with other data collected at different stages of a research project. In a thematic analysis process, each identified statement contributes more knowledge to understanding issues, which leads to their gaining a comprehensive picture of the study phenomenon. At a later stage, concepts are constructed to give a full picture of a study phenomenon. In the light of the above, the researcher made it his responsibility to ensure that themes and patterns were monitored and evaluated to certify that they represent the text being studied. In the present study, the researcher himself transcribed the data. The researcher was proficient in all the local languages that were spoken in the community of Tlhabane; there was therefore no need to involve a third party to transcribe the data.

4. Research findings

In this section, the research findings from the 300 sampled community members of Tlhabane and the responses of the five sampled Rustenburg Local Municipality officials under the Directorate of Technical and Infrastructure (Water Supply Unit) are presented. To conceal the

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participants' identities, the following codes were used to represent the responses of community members and municipal officials: C1, C2, and C3 up until C300 were used to represent the responses of the community participants; E1, E2, and E3 up to E5 were used to represent the responses of the Rustenburg municipal officials. The data were presented using Braun and Clarke's (2006) six steps of thematic data analysis.

The first step was to become familiar with the data. After collecting data from the community members and the municipal officials, the researcher examined the data to familiarize himself with them. He noted and jotted down some of his early impressions. The second step in using Braun and Clarke's six steps was to generate initial codes. The investigator used this step to organise the data strategically and meaningfully, generating codes that helped to reduce the research participants' responses to smaller units of meaning. Following that, codes were created for each section of the data that was relevant to the identified research questions. The next step involved identifying and comparing the codes and responses that did not respond to the research questions, which, naturally, led to their removal.

The third step was to search for themes. The researcher used this step to start searching for themes by generating topics that would be key to responding to each identified research question. Appropriate codes were set to fit each identified theme. The fourth step involved reviewing the themes developed in step three and modified them where necessary. In this step of reviewing themes, the researcher generated sub-themes to acquire more information relevant to each theme developed in step three.

The fifth step was to define the themes, reviewing them and the sub-themes to check if they corresponded properly and whether they could relate to the research objectives and answer the research questions. In this research, themes referred to the research objectives and sub-themes referred to questions developed to obtain answers to the specific research objectives. The sixth step of thematic data analysis occurred at the end of the data presentation. This is where the final report of the data collected from the community members of Tlhabane and the identified municipal officials could be found. Finally, a conclusion was formulated to close this section.

4.1 Demographic profile of community members

4.1.1 Gender

220 males successfully participated in answering this research questionnaire; 80 females successfully participated in answering this research questionnaire.

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4.1.2 Race

280 research participants are black people; 20 are coloured people. There were no white research participants.

4.1.3 Age

All the sampled research participants' age ranged between 18 and above but not exceeding 67.

4.1.4 Marital status

Never married	Married	Divorced	Widowed
240 research participants disclosed that they had never been married.	60 research participants disclosed that they are married.	The researcher did not come across any divorced research participants.	The researcher did not come across widowed research participants.

4.1.5 Employment status

A total of 100 research participants disclosed that they are employed; 40 disclosed that they are unemployed; 160 disclosed that they are self-employed.

4.1.6 Migration

How many years have you been living in Tlhabane?	Where did you live before you came to Tlhabane?	What were the reasons that led you to live in Tlhabane?	Are you renting/built or bought the house you are living in?
45% of the research participants said they had lived in Tlhabane since birth. 55% of the research participants said they had lived in Tlhabane for 10 years. The highest year recorded was 25 years from one of the sampled research participants.	45% of the research participants said they had lived in Tlhabane since birth. 55% of the research participants said they came from other areas in North West province, and others said outside North West province.	45% of the research participants said Tlhabane was their home; they were born there. 55% of the research participants said they had come to Tlhabane due to work opportunities, business opportunities (selling chips, car wash, salon, spaza shop), better housing, and peace.	45% of the research participants said that they had bought houses. 55% of the research participants said they were renting houses, including the backrooms.

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4.2 Community questionnaire: findings

Section B: Research objectives: community inputs

1) ***Theme:*** *To identify and analyse the perspectives of water-supply needs in Tlhabane by community members.*

1.1) ***Sub-theme:*** *What are your perspectives about the current state of water supply in Tlhabane?*

All the community members responded by saying that the water that is supplied is very dirty.

One research participant (C5) mentioned that the water quality is no longer the same as when he was growing up. He highlighted that the water being supplied tastes as if it has not been treated with chemicals. All the research participants stated that the water that is supplied sometimes smells very bad. It tastes as though it has not been treated the way it should have been. The majority of the research participants (C1, C2, C3, C4 up to C280) expressed the view that the water is no longer nice and is absolutely not safe to drink. 'We fear that one might get sick from drinking it,' they said.

All the research participants indicated that most of the time there is no water. They store water in tanks, but once that is depleted, they suffer a lot. A large number of the participants (C5, C6, C7, C8 up to C300) remarked that the water being supplied is of poor quality, with low pressure.

One participant (C45), who owns a spaza shop, mentioned that the water quality is very bad and that one cannot drink tap water anymore. 'It is very tough,' he said. Another participant (C53), who owns a tyre company, stated that the challenges of water in Tlhabane are too many. He noted that it is difficult to run a tyre company in conditions with water-supply interruptions as the water is used in the day-to-day activities of patching tyres. Participant C53 added that it seems as if the local government is doing nothing because the supplied water contains rust and, most of the time, there is no water available.

