INFRASTRUCTURE MASTER PLAN 2019-2029
PHASE 1 (WATER AND SANITATION)

DATE: 26 FEBRUARY 2019

MATJHABENG LOCAL MUNICIPALITY

CONTENTS

OFFICIAL SIGN-OFF

It is hereby certified that the **Matjhabeng Local Municipality Infrastructure Master Plan 2019-2029 Phase 1 (Water and Sanitation)** was developed under guidance of the council of Matjhabeng Local Municipality.

Acting Director: Technical: Mr T. Makofane **Signature:** ____________________

Date: ____________________

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Date: ____________________

GLOSSARY OF TERMS

Actual Consumption: The measured consumption by a customer measured in kl of water by means of a meter or any other water consumption mechanism.
Consumer: A person / entity with whom the municipality is currently providing municipal services to, or has concluded or is deemed to have concluded an agreement for the provision of a municipal services.
Customer: A person / entity with whom the municipality is currently providing municipal services to, or has concluded or is deemed to have concluded an agreement for the provision of a municipal services. . (Refers to any occupier of any premises to which the municipality has agreed to supply or is actually supplying services, or if there is no occupier, then the owner of such premises).
DWS: Department of Water and Sanitation
GAMAP: Generally Accepted Municipal Accounting Practice
IDP: Integrated Development Plan for 2015/16 of the Matjhabeng Local
Municipality Infrastructure
These are water services items that are included in the Asset Register of the municipality having a replacement value equal to or exceeding the amount of R15 000
MLM: Matjhabeng Local Municipality (FS184)
MSA: Local Government Municipal System's Act No 32 of 2000
MSP: Municipal Services Partnerships
Municipal: The area in respect of which the municipality has executive and
Area: Legislative authority as determined by the constitution and the National legislation and the area as demarcated by the Demarcation Act (Act No. 27 of 1998).
Physical Assets: These are water services items that are included in the Asset Register of the municipality having a replacement value equal to or exceeding the amount of R15 000
Services or Water Services:
Means water supply services and sanitation services as defined in the Water Services Act for the jurisdiction of Matjhabeng Local Municipality.
STATS SA: Statistics South Africa Census
Tariff Policy: A policy on the levying of fees, rates or taxes for the municipal services provided by the municipality itself and that complies with the Municipal Systems Act (Act No. 32 of 2000
The Municipality: Matjhabeng Local Municipality (FS184)
NRW: Non Revenue Water

WSA: Water Services Authority
WSDP: Water Services Development Plan
WWTW: Waste-Water Treatment Work
DORA: Division Of Revenue Act
SALGA: South African Local Government Association
DPLG: Department of Provincial and Local Government
MIG: Municipal Infrastructure Grant

1 EXECUTIVE SUMMARY

Background

The purpose of this Master Plan is to present an acceptable water and sanitation infrastructure development plan to the Matjhabeng Local Municipality. This as the municipality seek to eradicate service delivery backlogs in all its towns and townships and more particularly in poor and marginalised communities.

The Master Plan should be seen as the first step in a continuous process of project identification and prioritisation, design, allocation of funding, and development of an asset management programme in line with municipality's Integrated Development Plan.

This Master Plan covers the period between 2019 and 2029. It is split between the water services section and the sanitation services section.

The following are addressed in this report, legal framework for provision of water and sanitation services; general municipal considerations such as municipal demographics and economic growth; spatial development and land use; status quo of water and sanitation services and the condition assessment of the existing infrastructure, it goes on to make recommendations taking into account the associated costs and how these can be implemented in long, medium and short term for water and sanitation prioritised projects.

The study area includes Allanridge (including Nyakallong); Odendaalsrus (Including Kutlwanong);Welkom (including Bronville and Thabong); Virginia (including Meloding) Hennenman (including Phomolong) and Ventersburg (including Mmamahabane and Tswelangpele).

Legal Framework

The National Constitution determines rights of individuals to have access to basic water and sanitation. Furthermore, it sets out the institutional framework for the provision of these services. It provides municipalities the executive authority and the right to administer the provision of water services within their areas of jurisdiction.

Several pieces of legislation have been put in place to assist municipalities to meet the rights of the individuals in accessing basic water and sanitation services as envisaged in the National Constitution. These include, Water Services Act 1997; Water ACT,1998;White Paper on Water Supply and Sanitation Policy 1994;White Paper on basic household sanitation,2001; Policy for Free Basic Water; Policy for Free Basic Sanitation; Draft National Sanitation Policy. These talk to addressing the basic rights to water and sanitation, allocation and prioritisation of limited resources and intergovernmental integration and coordination in providing the required services.

Municipal Demographics

Average household size in Matjhabeng Local Municipality (MLM) is found to be 3 whereas Allanridge and Hennenman were the only regions with an average household size of 4.

Welkom contributes more than 50% of the municipality population with a percentage share of 51.9% followed by Virginia with 22.6%. Matjhabeng NU (Farms, small holdings, etc) and Ventersburg were the least contributors with a percentage share of 2.3% and 2.8% respectively.

The region with the highest youth unemployment rate is Ventersburg with 62.4% and the lowest is Matjhabeng NU with 16.2%. Adult unemployment rate was the highest in Ventersburg at 39.0% followed by Allanridge and Odendaalsrus with 33.5% and 31.1% respectively. On average, Ventersburg had the highest unemployment rate of 52.2% followed by Allanridge with 47.7%. Hennenman had the lowest unemployment rate of 11.3%.

While the municipality is working hard to eradicate service delivery backlogs, these high unemployment rates make it difficult for the municipality to collect revenue for services rendered due to non-affordability and thereby affecting the ability of the municipality to provide services in a sustainable way. It also increases the population of the indigent citizens.

Economic Growth

According to the Matjhabeng Integrated Development Plan 2018 , Matjhabeng is the largest municipality in the Lejweleputswa District Municipality and it contains most of the mining activities, especially gold mining, followed by Masilonyana with some of the gold mining and diamond mining. However, the mining sector has been on a decline due to apparent high costs of production among others.

The municipality’s economy Tress index has been fluctuating around the 60s between 2005 and 2014. This means the economy is less diversified. This can be further witness by the vulnerability of the economy of the MLM because of the declining mining sector. The economy of the MLM will need to be more diversified to cope during tough economic times.

The GDP of the MLM has been on the decline over the years. This has implications for the MLM, as a declining economy can lead to the municipality losing skilled labour, citizens finding it had to afford the cost of living and the citizens battling to pay for their municipality rates and services. It will also further strain the municipality’s ability to cater for its indigent citizens. However, the MLM’s Local Economic Development is driving initiatives to reverse this situation by making the MLM a destination of choice. Such initiatives are welcome as they will assist in creating employment opportunities and in turn increase the residents’ ability to pay for the services rendered by the municipality.

Spatial Development and Land Use

The following areas been recommended for prioritisation for low cost (low density) housing development with the necessary bulk services requirements:

Thabong - Homestead 668 (Low cost)
Thabong - Portion of Kijknou 81 (Low cost)
Thabong Portion of the farm Doornpan 772 (private land) for low cost housing Thabong - Erf 19143 Thabong (low cost)
Welkom - Mealiebult 146 (Low cost) – Harmony land Welkom - Lotgeval 96 (low cost)
Allanridge/Nyakallong – Zoetspruit and the redevelopment of existing erven in Phase 1 – Allanridge.
Odendaalsrus/Kutlwanong – Redevelopment of existing erven in Eldorie as well as the further development of Leeuwbosch.
Hennenman/Phomolong – Hennenman X10 and further development of Ventersvlakte 740.
Ventersburg/Mammahabane – Ventersburg X6 (land restitution) as well as the farm Kromfontein 209.
Virginia/Meloding – Land acquisition for at least 3000 erven.

The following areas been identified for prioritisation as for medium and high density (low and middle income housing development including student accommodation :

Bothmas Rust 159 (Medium density – student accommodation, townhouses, rental accommodation) – (CUT land)
Welkom X17 (Medium density – student accommodation, town houses, rental accommodation)
Naudeville X2, the vacant erven in Flamingo Park, a portion of Thabong X22 and Thabong T6 has been prioritized for the middle to high income market (gap market housing) for development by the private sector.

Water

Status Quo

Sedibeng Water Board is the main supplier of bulk water and internal reticulation. Matjhabeng has water infrastructure consisting mostly of four reservoirs and ninety nine km of bulk pipelines from Sedibeng Water Board, five pump stations and 1,540,862 m of reticulation pipeline. It is estimated that over a third of the reticulation system is over 40 years old and 36% of water reticulation consists of old AC pipe which is prone to damage. The infrastructure is generally in good working condition and maintained regularly by Sedibeng Water Board. The main challenge is the vandalism and pipe blockages caused on the main pipelines.

According to the Sedibeng Water Board, the following are potential future anticipated challenges with regards to MLM water supply ; the ageing main pipe lines which have were installed about 40 years ago will need to be replaced in most of the areas; the sewer spillages which in certain areas are covering main water pipe lines/valves may contaminate water if there is any openings or leakages and the pipeline from Koppie Allen to Ventersburg has reached its capacity and an expansion of the infrastructure will be needed in order to cater for the growing population.

Efficiency levels and losses

The NRW for January 2018 was at 63%. The trends show an increase since 2006 to 2018. These high NRW figures mean loss of revenue to the municipality and poor water management.

It has been shown that the highest component of the water loss component is physical losses followed by non-metered consumption.

The following has been identified as the main contributors to physical losses mainly associated with leakages, illegal miners and leakages.

Apparent losses are mainly due to unmetered water use for the irrigation of parks, unmetered connections, dysfunctional meters on metered stands, non-metering of communal standpipes and lack of capacity to read some metered stands.

Future Demands Needs and Challenges

The Balkfontein water purification has a design capacity of 360 Ml/d, this will be able to cater for 2029 water demand of approximately 209 Ml/d.

However, reducing the demand for water is a critical tool of managing the water demand. Therefore, the MLM has the following strategies for water demand management ,to build on current demand management activities, to achieve significant and sustained water savings by consumers, to minimize losses and non-revenue water in the distribution network, to continue to build a water conservation culture in the community, to improve water billing via metering, data management and reporting and to ensure the municipality positively contribute to the National Water Conservation targets set by the National and Provincial Department of Water and Sanitation.

Upgrades and Refurbishments

The following upgrades have been identified, replacement of old worn out water pipes to reduce water loss and service disruption, service and refurbishment of hydrants and valves, and replace valves that are beyond repairs. In addition, replacement of water meters that are dysfunctional.

Expansion of networks

The network will need to be expanded as a result of the eradication of the bucket system resulting into new stands added on the network, new developments but also in future as a result of recently approved and ongoing township establishments. For example Kutlwanong X9, K2, Block 5 water connections and Thabong X20 (Hani Park).

Drinking Water Risk Assessment

Sedibeng Water implements a weekly compliance monitoring, monthly catchment monitoring and biannual full SANS 241 monitoring programmes. These are based on SANS 241. The monitoring is carried out on raw, final and specific reservoir samples within the distribution system for both Balkfontein and Virginia Water Treatment Plants.

Regular testing shows that the water quality is highly compliant with SANS 241 requirements. Microbiological, chemical acute health, chemical chronic health and chemical aesthetics parameters are all within 1% to be 100% compliant. The operational and disinfectant parameters are within 2% of being 100% compliant. These are numbers to be proud of.

Sanitation

Current Loading and Bulk Capacity

It is estimated that Kutlwanong, Witpan Thabong and Mmamahabane wastewater treatment works are operating above design capacity.

Sanitation Network Issues

Network reticulation issues include residents illegally building houses on top of sewer lines, illegal Miners who are constantly blocking and damaging the sewer pipes to do their mining, some retail stores are also alleged to contribute to blockages due to fat deposited in the network, vandalised and stolen infrastructure and lack of resources to attend to these issues.

Waste Water Treatment Works Issues

Most wastewater treatment works do not comply with effluent management principles and sludge management requirements due to stolen or vandalised component of the treatment works.

Waste Water Pumps Stations Issues

Mots pumps stations operate partially due to vandalised or stolen pump station equipment.

Future Demands Needs and Challenges

Bulk Collection and Processing

There is a need to refurbish all the existing pump station, refurbish most of the wastewater treatment works and upgrade some in the short term and other in the long term. For example, Kutlwanong, Witpan Thabong and Mmamahabane wastewater treatment works are already operating above design capacity and should be upgraded in the short term.

Expansion of the Reticulation network

As stated in the water section, the expansion will be required because of adding more stands in the network and also as a result of new township establishments that will be developed in the future.

Risk Assessment

According to the Green Drop measurements, a wastewater treatment works with a higher Cumulative Risk Rating (CRR) value means that plant has reached or is approaching its critical state of operation and therefore requires intervention. A lower CRR value means the plant holds a low and manageable risk position.

In general, all WWTWs have seen an improvement in the %CRR/CRR(max). Furthermore, except for the Kutlwanong WWTW , all WWTWs have improved their categories from previous categorisation. This is positive for the municipality.

Challenges faced by the various departments linked to the delivery of water and sanitation services.

The report seeks to highlight the challenges faced by the various departments linked to the delivery of water and sanitation services.

Master Plan 2019- 2029

This section of the report looks at recommended upgrades and refurbishment of all the water and sewer infrastructure for the period 2019-2029.

The refurbishments required in the different WWTW plants are determined based on the conditions assessments which were conducted and also on the projected demand Volumes for the above period.

All refurbishments on the WWTW will have to be done in conjunction with the refurbishments on all the Pump stations as they form part of the whole system for all the WWTW to operate efficiently.

All the estimated costs associated with the refurbishments and upgrades are included as part of this report and were also used in recommending the best and more economic refurbishment options from the ones that are listed below. The three options were developed, after assessment one was recommended

Long term

The long-term plan focusses on projects or upgrades that can accommodate the demand until 2029.

In all the three options, the refurbishments and upgrades required to meet the 2029 demands will need to have been done by at least 2025.

3-5 year Capital and Operational Plan

This is a medium term solution which aims at ensuring that at least by 2025 the plants are upgraded to be able to meet the demands projected for until 2029.

This will be done as a second phase of refurbishment to minimise the costs that will be required at the same time.

One-year project and budget plan

This is a short term solution which aims at ensuring that all the plants are in good operating condition based on the current status from the conditions assessment and demand volumes required. These upgrades can be implemented from 2019 and to meet the demands of at least 2025. This will be the first phase of the upgrades and refurbishments.