Four research participants (C230, C256, C270 and C300) stated that water is life; without it, one cannot survive. Water needs to be supplied to proper standards; however, in Tlhabane, this is not the case. A spaza shop owner (C23) who specialises in selling chips, noted: 'It is not easy to run a business in an area such as Tlhabane that always experiences water interruptions.' The owner added that sometimes customers want to drink water or wash their hands before eating his food, but due to water-interruption it was difficult for him to provide them with water, leading to unhygienic conditions for his business.

A research participant (C39) indicated that the water problems in Tlhabane seem to suggest that there is no municipal official responsible for ensuring the provision of a clean, adequate water supply for all

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the residents. Three research participants (C40, C55 and C60) stated that they could go up to a week without water or any warning from the municipality. They expressed the view that it has become very difficult to live in Tlhabane lately, as one has to buy water constantly from shops, which is costly. During weekends, there are sometimes no water supplies and one has to wash laundry during the week at night after work. One participant mentioned that they always feare that someone could steal their hard-earned clothes from the washing line. 'Water has become a big problem,' they said. Three of the research participants (C70, C71 and C80) suggested that the municipality was led by opportunistic individuals who are failing the community. They noted that the water supplied is sometimes brown and the community cannot drink that water or even wash their clothes with it.

1.2) Sub-theme: *Are you happy with the quality of the water supplied in Tlhabane?*

All 300 of the research participants said that they are not happy with the water quality supplied.

1.3) Sub-theme: *Is the water that is supplied drinkable?*

A total of 20 research participants said yes, but at one's own risk; 280 said no, the water supplied to the community is not drinkable.

1.4) Sub-theme: *Do you buy water in the shops to drink instead of drinking water supplied in Tlhabane?*

All the identified 300 research participants said they buy their water for drinking from the shops; they do not drink the water supplied by the local municipality and that affects their budgets.

1.5) Sub-theme: *What do you mainly use water for that is supplied in Tlhabane?*

Three research participants (C89, C101, and C123) who operate carwash businesses indicated that they use water mainly to wash cars, while those participants who own spaza shops primarily use water to keep their businesses clean. Participants in tyre companies stated that they use water to determine whether tyres are leaking or punctured. In the hair salon business, they rely on a supply of water to wash or relax customers' hair, which requires clean water. The majority of the research participants (C1, C2, C3, C4, up to C290) reported that they use water for cooking, cleaning, bathing, flushing toilets, watering gardens, hygiene purposes and washing laundry, and boiling water to prepare hot beverages such as coffee and tea.

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1.6) ***Sub-theme:*** *How do the days when there is absolutely no water running out of taps in Tlhabane affect your life?*

One research participant (C63) responded by saying it affects their health as they have to use buckets to flush their toilets. Also, when they have to clean anything, they do not clean properly because they can use only a little water for cleaning, which makes life unbearable since they have small children to look after. One participant (C130), who is a community member in Tlhabane, said that when there is no water, there is nothing they could do.

Carwash owners (C89, C101 and C123) stated that they struggle to make money as their businesses rely on water to operate. They added that they struggle to meet their basic needs and, furthermore, have to buy water elsewhere, which is very costly. A salon owner (C43) mentioned that it is difficult to operate a business as their core business is to wash and relax customers' hair; there is no way to wash or relax customers' hair using dirty water. One participant (C67) who rents a room in Tlhabane said there is nothing they can do when there is no water at all. They cannot bathe or cook and, in addition, they have to go far to buy water, which is very expensive. Water is a real necessity.

A local tyre business owner remarked that without water everything comes to a standstill and they cannot operate their business. For instance, there is no way they can check tyre pressure without using water. The participant added that water is a real need for their business. A spaza shop owner (C23) who sells chips responded by saying that when there is no water, business is not profitable as they have to buy bottled water from local shops. Sometimes customers want to wash their hands before they eat, and there is no water for that. There is nothing he can do to provide them with water. Another participant (C97), who is a teacher at a local public school, said that when there is no water, unfortunately, learners have to be dismissed earlier from school than usual, which compromises learning. The participant said this is due to the fact that they do not have enough JoJo tanks to store the water that would sustain them for longer periods when there is no water. However, in private schools, teaching and learning are not affected when there is no water because they are provided with boreholes and JoJo tanks to keep them going in case their taps run dry. Another participant (C244) stated that when there is no water, some government departments have to close earlier than usual, which effectively denies community members access to services.

1.7) ***Sub-theme:*** *What are some of the steps that you take for yourself to ensure that you have water during the period when there is no water in Tlhabane?*

Eighty per cent of the research participants said they use buckets, five-litre bottles, containers, and JoJo tanks to store water for the days when

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there would be no water, even though that approach is not enough to sustain them for long. This is because they could go for many days without water and without any form of communication from the municipality.

Five participants (C66, C77, C81, C92 and C179) mentioned that they buy water and use it during the days when there was no water running from the taps. One participant (C44) stated that he harvests rainwater during the rainy season, although it does not rain often. He added that he stores water in containers, even though it is not enough to meet his needs, and he said a JoJo tank would have been helpful.

1.8) ***Sub-theme:*** *Do you think the Rustenburg Local Municipality assists with other means to provide water on the days when there is absolutely no water running out of the taps in Tlhabane?*

Eighty per cent of the research participants responded by saying the municipality is not doing enough to provide them with water on the days when there is no water in Tlhabane. Five per cent of the participants said there are water trucks that provide them with water, but that they are not sufficient considering Tlhabane's large population.

Ten per cent of participants stated that sometimes they see water trucks moving around, but they hardly came to their rescue. They added that there are community members who used their personal resources to provide the community with water, but the municipality does not meet them halfway. Five per cent of the participants said the municipality does not do anything to provide them with water, even if they have to go for days without it; their suffering continued until the cows came home.