2 INTRODUCTION

This section of the report addresses the following:

2.1 Background;
2.2 Purpose of the Master Plan;
2.3 Legislative Context; Strategic Planning

2.1 Background

Matjhabeng Local Municipality (MLM) is one of the local municipalities within the Lejweleputswa District Municipality in the Free State. To the North is the Nala Local Municipality, to the south is the Masilonyana, to the east Tswelopele Local Municipality and to the west is the Moqhaka Local Municipality.

The Housing Development Agency (HDA) has been appointed by the National Department of Human Settlements (NDoHS) to assist with the Human Settlements component of the National Mining Towns Intervention. The objectives of the human settlements component of the intervention require the transformation of the mining towns through the creation of sustainable integrated human settlements. Currently, the intervention has focused on fast-tracking and supporting existing human settlement projects in the mining town areas. The human settlement planning and project pipeline development work requires accurate planning of the required infrastructure to ensure the necessary impact and transformation in the mining towns to ensure the creation of integrated sustainable human settlements. The MLM is one of the municipalities selected to be assisted by the HDA.

As recent as 2017, the HDA in consultation with MLM conducted a preliminary assessment of the water and sanitation infrastructure in the city of Welkom and the surrounding towns of Odendaalsrus, Virginia, Hennenman, Allanridge and Ventersburg.

The purpose of the project was to gather key information in preparation for the development of the Matjhabeng Infrastructure Master Plan. Amongst the findings of the exercise was the high rate of preventable water losses and the aging infrastructure. It was resolved that the focus of the Infrastructure Master Plan is to consolidate and coordinate the planning actions of Matjhabeng LM. This resulted in the development of this Water and Sanitation Masterplan over the next ten years (2019-209).

2.2 Purpose of the Master Plan

The purpose of the Master Plan is to present an acceptable water and sanitation infrastructure development plan to the Municipality in order to assist with the implementation of projects that will ensure the improvement and sustainability of the current infrastructure.

The Master Plan should be seen as the first step in a continuous process of project identification and prioritisation, design, allocation of funding, and development of an asset management programme.

Objectives of the Masterplan

The following are objectives of the Infrastructure Master Plan:

a status quo evaluation of the infrastructure elements already in place;

an engineering determination of the required elements of supply, storage and distribution of water as well as the disposal of wastewater; and

a prioritisation of projects required to manage, complete and maintain the water and sanitation scheme(s) in the short, medium and long term.

Vision Mission and Objectives

This section of the report seeks to set and address the vision, mission, goals and objectives of the new Infrastructure Master Plan.

The above will not only apply for the Water and Sanitation Infrastructure Master Plan, but instead will apply for all the various components (e.g. Roads and Stormwater Infrastructure Master Plan) of the new Infrastructure Master Plan. As a result, it best to align with the vision, mission, goals and objectives of the Matjhabeng Local Municipality as stated in the municipality's Integrated Development Plan.

Vision

To be a benchmark developmental Municipality in service delivery excellence.

Mission

To be a united, non-racial, non-sexist, transparent and responsive municipality;

To provide municipal services in an economic, efficient and effective way;

To promote a self-reliant community through the promotion of a culture of entrepreneurship;

To create a conducive environment for growth and

development, To promote co-operative governance;

To promote a dynamic community participation and value adding partnership.

Goals

The Municipality's vision and mission are translated into the following five municipal key performance areas:

KPA1: Good governance

KPA 2: Basic Service delivery

KPA 3: Inclusive economic development and job creation

KPA 4: Institutional Transformation

KPA 5: Financial sustainability and viability

Strategic Objectives

Ensuring access to basic services for all residents;

Developing and sustaining spatial, natural and built environments;

Providing integrated and sustainable human settlements;

Addressing the challenges of poverty, unemployment and social inequality;

Fostering a safe, secure and healthy environment for employees and communities;

Developing a prosperous and diverse economy;

Accelerating service delivery through the acquisition and retention of competent and efficient human capital;

Ensuring sound financial management and viability.

Study Area

The study area is made up of six towns within the Matjhabeng Local Municipality (MLM) in Lejweleputswa District, Free State Province. Below are the six towns forming the study area:

Allanridge (including Nyakallong)
Odendaalsrus (Including Kutlwanong)
Welkom (including Bronville and Thabong)
Virginia (including Meloding)
Hennenman (including Phomolong)
Ventersburg (including Mmamahabane and Tswelangpele)

Figure1.1 below shows the MLM in the context of the Free State Province and its district municipalities.

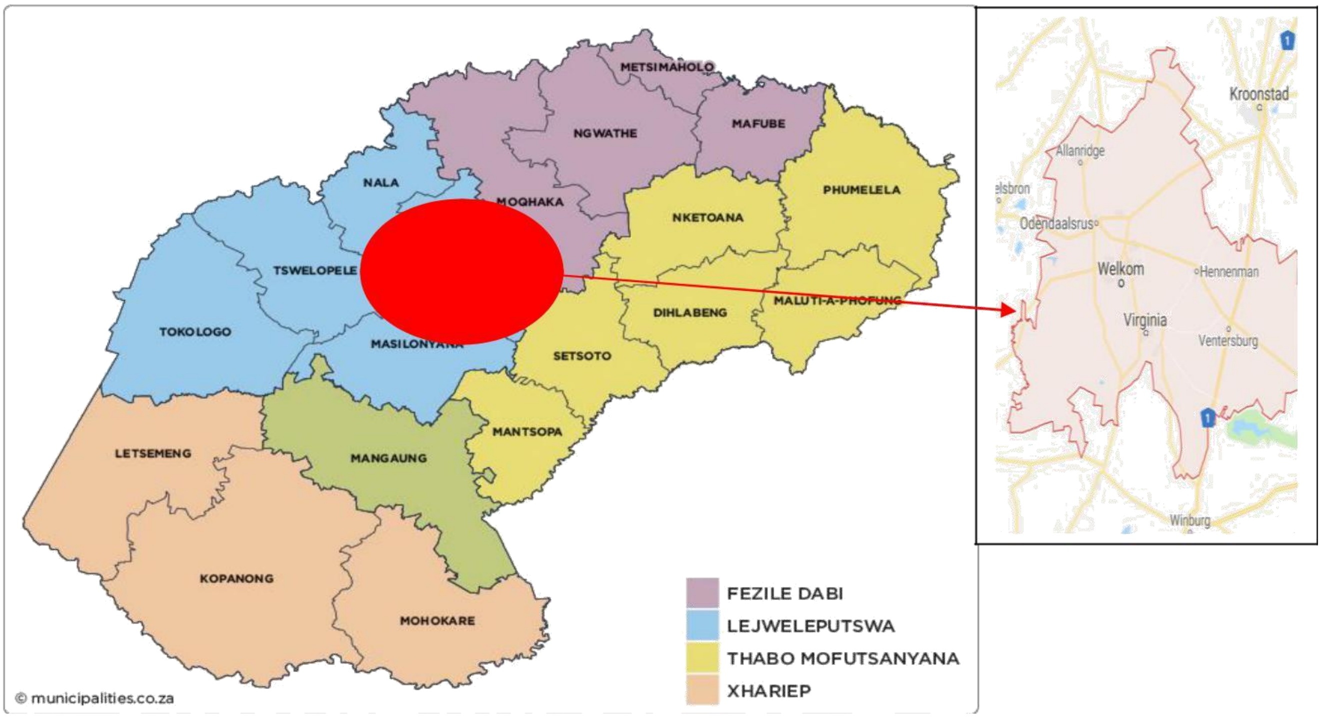


Figure 1.1: MLM in the context of the Free State Province and its district Municipalities.
Source: municipalities.co.za

Scope of Works

The scope of works is outlined below.

Infrastructure Assessment & Baseline analysis

Undertake an assessment of existing situation in the Matjhabeng Water and Sanitation Supply (WSS), including but not limited to, the following:

Assessment of the conditions, and performance of Matjhabeng WSS unit (Infrastructure Department) of the last 10 years. The assessment shall include sector analysis of gaps/needs, investment trends and any issues highlighted by the municipality.

Assessment of the implementation of the water and sanitation projects and interventions on the past IDP (2011-2016). Determination of the extent of the implementation of the projects and interventions and describe the impact on the overall development plans of the municipality.

Identification of key performance indicators and trends such as incomes, willingness to pay, and other social indicators.

Gathering and updating of all relevant information to the latest available data including baseline statistics on access and level of service, as well as the list of relevant completed, on-going and forthcoming WSS projects.
Gathering first-hand data, to the extent possible, on WSS unit information that is or adequately reported on sewerage access, provision of dislodging and treatment, water supply access etc.

Based on the data gathered, conducting a demand-supply analysis, identifying areas with the most need for water supply and sanitation services and conducting ground survey activities for primary data gathering and validation of existing data.

Identification of major infrastructure assets such as reservoirs, waste water treatment plants, pump stations, water quality monitoring and waste disposal.
Gathering of the updated relevant data from Sedibeng Water Board on bulk water supply to Matjhabeng Local Municipality.
The review of the appropriateness of the completed, on-going and proposed WSS infrastructure and other investment projects in terms of effectives in addressing the major issues in the target areas.
Assessment of capacities of the existing institutional arrangements with Sedibeng Water Board on the provision of bulk water supply services.

Evaluation safe long-term yield of water sources vs future average daily demands to determine when augmentation and what upgrading, or augmentations will be required and in which phases.
Determination of hydraulic design parameters for internal bulk supply system based on historical water demand and sewer distribution and treatment patterns.
Examination of the storage capacities of internal supply reservoirs vs present and future average daily water demands and sewer distribution and treatment.

Development of the Infrastructure Master Plan

Create a vision, mission, goals and objectives for the new Infrastructure Master Plan.
Formulate an integrated roadmap and action plan for Matjhabeng WSS unit towards the attainment of the new vision, mission, goals and objectives which shall include:

- List of priority WSS projects for the short term, medium term and long term as well as the accompanying infrastructure investment plan detailing the indicative cost requirements and spatial dimension (ie. determination of priority area).
- Proposed municipal by-laws or policy interventions and reforms to address any identified policy gaps/overlaps and impact, including those pertaining to the institutional set-up, for the proper implementation of the identified projects and activities.
- Alternative options, including the associated costs, benefits and risks involved, in delivering projects and selecting the best possible implementation configuration involved.

Prepare comprehensive and detailed maps of existing WSS facilities, assets and investment/intervention areas including possible water sources for water sources for supply and project sites.
Establish & document information from town planning and housing units MLM which areas will be developed for housing back logs, i.e. areas of high water demand growth rate and possible sanitation usage and provides solutions.
Evaluate present reticulation reservoir zones and sewer stations against long term town and regional planning, taking into account non-development area such as steep slopes and defined zones.
Determine ultimate and revised, if necessary supply zone boundaries for present reservoirs.
Identify areas where storage will be required up to 2029 and determine future reservoir locations and supply zone boundaries, while optimizing the present storage capacities.
Formulate a monitoring and evaluation system for the Master Plan, identify important indicators to be monitored, sections or departments with the Municipality that should monitor and how these indicators should be monitored.
In case of data gaps, recommend measures to generate the lacking information

for future use.
Document all information on the state on the installed infrastructure, record any possible sources of water losses and recommend methods of addressing them.
Compile an implementation programme complete with estimated costs to meet the peak week and daily water demands of new supply zones and growth points within existing reservoir supply zone as well as for sewer infrastructure to accommodate future growth.

Develop a maintenance and replacement programme of ageing infrastructure.

2.3 Legislative Context and Strategic Planning

Three major pieces of legislation post 1994 provide the legislative framework for water and sanitation services in the country. **Figure 2.1** shows the relevant Acts.

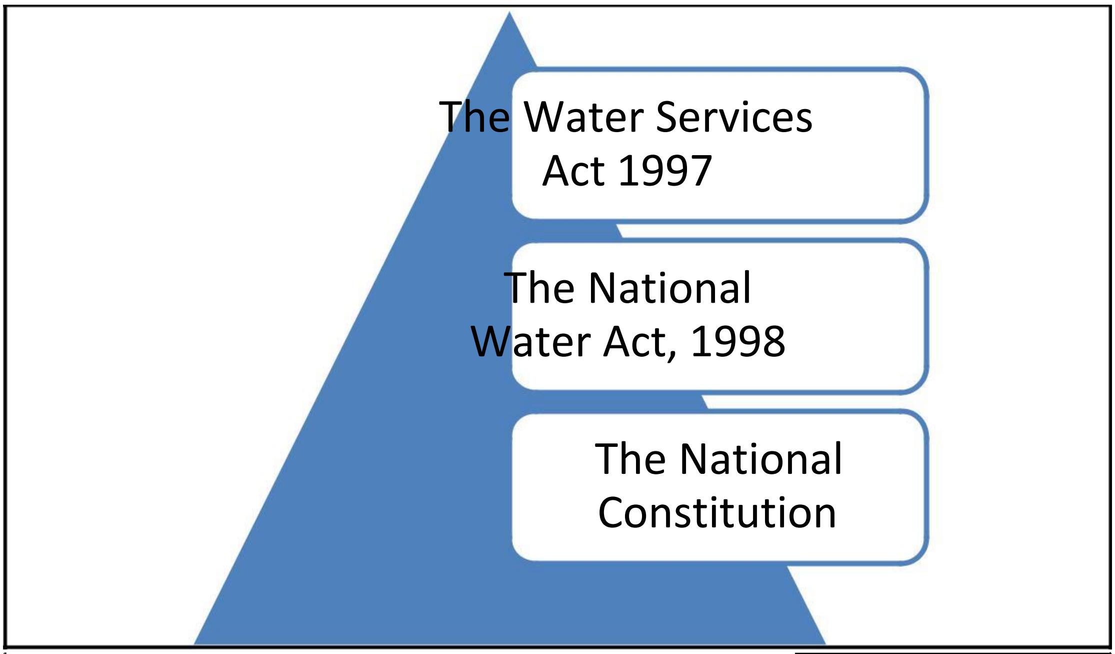


Figure 2.1: Three key Water and Sanitation Acts Post 1994

The National Constitutional

The National Constitution determines rights of individuals to have access to basic water and sanitation. Furthermore, it sets out the institutional framework for the provision of these services. It provides municipalities the executive authority and the right to administer the provision of water services within their areas of jurisdiction.

According to the Constitution, national and provincial government authority have the obligation to regulate local government in terms of water and sanitation services. They also have obligation to support and strengthen the capacity of local government to provide the water and sanitation services.