1.9) ***Sub-theme:*** *Do you think that the Rustenburg Local Municipality is informing the Tlhabane community of the days when there will be no water?*

Fifteen per cent of the research participants said that sometimes they inform them, using the WhatsApp community group chat. But for those without social media, they do not inform them at all; those residents discover that there is no water only when they open their taps. Fifteen per cent of the participants with social media stated that they sometimes receive notifications through the local municipal Facebook page. Seventy per cent of the identified respondents said they do not receive any communication from the local municipality at all. They added that the local municipality hardly reaches out to them, so they have to make alternative plans.

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2) ***Theme:*** *An investigation of the challenges faced by the Rustenburg Local Municipality in ensuring a reliable water supply.*

2.1) ***Sub-theme:*** *What do you think are the main challenges of water supply in Tlhabane?*

All the research participants responded by saying that the old and ageing water infrastructure, along with the rapidly growing population, are the main reasons that make it difficult for the local municipality to provide the community with a reliable water supply. Five participants (C77, C80, C85, C101 and C260) blamed the situation on a lack of accountability, a 'don't care' attitude and poor town planning. They believed that if the municipality had cared about delivering good service, it should have planned for such challenges. The municipality provides the community with water of poor quality, which is a contravention of the Constitution of the Republic of South Africa.

Four research participants (C44, C55, C90 and C130) believe that the challenges could have stemmed from aged pipes and constant pipe bursts. Five participants (C43, C57, C66, C180 and C191) think that the municipality might not have had enough money to renew the old water infrastructure and provide everyone with a reliable water supply. One group of four participants (C1, C2, C7 and C10) stated that the municipality is the main problem as it is responsible for providing the community with water.

One participant (C100) believes that corruption could have been a factor leading to the water challenges and the awarding of tenders to the wrong service providers. In addition, five participants (C11, C34, C55, C101 and C123) believe that the water problem might have been caused by poor management practices on the part of the municipality rather than a shortage of staff. They argue that if it had not been for bad management, the municipality would have alerted the public in advance about any planned water cuts and the expected restoration dates.

Four participants (C2, C6, C11 and C30) noted that new housing developments, including RDP houses and rental backrooms, have created significant problems as some community members are accessing water for free without paying for it. This situation greatly affects the municipality's capacity to supply water to the community. Finally, four participants (C44, C43, C67 and C70) indicated that they believe that the political parties running the municipality are not doing enough to resolve the water crisis because they do not budget sufficient funds to tackle this challenge.

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2.2) Sub-theme: *What do you think can be done to solve the challenges of water supply in Tlhabane?*

Four research participants (C23, C71, C80 and C82) stated that the municipality should have implemented pipe maintenance regularly and replaced the old water infrastructure with new ones to cater for the rapidly growing population as they had never struggled with water before. They suggested that the municipality should build water-storage facilities which could be used when there was no water supply. Three other participants (C19, C25 and C111) believe that the municipality should have built enough water reservoirs, which would have been helpful during times of water shortages.

Three more participants (C22, C43, and C55) noted that it was time for the municipality to educate people, even those living in RDP housing, that water is not free. They emphasized that the community should have been encouraged to pay for water to learn how to use it wisely. Another three participants (C16, C17, C22) suggested that proactive new staff should have been recruited to the municipality to improve water availability.

Four of the research participants (C119, C180, C191 and C200) mentioned that the municipality should have been held accountable as the community has suffered from the consequences of water unavailability for a long time. They insisted that if the municipality did not fulfil its role, the community would continue to suffer. They stressed that the municipality needs to prioritize the supply of enough water.

In addition, three other participants (C201, C206 and C230) believe that the municipal manager needs to change his or her attitude towards providing water services to the local community. They feel that while the resources and capacity are available, the negative attitude of government officials is the main issue. These participants asserted that if quality water were to be supplied, people would be willing to pay for water services; but no one wants to pay for the brown water coming from the taps.

Finally, some participants (C222, C233 and C240) believe that the municipality should have educated the community about taking care of their water infrastructure, as there has been a troubling trend of stealing water meters and other supplies meant to deliver water to the community. This has been causing significant problems due to the loss of water through such illegal activities. They concluded that the municipality should also have voiced the challenges it was experiencing to prevent the community from panicking and striking due to a lack of information about what was happening.

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3) ***Theme:*** *An exploration of opportunities to enhance water-supply management in Tlhabane.*

3.1) ***Sub-theme:*** *Do you think there are water-supply companies that can address the issue of water supply in Tlhabane?*

A total of 100 research participants believe that there are other water-supply companies that could resolve the issue of water supply in Tlhabane. Another 200 believe that there are no other companies that can do so.

3.2) ***Sub-theme:*** *Do you think local community companies which are supplying water are well supported to address the issue of water supply in Tlhabane?*

A total of 60 research participants said yes, but added that these companies did not have the capacity to supply the whole of Tlhabane; in contrast, 240 participants believe that local community companies are not well supported in doing so.

3.3) ***Sub-theme:*** *Do you think there will be water-supplying companies in the future that are really going to assist Tlhabane better?*

A total of 100 research participants said yes, they believe that more companies would come as the water challenges are a great concern that needs to be resolved. But they believe that this would happen only if they were supported by the Department of Water and Sanitation and the local municipality financially.

Another 200 participants responded by saying no, they believe that it is the duty of the municipality and that water should continue to be supplied by the municipality.