The implications of the above is that there is a need for an intergovernmental cooperation approach to managing water resources and water and sanitation services. Clearly defined roles, functions, powers and authority of the different spheres of government and acting on those will enable all the three spheres of government to carry out they Constitutional mandate harmoniously and effectively without duplicating scare resources.

Several substantive rights in the Constitution's Bill of Rights are of relevance to water and sanitation. These rights fall under the heading of so-called 'socio economic' or 'second generation' rights. The founding provisions of the Constitution open with the values on which the state is founded and list the first of these as 'human dignity, the achievement of equality and the advancement of human rights and freedoms'.

Sections 24 and 27 of the Bill of Rights in the Constitution grant specific rights to access to sufficient water, an environment not harmful to health and well-being and the protection of the environment from degradation. Section 27 provides that 'everyone has the right to have access to sufficient water' and that 'the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of these rights'.

The right to basic sanitation is not an explicit constitutional right; however, it could be derived from the right to a clean environment read together with the right of access to clean water. The right to an amount of water for sanitation purposes is included in the right to water as discussed above. This is confirmed by the provisions of the Water Services Act (WSA), which give effect to the constitutional rights in section 27(1)(b) and specifically extend the right of access to water to include the right to basic sanitation.

The National Water Act, 1998 (Act No 36 of 1998)

The purpose of this Act is to provide for fundamental reform of the law relating to water resources; to repeal certain laws; and to provide for matters connected therewith.

It seeks to ensure that the national water resources are managed and controlled in an equitable and sustainable manner. It provides for the establishment of suitable institutions in order to achieve its purpose. The State's role as the custodian of the national water resources is to 'ensure that water is protected, used and developed, conserved, managed and controlled in a sustainable and equitable manner'.

The Act also mandates government to develop in consultation with relevant stakeholders a water resource strategy in line with the framework of the Act and its purpose. The National Water Act of 1998 must be read with the Water Services Act, which is primarily concerned with the issue of access to water services by individuals in line with constitutional obligations.

Section 3 of the National Water Act reaffirms the role of government as the public trustee of South Africa's water resources and provides a legal framework for the management of water resources, which includes the allocation of water for beneficial use and the redistribution of water.

The Water Services Act, 1997 (Act No 108 of 1997)

Purpose of the Act

The purpose of this Act is to provide for:

- the rights of access to basic water supply and basic sanitation;
- the setting of national standards and of norms and standards for tariffs;
- water services development plans;
- a regulatory framework for water services institutions and water services intermediaries; to provide for the establishment and disestablishment of water boards and water services committees and their powers and duties;
- the monitoring of water services and intervention by the Minister or by the relevant Province;
- financial assistance to water services institutions; to provide for certain general powers of the Minister;
- gathering of information in a national information system and the distribution of that information; to repeal certain laws; and to provide for matters connected therewith.

Objectives of the Act

The main objects of this Act are to provide for:

- the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being;
- the setting of national standards and norms and standards for tariffs in respect of water services;
- the preparation and adoption of water services development plans by water services authorities;
- a regulatory framework for water services institutions and water services intermediaries;
- the establishment and disestablishment of water boards and water services committees and their duties and powers;
- the monitoring of water services and intervention by the Minister or by the relevant Province; financial assistance to water services institutions;
- the gathering of information in a national information system and the distribution of that information;
- the accountability of water services providers; and
- the promotion of effective water resource management and conservation.

The main aim of the Water Services Act (Act No. 108 of 1997) is to assist municipalities to undertake their role as water services authorities and to look after the interests of the consumer. It also clarifies the role of other water services institutions, especially water services providers and water boards. According to the Act, it is the responsibility of water services authorities to ensure access to both water supply services and sanitation services.

The Water Services Act also provides for:

- The right of access to basic water supply;
- The right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health; and
- The setting of national standards and norms and standards for tariffs in respect of water services.

The Act defines basic sanitation as the prescribed minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic wastewater and sewage from households, including informal households. Section 3 of the Act states that:

- Everyone has a right of access to basic water supply and basic sanitation.
- Every water services institution must take reasonable measures to realise these rights.
- Every water services authority must, in its water services development plan, provide for measures to realise these rights.
- The rights mentioned in this section are subject to the limitations contained in this Act.

Other relevant legislation

Other legislations that affect the provision and management of water and sanitation infrastructure and services include:

- Intergovernmental Relations Framework Act, 2005 (Act No. 13 of 2005);
- National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended by the National Environmental Management Amendment Act (No. 62 of 2008);
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended by the National Environmental Management: Waste Amendment Act, 2014 (Act No. 26 of 2014);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
- Infrastructure Development Act, 2014 (Act No. 23 of 2014);

Spatial Planning and Land Use Management Act, 2013(Act No. 16 of 2013);
Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), as amended by the Restitution of Land Rights Amendment Act, 2014 (Act No. 15 of 2014);
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended by the Mineral and Petroleum Resources Development Amendment Act 2008, (Act No. 49 of 2008);
Municipal Systems Act (No. 32 of 2000);
Municipal Finance Management Act (No. 56 of 2003).

2.4 Water and Sanitation National Policy

Five key policy documents guide the policy matters concerning water and sanitation is South Africa. These include:

Water Supply and Sanitation Policy, White paper ,1994
National Sanitation Policy, White Paper ,1996
National Water Policy for South Africa, White Paper ,1997
White Paper on Basic Household Sanitation ,2001
National Sanitation Policy, 2016

The White Paper on Water Supply and Sanitation Policy, 1994

The White Paper on Water Supply and Sanitation Policy (1994) advocates that sanitation should be integrated into programmes for the provision of other basic needs. The coordination of the various public organisations involved in the planning and delivery of basic services is therefore essential. The 1994 White Paper recognised the role of water supply and sanitation to the process of development in South Africa. Considering the past imbalances of apartheid, the White Paper sought to provide a 'framework for ensuring equitable access to water supply and sanitation services'. It sought to fill the gap for the lack of comprehensible policy in water and sanitation since the apartheid government's 1956 Water Act.

The explicit inclusion of sanitation in the policy signified the need to see the important link between water and sanitation, which speaks to the 'one right with two components' formulation. The function of the White Paper was also to provide standard outlines for the delivery of services at the local level. Based on the Reconstruction and Development Programme (RDP), the white paper seeks to implement a comprehensive development strategy. The White Paper also sets out the role of national, provincial and local government, with national government functioning through the Department of Water Affairs and Forestry (now called the Department of Water and Sanitation). The national government acts as overall manager of the 'nation's water resources in the public interest' to ensure 'that all citizens have access to adequate water and sanitation services'.
The principles of the policy are premised on the assumption of 'universal human rights and the equality of all persons regardless of race, gender, creed or culture'. The principles are set out as:

Looking at basic services as a human right to enable access to a healthy environment while respecting the rights of others.
There should be a priority to plan and allocate public expenditure to the most marginalised.
Taking into account the issue of limited resources, there should be equitable distribution in the country as according to population requirements.
Recognising that the provision of water and sanitation services requires economic capacity to effect sustainability and economic growth.

A central principle to ensure payment of usage or 'user pays', to facilitate development and sustainable maintenance of water and sanitation services.

The development of water and sanitation services cannot occur in isolation with other sectors and thus coordination and collaboration is imperative to find benefits for the development process.

Development of water and sanitation should not compromise environmental integrity.

National Sanitation Policy, White Paper, 1996

The eight policy principles stated in the White Paper on Water Supply and Sanitation Policy of 1994 form part of the principles highlighted in this policy with the addition of two more. The policy principles apply in rich and poor communities, in rural and urban areas.

Development should be demand driven and community based. Household sanitation is first and foremost a household responsibility and is demand driven

Basic services are a human right. In fulfilment of its obligation, government must create an enabling environment through which all South Africans can access services and support in obtaining those services, but in the end it is individuals who are responsible.

"Some for All" rather than "All for Some". The use of scarce public funds must be confined to assisting those who are unable to attain a basic level of service. Individual householders are ultimately responsible, although communities may require a degree of conformity to achieve the "healthy environment" envisaged in the Constitution. A careful balance needs to be achieved between what is affordable to households, communities and the national economy.

Equitable regional allocation of development resources. The limited national resources available to support the provision of basic services should be equitably distributed throughout the country, according to population and level of development.

Water has an economic value. The way in which sanitation services are provided must take into account the growing scarcity of good quality water in South Africa. The true value of these services must be reflected in such a way that it does not undermine long term sustainability and economic growth. The pollution of water resources also has an economic cost.

The user pays. Sanitation systems must be sustainable. This means they must be affordable to the service provider, and payment by the user is essential to ensure this. Similarly, polluters must pay for the cost of cleaning up the impact of their pollution on the environment.

Integrated development. Sanitation development is not possible in isolation from other sectors. There is a direct relationship between water supply and sanitation and their combined impact on health. Co-ordination is necessary between different departments, all tiers of government and other stakeholders.

Environmental integrity. The environment must be considered in all development activities. Appropriate protection of the environment must be applied, including if necessary prosecution under the law. Sanitation services which have unacceptable impacts on the environment cannot be considered to be adequate.

Sanitation is about health. Sanitation is far more than the construction of toilets - it is a process of improvements which must be accompanied by promotional activities as well as health and hygiene education. The aim is to encourage and assist people to improve their health and quality of life.

Sanitation is a community responsibility. Improvements in health through improved sanitation are most likely to be achieved when the majority of households in a community are involved. Sanitation is therefore a community responsibility, and this must be emphasised through sanitation awareness programmes.

National Water Policy of South Africa, White Paper, 1997

The purpose of this White Paper is to:

- provide some historical background regarding access to and the management of water in South Africa;
- explain the current development context in which South Africa finds itself; explain the environmental and climatic conditions which affect the availability of water in South Africa;
- put forward certain policy positions, based on the Fundamental Principles
- outline the proposed institutional framework for water management functions;
- outline the steps which will follow the publication of this White Paper in order to translate the policy into law and action.

The White Paper on Basic Household Sanitation, 2001

The White Paper on Basic Household Sanitation (DWAF, 2001) emphasises the provision of a basic level of household sanitation to those areas with the greatest need. It focuses on the safe disposal of human waste in conjunction with appropriate health and hygiene practices. The key to this White Paper is that provision of sanitation services should be demand driven and community based with a focus on community participation and household choice.

The purpose of this policy document is to:

- highlight the impact of poor sanitation on health, living conditions and the environment;
- articulate government policies on sanitation;
- provide a basis for the formulation of local, provincial and national sanitation improvement strategies aimed at addressing the backlog;
- provide a framework for municipality driven implementation programmes;
- promote greater coherence and co-ordination amongst the different spheres of government and amongst other role players in addressing the sanitation problem;
- ensure that sanitation improvement programmes are adequately funded;
- and put in place mechanisms to monitor the implementation of this policy and sanitation improvement programmes so that corrective action can be taken when necessary.

This policy focuses specifically on the provision of a basic level of household sanitation to mainly rural communities and informal settlements. These are the areas with the greatest need. This policy also deals with the need for an environmentally sound approach to providing sanitation services and addresses the need to protect surface and ground water resources from sanitation pollution through integrated environmental management practices.

National Sanitation Policy, 2016

According to the National Sanitation Policy,2016, a number of challenges and unintended consequences have been identified that require a sanitation policy review, and consequent legislative amendment.

As a result, there is a need to revise current sanitation policy to accommodate aspects of the changed service delivery environment and priorities, and to address gaps identified by the sector.

This National Sanitation Policy Review provides policy positions to address the identified policy gaps and challenges, as well as to address the country's new national and international development imperatives. However, this policy document does not invalidate the policy positions in current sanitation policy (1994; 1997 and 2001).

Instead, this policy review adopts many of the strategic policy positions outlined by the Strategic Framework for Water Services (SFWS) of 2003.

The sanitation sector is a diverse sector made up of a number of stakeholders and institutions. The key institutions which are affected by this policy review include the local government sector, public sector, research and innovation sector, nongovernmental and private sector.

The policy also endorses the national sanitation targets, as outlined in the National Development Plan (NDP) and Medium Term Strategic Framework (MTSF). In addition, it gives effect to the International Sustainable Development Goals, 2015 (SDG).

2.5 The Strategic Framework for Water Services, 2003

The Strategic Framework for Water Services regards the provision of at least a basic water and sanitation service to all people living in South Africa, referred to as a 'universal service obligation', as an important policy priority and commits government to making adequate funds available to make this possible. The following definitions are set out for water supply and sanitation services:

Basic water supply facility:

- The infrastructure necessary to supply 25 litres of potable water per person per day within 200 metres of a household and with a minimum flow of 10 litres per minute (in the case of communal water points) or 6 000 litres of potable water supplied per formal connection per month (in the case of yard or house connections).

Basic water supply service:

- The provision of a basic water supply facility, the sustainable operation of the facility (available for at least 350 days per year and not interrupted for more than 48 consecutive hours per incident) and the communication of good water use, hygiene and related practices.

Basic sanitation facility:

- The infrastructure necessary to provide a sanitation facility that is safe, reliable, private, protected from the weather and ventilated; keeps smells to a minimum; is easy to keep clean; minimises the spread of sanitation-related diseases by facilitating appropriate control of disease carrying flies and pests; and enables safe and appropriate treatment and/or removal of human waste and waste water in an environmentally sound manner.

Basic sanitation service:

- The provision of a basic sanitation facility that is easily accessible to a household; the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary; and the communication of good sanitation, hygiene and related practices.

2.6 Indicators for the right to water and sanitation in South Africa

National Development Plan (NDP)

The NDP 2030 vision is for investment in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and social objectives. This economic infrastructure is a precondition for providing basic services such as electricity, water, sanitation, telecommunications and public transport, and it needs to be robust and extensive enough to meet industrial, commercial and household needs.

Medium Term Strategic Framework (MTSF)

The Medium Term Strategic Framework (MTSF) sets out the actions that government will take and targets to be achieved (Presidency, 2014). Over the past years, government has massively expanded access to basic services, but backlogs remain and the quality of services is uneven. In addition to ensuring universal access, the challenge is therefore to improve the quality and consistency of services, which requires improvements in the performance of the public service, municipalities and service providers.

Water and sanitation key targets for the MTSF include:

- Increase in the percentage of households with access to a functional water service from 85% in 2013 to 90% by 2019.
- Increase in the percentage of households with access to a functional sanitation service from 84% in 2013 to 90% by 2019, including elimination of bucket sanitation in the formal areas.