4.3 Interviews with the Rustenburg Local Municipality officials: findings

Presentation of the in-depth interview results with the five Rustenburg Local Municipality officials under the Directorate of Technical and Infrastructure (Water Supply Unit)

Section A

1) ***Theme:*** *Background of the staff employed in the Directorate of Technical and Infrastructure (Water Supply Unit)*

1.1) ***Sub-theme:*** *How many staff members are employed in the Directorate of Technical and Infrastructure (Water Supply Unit?)*

The information acquired from the five municipal officials indicated that the Directorate of Technical and Infrastructure (Water Supply Unit) was divided into the following sub-units: Water Quality Unit, Water Maintenance Unit, Bulk Water Unit, and Engineering Unit.

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The total number of staff members employed is 240, of whom seven are employed temporarily. The positions of these employed staff members range from general workers to supervisors and unit managers.

1.2) ***Sub-theme:*** *What is the gender category of the staff officials employed (how many males and females are there)?*

The total number of males employed is 161. The total number of females employed is 79.

1.3) ***Sub-theme:*** *What is their estimated age group?*

The employed staff members' age ranges from 26 to 60 years.

1.4) ***Sub-theme:*** *What is their estimated level of education?*

The response received from E1, E2, E3, E4, and E5 was that everyone employed had a matric certificate, and there were staff members with university and college qualifications. All the staff members employed had successfully met the minimum requirements of the positions they were appointed to.

1.5) ***Sub-theme:*** *Are they all qualified to work in the Directorate of Technical and Infrastructure (Water Supply Unit)?*

Yes, all the staff members employed are qualified and have successfully met the minimum requirements of the positions they were appointed to.

1.6) ***Sub-theme:*** *If no, are there training/support programmes to induct them about the work being done in the Directorate of Technical and Infrastructure (Water Supply Unit)?*

The response received from E1–E5 was that educational training programmes for empowerment were there and offered by the municipality's HR (Human Resources) department. For example, one would be trained and be issued a trade certificate for being a plumber.

Section B

1) ***Theme:*** *Water in Tlhabane*

1.2) ***Sub-theme:*** *What are the historical challenges of water supply in the Rustenburg Local Municipality, specifically in Tlhabane?*

The officials (E1–E5) responded by saying that, in Tlhabane, there has been a backlog of old pipe infrastructure that needed to be replaced, constant pipe leaks and bursts, and a shortage of water supply from the Magalies Water Board. Water in Tlhabane is supplied by Magalies Water, which faced challenges in supplying water, including a low capacity to provide for everyone they needed to serve. When their

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pipes broke, it became very difficult to supply water to everyone who depends on Magalies Water.

The officials (E1–E5) added that water quality has historically been a challenge. Magalies Water has been supplying raw water that is not purified, which sometimes results in the water being brown, especially when it flows from the reservoirs. The officials also noted that the population in Tlhabane has rapidly increased to the point where the potable water supply of megalitres is no longer sufficient to cover the entire population of Tlhabane, 24 hours a day, 7 days a week.

1.3) Sub-theme: *What has the Rustenburg Local Municipality been doing to mitigate the challenges?*

The identified municipal officials (E1–E5) stated that there is a new project they are about to implement to change the aged water infrastructure. This project includes changing the old AC pipes (asbestos cement pipes) and replacing them with HDPE pipes (high-density polyethylene pipes) and PVC pipes (polyvinyl chloride pipes) because they are easier to repair and last longer than the asbestos cement pipes, which last for a shorter period and are difficult to repair.

The officials added that there are new water-quality projects aimed at cleaning the water reservoirs in order to supply clean potable water to the community of Tlhabane. All the officials mentioned that they conduct educational awareness programmes to encourage the Tlhabane community to save water. Finally, all the officials indicated that there is a new programme from the Pilanesberg water scheme being implemented to augment the water supply in Tlhabane.

1.4) Sub-theme: *How many water reservoirs supply water to Rustenburg Local Municipality, specifically in Tlhabane?*

All the identified officials said that the municipality has a total of 58 water reservoirs and that of these two water reservoirs supply water to Tlhabane, known as the Tlhabane Upper Reservoir and the Tlhabane Lower Reservoir. These two reservoirs of Tlhabane receive water from the Bospoort reservoir, which is the main reservoir that receives water directly from the Magalies water scheme.

1.5) Sub-theme: *Are these reservoirs enough to supply water for the whole community of Tlhabane?*

Sixty per cent of the municipal officials stated that, with water supply, they work on the demand per household. Tlhabane's population has grown to a level that the available water reservoirs could not supply reliable water to its community for 48 hours. Therefore, the existing reservoirs and water schemes are insufficient, which has prompted them to work on developing a new water scheme in Pilanesberg to increase the water supply to Tlhabane and other areas.

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Forty per cent of the municipal officials believe that the available reservoirs are sufficient to supply water to Tlhabane. They asserted that whereas their capacity is sufficient, the water supply to these reservoirs is inconsistent. Without a consistent supply, the community will suffer from shortages. These reservoirs (Tlhabane Upper and Tlhabane Lower), when filled to their maximum capacity, can last for about only 7 to 8 hours. Consequently, they need to be refilled consistently by the supplier, Magalies Water. The flow is constructed in this manner: water comes from Magalies Water to the large reservoir in Rustenburg, known as the Bospoort Reservoir, situated in Kanana, and it is then supplied to the two reservoirs.

1.6) Sub-theme: *Where are these water reservoirs located?*

All the identified officials said in a place called Lefaragatlhe towards the end of the Tlhabane area.