2.7 Sustainable Development Goals (SDGs)

At the conclusion of the Millennium Development Goals in 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development, which announced the Sustainable Development Goals (SDGs).

Goal 6 deals with the right to water and sanitation for all.

Goal 6: 'Ensure availability and sustainable management of water and sanitation for all'.

- **6.1 By 2030**, achieve universal and equitable access to safe and affordable drinking water for all.
- **6.2 By 2030**, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

2.8 Post-2015 Water, Sanitation and Hygiene (WASH) Targets and Indicators

Safe and sufficient drinking water, along with adequate sanitation and hygiene have implications across all Millennium Development Goals (MDGs). Much progress has been achieved over the past decade. However, the MDG framework did not address the full water and development agenda, nor did it fully recognise its synergies with other areas and concerns. Emphasis on 'Sustainability' was not included, and human rights and inequalities were also largely ignored in the MDG framework. UN-Water and its partners have come together to develop suggestions for a dedicated global goal for water, 'Securing sustainable water for all'. This global goal for water and associated targets would build on the MDGs and redouble efforts to develop water supplies and sanitation services for human needs.

It would ensure water – as a resource – remains of high quality and is managed equitably and efficiently. It would also make societies resilient to extreme events and climate change. The goal addresses all dimensions of the water cycle connecting access, use, development, pollution and risks associated with water. The goal is relevant and applicable to both developed and developing countries.

Target 1: By 2025, no one practises open defecation, and inequalities in the practice of open defecation have been progressively eliminated.

Target 2: By 2030, everyone uses basic drinking water supply and hand washing facilities when at home; all schools and health centres provide all users with basic drinking water supply and adequate sanitation, hand washing facilities and menstrual hygiene facilities, and inequalities in access to each of these services have been progressively eliminated.

Target 3: By 2040, everyone uses adequate sanitation when at home; the proportion of the population not using an intermediate drinking water supply service at home has been reduced by half, the excreta from at least half of schools, health centres and households with adequate sanitation are safely managed, and inequalities in access to each of these services have been progressively reduced.

Target 4: All drinking water supply, sanitation and hygiene services are delivered in a progressively affordable, accountable, and financially and environmentally sustainable manner.

Legal Framework and Policy Considerations (A summary of the above discussion in Section 2 of this document)

Basic right of access to basic water and sanitation

- everyone has the right to have access to sufficient water
- a right to sanitation derived from section 24(a) (the right to a clean environment) read with the right of access to adequate water.
- Every water services institution must take reasonable measures to realise the above rights.
- Free basic water of 25l/p/d
- Or Free basic water of 600l/hh/m

Allocation and prioritisation of resources

- There should be a priority to plan and allocate public expenditure to the most marginalised.
- there should be equitable distribution in the country as according to population requirements
- A central principle to ensure payment of usage or 'user pays', to facilitate development and sustainable maintenance of water and sanitation services.
- Water and Sanitation services should be demand driven.

Integration and Coordination

- sanitation should be integrated into programmes for the provision of other basic needs
- The development of water and sanitation services to be coordinated with other sectors

Legislation and Policy Considerations

1 National Constitution

2 Water Services Act ,1997

3 Water Act ,1998

4 White Paper on Water Supply and Sanitation Policy, 1994

5 White Paper on basic household sanitation ,2001

6 Strategic Framework for Water Services ,2003

7 Policy for Free basic water

8 Policy for Free basic sanitation

8 Draft national sanitation policy ,2012

2.9 INSTITUTIONAL ARRANGEMENTS

The current water institutional management arrangements are discussed below. The following is the list and key roles and responsibilities water institutions in the Water Sector:

Department of Water and Sanitation (DWS): responsible for water sector policy, support and regulation;

Water Boards: are state-owned regional water services providers who may provide both bulk and end user services to more than one Water Services Authority Area. The Water Boards reports to the Minister of Water and Sanitation.

Catchment Management Agency (CMA): undertake water resource management at a regional or catchment level and involve local communities, within the framework of the national water resource strategy. Regulation of CMAs is the responsibility of the Minister of Water Affairs.

Water User Associations (WUA): operate at a restricted localised level and are in effect co-operative associations of individual water users who wish to undertake water related activities for their mutual benefit. A water user association may exercise management powers and duties only if and to the extent these have been assigned or delegated to it. Regulation of WUAs is the responsibility of the Minister of Water Affairs.

Irrigation Board: these are established by or deemed to be an Irrigation Board in terms of any law in force immediately before the commencement of the NWA. The Act mandates that a board may continue to exist until it is declared to be a water user association or until it is disestablished in terms of the law by or under which it was established. The NWA contends that Irrigation Boards must submit a proposal to transform to a WUA, within 6 months of commencement of the NWA.

Water Services Authorities (WSA): these could be a metropolitan municipality, an authorised district municipality or an authorised local municipality which is responsible for ensuring provision of water

Water Services Provider (WSP): this is a WSA or any person who has a contract with a Water Services Authority or another water services provider to sell water to, and/or accept wastewater for the purposes of treatment from, that authority or provider (bulk water services provider); and/or has a contract with a Water Services Authority to assume operational responsibility for providing water services to one or more consumers (end users) within a specific geographic area (retail water services provider).

Management of a WSP is through a contract with a WSA. At a regional level, water management is currently carried out by the regional offices of DWA. These offices continue to function as part, and respond to the priorities, of a central office and do not necessarily reflect the intent of Principle 23 of the 1997 White Paper which requires responsibility for the “development, apportionment and management of available water resources” to be delegated to a “catchment or regional level in such a manner as to enable interested parties to participate”.

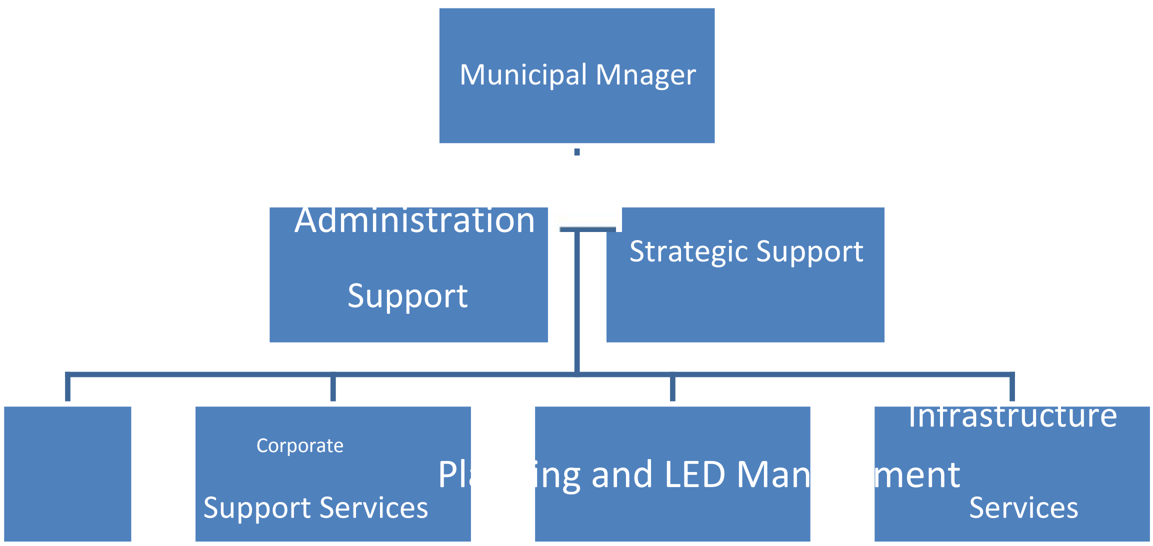
Municipal Organizational Structure

According to the Matjhabeng IDP 2017/2018 , the municipality has completed its top organizational structuring and has embarked on the process of reviewing the micro organizational structure.