1.7) Sub-theme: *What is their capacity?*

All the identified officials said that Tlhabane Lower's capacity is estimated to be 4 500 kilolitres. All the officials said Tlhabane Upper consists of two reservoirs with a capacity estimated to be 5 000 kilolitres each.

1.8) Sub-theme: *What other water schemes supply water to Rustenburg Local Municipality, specifically in Tlhabane?*

All of the identified officials said there has been a joint supply between Rand Water and Magalies Water that supplies water to Rustenburg Local Municipality. The water that Tlhabane receives comes from Magalies Water and is purchased by the municipality.

1.9) Sub-theme: *In an event where there is no water in Tlhabane, what would be the problem?*

Sixty per cent of the identified municipal officials stated that there might have been a major pipe burst leading to the Upper and Lower reservoirs being closed temporarily to save water. Sometimes finding the right equipment and fixing that major pipe can take days, resulting in the community not having access to water until the pipe is repaired.

Forty per cent of the identified municipal officials mentioned that there have been instances when there is no water supply from Magalies Water. This is due to Magalies Water facing challenges of limited capacity as they are supplying different areas with their water. Sometimes, the municipality closes the water sources at night to pump and refill reservoirs with water to be used by the community once these reservoirs are filled to capacity.

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1.10) Sub-theme: *What is the maximum number of days where water was not supplied to Tlhabane?*

The municipal officials responded by saying it is three days, but they send a communique to the community through the municipal Facebook page and community WhatsApp group chat, and also the councillors spread the communique among the community.

1.11) Sub-theme: *Does the Rustenburg Local Municipality make other plans to provide water in Tlhabane in cases where there is no water coming out of the taps?*

All of the identified officials said the municipality sends water trucks to supply water, even though it is not enough, but at least it was not like nothing at all.

1.12) Sub-theme: *What is the estimated capacity of water supplied to Tlhabane on a daily basis?*

The response received from all of the identified officials was that it does not exceed an estimate of 20 megalitres.

1.13) Sub-theme: *What is the estimated capacity of water lost through a pipe burst?*

All of the officials said they are not sure and that it depends on when the pipe burst is reported.

1.14) Sub-theme: *Over the years, how much has the Rustenburg Local Municipality spent on replacing damaged water pipes?*

All of the officials said the amount was in millions, but they could not state the exact amount in actual figures.

1.15) Sub-theme: *Have the community members in Tlhabane been paying for water usage?*

If no, what happens to community members who are using water but not paying for it?	**If yes, what pushes community members to pay for water? Is it part of the standard operating procedures?**
Officials E1 and E5 said that only a few paid, but many did not pay. There were many illegal connections, and the meter readers reported to the municipality. Those with illegal water connections in their houses were fined by the municipality. The municipality also switched off access to water for those who made illegal connections. Official E4 stated, 'Out of 10, I would say 3 were paying for water, and for those using water without paying for it, there was nothing the municipality did at that time to fine them.'	The majority of the officials (E2, E3, and E4) indicated that those who paid for water were accountable and responsible citizens, but the municipality did not apply pressure on them.

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Section C

1) ***Theme:*** *Perceptions/preferences*

1.1) ***Sub-theme:*** *In Tlhabane, does every household have a proper operating meter?*

All the identified officials said, yes, every household does have a proper operating meter.

1.2) ***Sub-theme:*** *Are the meters installed bringing enough revenue to the Rustenburg Local Municipality for it to maintain its duty of supplying potable water to the community members of Tlhabane?*

All the identified officials said no; most of the community members are not paying their water bills. For those who are paying for water every month, their money did not bring in enough revenue to the municipality to maintain its services to the community. The municipality has stopped issuing letters every month as they used to before to remind community members who were owing water bills to pay.

1.3) ***Sub-theme:*** *What opportunities are there for Tlhabane regarding ensuring that there is reliable provision of water?*

The response received from all the identified officials was that there are new opportunities from the DBSA (Development Bank of Southern Africa) that aim to fund the municipality in upgrading its water infrastructure. Another response received from the all the officials was that new water projects are needed to bring sufficient water and that one is currently underway, which is a 30 megalitre reservoir.

1.4) ***Sub-theme:*** *Are there water scheme companies willing to assist Tlhabane in supplying reliable water?*

All the officials responded by saying that, so far, they have Magalies Water, Randwater and Water and Sanitation Services South Africa (WSSA) on board in supplying water, a scheme run by the Rustenburg Municipality Water Services Trust. The municipality is in the process of opening a new water scheme in Pilanesberg to boost the water supply in the local communities of Rustenburg, including that of Tlhabane.

1.5) ***Sub-theme:*** *What is the Rustenburg Local Municipality doing to ensure that there is reliable quality water provision in Tlhabane?*

The identified municipal officials said the municipality is working on opening a new water scheme in Pilanesberg to supply enough water to the local communities, including Tlhabane. They are also focusing on new water projects to boost the water quality and maintain proper provision to the community.

Official E3 mentioned that the municipality has established a dedicated team for water quality that tests the water in their laboratory

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to ensure that they supply water of a reliable quality to the community. Official E1 stated that the municipality is working on new water projects in Tlhabane to change the old water infrastructure, which constantly broke down.

4.4 Research findings: conclusion

This section presented the research findings from the sampled community members of Tlhabane and the identified Rustenburg Local Municipality officials who fall under the Directorate of Technical and Infrastructure (Water Supply Unit). This conclusion provides a summary of the outcomes and results emanating from the problem statement and research objectives.

Perspectives on water supply in Tlhabane:

- Community members expressed frustration at the unreliable access to water.
- Many residents lack confidence in the municipality's ability to provide sustainable water services.
- There is a growing reliance on self-supply methods, such as boreholes, storing water in containers, including JoJo tanks, and rainwater harvesting.

Challenges faced by the Rustenburg Local Municipality:

- Ageing infrastructure (eg, asbestos-cement pipes) leads to frequent pipe leaks and bursts.
- Limited financial resources that hinder infrastructure maintenance and upgrades.
- High levels of water loss due to inadequate pipeline maintenance.
- Community protests due to persistent water shortages.

Opportunities for improvement: there is an urgent need to

- upgrade the water distribution infrastructure to reduce leaks and wastage.
- strengthen public–private partnerships for better water management.
- encourage community participation in water conservation efforts.
- leverage alternative water sources such as recycled water and sustainable supply strategies.

The research findings indicate that, on numerous occasions, the residents of Tlhabane lacked access to water. This situation compelled community members to store water in various containers and tanks.

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The persistent problem of water interruption significantly affected individuals' plans and business operations, given that water is a fundamental necessity. Furthermore, the water supplied to the community was often contaminated and rust-coloured, posing potential health risks.

Recently, living conditions in Tlhabane have become increasingly challenging, as residents frequently needed to purchase water from shops, resulting in an additional financial burden. It was reported that, for extended periods, the municipality provided water that was not only dirty but also unsuitable for consumption. The lack of notification from the municipality regarding water shortages sometimes lasting up to a week raised significant concerns regarding the authorities' commitment to their responsibilities.

The municipality is tasked with informing community members about scheduled water outages; however, there was a noticeable inconsistency in these communications. It became evident that if certain community members lacked the financial resources to purchase water from retail outlets, and their limited stored water was exhausted, they would suffer significantly until access to water was restored.

The research findings indicate that the absence of water significantly detract from the quality of life for individuals within the community of Tlhabane. The water crisis has rendered living conditions intolerable, particularly for vulnerable populations. Individuals with sensitivities were especially prone to health problems stemming from the unhygienic circumstances caused by inadequate access to water. Moreover, community members operating businesses dependent on water resources faced considerable challenges in fulfilling their basic needs.

In addition, the early dismissal of learners or students from educational institutions due to a lack of water constituted a denial of their constitutional right to education. Particularly those from financially disadvantaged backgrounds should not have been subjected to such hardships because of a water scarcity; they have a legitimate right to pursue their education without disruption. Furthermore, during periods of water scarcity in Tlhabane, government departments often closed their offices earlier than usual, in this way restricting public access to essential services. It is indeed unjust for citizens to visit government facilities, only to encounter closures attributed to insufficient water supplies.

The findings of this research further highlight the fact that the local municipality has not adequately responded to the water needs of the Tlhabane community. Although water trucks were deployed, they proved to be insufficient to meet the demands of the continually growing population.

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The research findings reveal that the Rustenburg Local Municipality has never had a viable plan in place to address the water issues in the past. Knowing very well that Rustenburg was continuously becoming a destination for many job-seekers due to its mining industry, the municipality should have developed a plan for maintaining a good water supply service under the conditions of an increasing population. The municipality should have formulated a plan for servicing old water infrastructure, which was the cause of the community's current concerns about water denial. In addition, there was a lack of accountability in the municipality, as it had existed for many years providing water service to the community of Tlhabane without planning and budgeting for future pitfalls such as the current water crisis. The municipality needed to make officials accountable and, where necessary, charge them for not complying with their standard operating procedures, rather than blaming previous administrations for the issues occurring at that time.

The research findings also reveal that corruption and the awarding of water maintenance tenders to the wrong service-providers is likely to destroy future generations' access to an adequate clean water infrastructure. The findings have also indicated that the water problems in the municipality are caused by a lack of knowledge, proper skills and a shortage of well-trained staff in the municipality. In addition, new housing developments, including RDP houses and backrooms for rental have created significant problems as many residents use water without paying for it. This has greatly affected the capacity of the municipality to supply water to the community.

The research findings highlight the reality that the political parties running the municipality do not do enough to solve the water crisis. There is an element of ignorance on the part of the local municipality in providing sound water service delivery to its community. Moreover, the staff members are not competent enough to manage the water supply in the municipality. The municipality therefore continues to fail to resolve the issue of people using water without paying for it, lacking strict laws that could be implemented to encourage all community members to pay for water.

In addition, the findings reveal that in Tlhabane every household has a properly operating water meter. However, the meters installed do not bring in enough revenue to the municipality for it to maintain its duty to supply water to the community. In addition, using water without paying for it is the main problem that other responsible citizens experienced because the municipality could not generate enough money to sustain its services to the community as a whole.

The findings also reveal that the local municipality has been failing to resolve the problem of aged water infrastructure for some time. Instead of replacing the old water infrastructure, which constantly

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bursts and leads to pipe leaks, the municipality has been maintaining it only intermittently. This approach is not costly; however, it overlooks the fact that, a few years later, the water infrastructure will break down again. In addition, the Tlhabane community does not have enough water reservoirs to cater for the entire population. The two reservoirs that were built more than 20 years previously are no longer adequate to provide sufficient water for the ever-growing population of Tlhabane. Moreover, closing reservoirs at night to fill them with water has not ensured that the available reservoirs, even when filled, are sufficient to meet the needs of Tlhabane's residents.

Moreover, the research findings indicate that the municipality has not been keeping water records for statistical purposes. Recording water statistics would have enabled the local municipality to start maximising its water services. Furthermore, it has not documented the amount of money spent on replacing and maintaining the water infrastructure. Keeping records of the work done and the expenses incurred would have greatly assisted in eliminating potential corruption, if it existed. Moreover, the municipality has not found a solution to the problem of illegal water connections and community members who were using water without paying for it.

The research findings show that the majority of the community members do not believe that bringing in other companies could serve to resolve the issue of the water supply in Tlhabane, as they feel it is the municipality's duty to do so. A minority of the community members believe that other companies and opportunities could resolve the water-supply issue only if they are supported by the local municipality. This perspective is imperative, as the problem with the water supply is unlikely to end soon, given the increasing population and the continuous demand for more water.

Even though the municipality is in the process of opening a new water scheme in Pilanesberg to boost the water supply in the 63 238 households of Rustenburg Local Municipality, including Tlhabane, the research findings reveal that there are no other water scheme companies willing to assist Tlhabane with supplying reliable water at this time. Currently, the only ones that could be relied on are Magalies Water, Randwater and Water and Sanitation Services South Africa (WSSA), which are run by the Rustenburg Municipal Water Services Trust. It is therefore recommended that the municipality identify other water-supplying schemes to boost the supply of water feeding into Tlhabane and the surrounding areas. This will help greatly to resolve the water crises that keep recurring.

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5. Recommendations

Arising out of the findings derived from both the community members and the municipal employees responsible for the water supply to Tlhabane, the following recommendations can be made:

- Water-supplying companies will be essential to resolving the increasing water-supply challenges faced by Tlhabane in the future.
- It is imperative that the local municipality conduct regular maintenance and replace the ageing water infrastructure with modern systems that accommodate a growing population.
- The local municipality should ensure adequate water storage for the community to use during periods of supply disruption. This can be achieved by constructing sufficient water reservoirs.
- The local municipality must engage in community education, emphasising that water is not a free resource. It is important to encourage residents, including those living in RDP houses, to pay for water services, which will foster responsible usage.
- To enhance water management and supply, the local municipality should recruit suitably qualified personnel dedicated to these functions. The municipality must also be held accountable to the community it serves.
- The municipal manager and the Water Supply Unit manager must implement changes in their approach to providing water services, prioritising the supply of high-quality water to the Tlhabane community. Only with an assurance of delivering quality water will residents be willing to invest in water meters.
- Furthermore, the municipality should educate community members on safeguarding their water infrastructure and deal with matters such as the theft of water meters and pipes, which contributes to significant water loss.
- Transparent communication about ongoing challenges is vital to prevent community unrest stemming from uncertainty during water-supply outages.
- Community members should be urged to invest in JoJo tanks and water storage containers as interim solutions during supply disruptions. While this may pose a financial burden, reliance on municipal services may lead to ongoing disappointment.
- Individuals are also encouraged to harvest and store rainwater for times when municipal supply is halted.
- The local municipality must commit to effective and efficient service delivery.

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- A comprehensive plan must be developed to tackle water-supply issues in response to the population increase in Tlhabane.
- In addition, the municipality should prioritise the purification of its water supply and work towards obtaining International Blue Status for drinking water quality.
- To support local small businesses – such as hair salons, car washes, tyre companies and spaza shops the local municipality should consider donating JoJo tanks to facilitate their operations without interference from water-supply interruptions.
- In instances of water outages, it is essential for the municipality to issue communications to the residents in the affected areas detailing the nature of the problem and the estimated resolution time.
- Schools that are forced to close due to water-supply issues impede students' constitutional right to education. The municipality should identify such schools and provide them with sufficient JoJo tanks to ensure that uninterrupted teaching and learning take place.
- Similarly, government departments that are compelled to close early due to a lack of water hinder community access to essential services; therefore the local municipality must prioritise the provision of JoJo tanks to these departments' offices.
- The municipality must consistently deploy water trucks to replenish residents during outages and establish a centralised location for community members to collect water from.
- Accountability among municipal officials is essential; those failing to comply with standard operating procedures should be subject to appropriate consequences.
- Efforts should be made to discontinue the partnerships with underperforming service providers and to establish and enforce bylaws that encourage timely payment for water usage.
- The local municipality should issue warning letters to delinquent account-holders to encourage compliance with and adherence to their payment obligations.
- Furthermore, the development of additional water-supply schemes, serving as alternatives to Magalies Water, must be prioritised.
- The municipality should also enhance its water reservoirs to ensure a reliable water supply.
- Regularly recording water statistics would provide crucial insights into water loss and consumption patterns, enabling the municipality to optimise its water services effectively.

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6. Conclusion

The motivation for this study, the study methodology, the findings derived from both a survey conducted among community members and an interview held with a group of municipal employees were set out above, as was a set of recommendations offered by the researcher aimed at enhancing service delivery to the Tlhabane community in the light of the ongoing water crises. It is contended that the effective implementation of these recommendations will lead to the resolution of the existing water-supply constraints. These recommendations are designed to aid the Rustenburg Local Municipality in improving water services for the community by addressing water shortages. Such improvements are expected to foster economic development, create or restore employment opportunities and promote peace and stability in the region.

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Annexures

Annexure A: Questionnaire for the community members of Tlhabane

Perspectives, challenges, and opportunities for water-supply management in Rustenburg. A case study of Tlhabane

Researcher: *Tsie Omphile Mathope*

Questionnaire for the community members of Tlhabane

Name:

Address:

Section A: Modernised Demographic Profile of the Research Respondents

Gender: *(please tick below)*

Male	Female

Nationality: _____

Race: *(please tick below)*

Black	White	Coloured

Age: *(please tick below)*

18–22	43–47
23–27	48–52
28–32	53–57
33–37	58–62
38–42	63–67

Marital status: *(please tick below)*

Never Married	
Married	
Divorced	
Widowed	

Employment status: *(please tick below)*

Employed	Unemployed	Self-employment

Migration

How many years have you been living in Tlhabane?
Where did you live before you came to Tlhabane?
What were the reasons that led you to live in Tlhabane?
Are you renting/built or bought the house you are living in?

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Section B: Research Objectives

- ***To identify and analyse the perspectives of water-supply needs in Tlhabane by community members.***

  1) What are your perspectives about the current state of water supply in Tlhabane?

  2) Are you happy with the quality of water supplied in Tlhabane? *(please tick below)*

Yes	No

  3) Is the water that is supplied drinkable? *(please tick below)*

Yes	No

  4) Do you buy water in the shops to drink instead of drinking water supplied in Tlhabane?

  5) What do you mainly use water for that is supplied In Tlhabane?

  6) How do the days when there is absolutely no water running out of taps in Tlhabane affect your life?

  7) What are some of the means that you make for yourself to ensure you have water at the time where there is no water in Tlhabane?

  8) Do you think the Rustenburg Local Municipality is making other means to provide water on the days where there is absolutely no water running out of taps in Tlhabane?

  9) Do you think that the Rustenburg Local Municipality is informing the Tlhabane community of the periods where there will be no water?

- ***To investigate the challenges faced by the Rustenburg Local Municipality in ensuring a reliable water supply.***

  1) What do you think are the main challenges of water supply in Tlhabane?

  2) What do you think can be done to solve the challenges of water supply in Tlhabane?

- ***To explore opportunities and to enhance water-supply management in the Rustenburg Local Municipality, specifically in Tlhabane.***

  1) Do you think there are water-supply companies that can address the issue of water supply in Tlhabane? *(please tick below)*

Yes	No

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2) Do you think local community companies which are supplying water are well supported to address the issue of water supply in Tlhabane? *(please tick below)*

Yes	No

3) Do you think there will be water-supplying companies in the future that are really going to assist Tlhabane better? *(please tick below)*

Yes	No

Thank you

Annexure B: In-depth interview with five Rustenburg Local Municipality officials within the Directorate of Technical & Infrastructure (Water Supply Unit)

Title: Perspectives, challenges, and opportunities for water supply management in Rustenburg. A case study of Tlhabane

Researcher: Tsie Omphile Mathope

In-depth interview with five Rustenburg Local Municipality officials under the Directorate of Technical & Infrastructure (Water Supply Unit)

Introduction

Greetings

The researcher will introduce himself to the interview respondent

The researcher will explain to the interview respondent that his conducting research about the perspectives, challenges and opportunities for water supply management in Rustenburg, a case study of Tlhabane.

The researcher will explain to the interview respondent that questions related to water supply challenges will be asked. The researcher would like the interview respondent to answer all questions in detail and be honest.

Confidentiality

The researcher will explain to the interview respondent that all the information collected will be kept safe and confidential.

Study identifiers

The researcher will assure the interview respondent that anything he say will only be used for the purpose of this research.

Interview guide

- How are you doing today?
- The interview has 25 questions and the duration of the interview can take up to 15 to 30 minutes depending on how fast the interview respondent is.
- The researcher is not going to harm the interview respondent, only questions will be asked.

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A) Background of the staff members occupied within the Directorate of Technical and Infrastructure (Water Supply Unit)

1) How many staff members are occupied within the Directorate of Technical and Infrastructure (Water Supply Unit)?
2) What is the Gender Category of the staff officials employed (How many Males are there and Females)?
3) What is their estimated age group?
4) What is their estimated level of Education?
5) Are they all qualified to work under the Directorate of Technical and Infrastructure?
6) If no, are there training/support programmes to induct them about the work being done under the Directorate of Technical and Infrastructure?

B) Water in Tlhabane

1) What are the historical challenges of water supply in the Rustenburg Local Municipality, specifically in Tlhabane?
2) What has the Local Municipality been doing to mitigate the challenges?
3) How many water reservoirs supply water to Rustenburg Local Municipality, specifically in Tlhabane?
4) Are these reservoirs enough to supply water for the whole community of Tlhabane?
5) Where are these water reservoirs located?
6) What are their capacity?
7) What other water Schemes supply water to Rustenburg Local Municipality specifically in Tlhabane?
8) In an event where there is no water in Tlhabane what would be the problem?
9) What is the maximum number of days where water was not supplied to Tlhabane?
10) Does the Rustenburg Local Municipality make other plans to provide water in Tlhabane in cases where there is totally no water coming out of the taps?
11) What is the estimated capacity of water supplied to Tlhabane on daily basis?
12) What is the estimated capacity of water lost through a pipe burst?
13) Over the years how much has the Rustenburg Local Municipality spent in replacing damaged water pipes?

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14) Have the Community members in Tlhabane been paying for water?
   – If **no,** what happens to community members who are using water but not paying for it?
   – If **yes,** what pushes community members to pay for water? Is it part of the standard operating procedures?

C) ***Perceptions/preferences***

1) In Tlhabane does every household have a proper operating meter?
2) Are the meters installed bringing enough revenue to the Local Municipality for it to maintain its duty of supplying potable water to the community members of Tlhabane?
3) What opportunities are there for Tlhabane with regard to ensuring that there is reliable provision of water?
4) Are there water schemes companies willing to assist Tlhabane with supplying reliable water?
5) What is the Rustenburg Local Municipality doing to ensure that there is reliable quality water provision in Tlhabane?

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