Currently, the municipality has 2240 under its employ of which 1826 are appointed on permanent and 414 are on temporary basis. The municipality acknowledged the current situation on temporary workers and pledged to rectify it.

Departments are structured in such a way that there is a responsible Executive Director appointed under Section 56 of MSA for each core function. These functions are aligned to meet strategic and operational mandates.

Key positions as per the Matjhabeng IDP 2017/2018 are shown below.



Sedibeng Water Board

The Sedibeng water board provides water to the MLM. The original Service Level Agreement (SLA) expired few years ago. However, the SLA is now renewed a month-to-month on a monthly basis.

2.10 Tariff policy

According to the MLM Tariff policy document, one of the primary functions of a local authority is to provide services to the resident within its municipal area. The funding of these services is made possible by levying property taxes, charging for municipal services rendered and levy collection through business levies.

Tariffs represent the charges levied by Council on consumers for the utilization of services provided by the Municipality. These are calculated dependent on the nature of service being provided. They may be set in a manner so as to recover the full cost of the service being provided or recover part of the costs or bring about a surplus that can be utilized to subsidies other non-economical services.

The main objectives of the tariff policy are to ensure that:

- The tariffs of the MLM comply with the legislation prevailing at the time of implementation.
- The MLM services are financially sustainable, affordable and equitable.
- The needs of the indigent, aged and disabled are taken into consideration.
- There is consistency in how the tariffs are applied throughout the municipality and;
- The policy is drawn in line with the principles as outlined in the MSA
- To ensure that the municipality, in levying of fees for services provided shall at all times take into cognisance of the tariffs applicable elsewhere in the economic region, and of the impact which its own tariffs have on local economic development.

The MLM differentiates between the following categories of users with regard to tariffs which it levies;

- Residential,
- Business,
- Industrial and
- Government consumers

The MLM has adopted two -part tariff structure, namely;

- monthly availability charges for the services.
- monthly charge based on consumption

According to the Tariff policy document, the tariffs levied for domestic water consumption shall escalate according to the volume of water consumed. Tariffs for non-domestic water consumption shall be based on each kilo litre consumed, irrespective of the volume of consumption concerned. Furthermore, tariffs for pre-paid meters shall be the same as ordinary consumption tariffs levied on the category of consumer concerned, but no availability charge shall be levied.

Water Tariffs

The following categories of water consumers will be charged applicable tariffs as approved by Council in each financial year and implemented as from 01 July each year;

- Tariff for domestic consumption shall be charged for actual water consumed at a stepped tariff per kilo litre as determined by Council, except for registered indigents.
- Tariffs for non-domestic water consumption shall be based on each kilo litre consumed, irrespective of the volume of consumption concerned.
- A monthly availability charge per meter installed/business, as determined by Council, shall be charged on all water consumers (except for registered indigents). The owner of the erf on which such charges is raised will be liable to pay the charges levied for each individual business. Tenants will only be liable for consumption charges.
- Municipality's departmental water consumption will be charged at cost.

However, concerning the last to bullets above, no consumers have been charged for the past five years.

Sewerage Tariffs

- The following categories of sewerage users will be charged applicable monthly tariffs as approved by Council in each financial year and implemented as from 01 July each year;
- A monthly basic (availability) charge shall be charged on undeveloped erf (vacant stand), irrespective of their permitted or intend of use.
- Monthly charges shall be charged for domestic users on percentage of water consumed.
- A fee shall be payable by factories and other industrial users where waste water emanating from such users requires special purification.
- Municipality's monthly departmental charge shall be equal to the lowest tariff.
- The owners of erf will be liable to pay for the charges of each individual unit.

Indigents

The indigent assistance scheme will apply to tariffs set by the Council. This is laid out in Municipality's Indigent Policy.

Proposed Tariff Increases

According to the 2018 MLM IDP, tariff setting is a pivotal and strategic part of the compilation of the budget. During the revision of the tariffs the local economic conditions, input costs, the macro-economic forecasts as prescribed by MFMA circulars and the affordability of services were taken into account to ensure financial sustainability. The municipality also participated in a tariff setting workshop which was presented by the National and Provincial Treasury.

The average tariff increase for rates will be 6.4%. The estimated tariff increase for water and sewer are each 6.4%.

Revenue Raising Strategy

According the MLM's IDP,2018, the municipality's anticipated revenue was based on a collection rate of 65%. The municipality aspires to improve their collection rate to 80% - 85%.

A revenue strategy has been developed to ensure the improved collection rate is achieved.

The municipality's revenue strategy is built around the following key components:

National Treasury's guidelines and macroeconomic policy;

Growth in the municipality and continued economic development;

Efficient revenue management, which aims to ensure a 80 - 85 per cent annual collection rate for property rates and other key service charges;

Electricity tariff increases as approved by the National Electricity Regulator of South Africa (NERSA);

Achievement of full cost recovery of specific user charges especially in relation to trading services;

Determining the tariff escalation rate by establishing/calculating the revenue requirement of each service;

The municipality's Property Rates Policy approved in terms of the Municipal Property Rates Act, 2004 (Act 6 of 2004) (MPRA);

Increase ability to extend new services and recover costs;

The municipality's Indigent Policy and rendering of free basic services; and

Tariff policies of the municipality.

3 GENERIC CONSIDERATIONS

This section is structured as follows:

3.1 Municipal Demographics
3.2 Economic Growth
3.3. Spatial development and land use

3.1 Municipal Demographics

This section discusses the initial site appraisal of the various townships in terms of the following:

Overview of the Towns/Townships within Matjhabeng Local Municipality Population size and population growth
Total population and number of households
Percentage distribution of population per region per functional age groups
Dependency ratio per region
Unemployment rate per region
Percentage distribution of employed population by sector and age groups per region

Overview of the Towns/Townships within Matjhabeng Local Municipality

Allanridge and Nyakallong: Named in honour of the late Alan Roberts, whose pioneering geological and prospecting work was key in the eventual discovery of gold and the development of the Goldfields, Allanridge was founded as a settlement in 1947, although it was only proclaimed as a town in 1956.

Home of the Lorraine Gold Mine, one of the biggest in the Goldfields, Allanridge is a town of sunshine, and the thousands of flamingos who make the area their home provide natural beauty. Nyakallong location was established by the mineworkers working at Lorraine mine and started as a dwelling place only to have their permanent homes where they came from.

Hennenman and Phomolong: Hennenman is unusual within Matjhabeng’s economic make-up in that it has a well-balanced economy based mainly on agriculture, an anomaly in an area in which most income is derived from mining and industry.

Before the town was officially established, it was as a railway station, Ventersdorp. This name was changed to Hennenman Station in 1927, after a prominent local farmer. The town began to grow in earnest after the discovery of gold between Hennenman and Odendaalsrus in 1946 and was proclaimed a Municipality in 1947. Hennenman and Phomolong have a population of approximately 25 000. Phomolong Township emerged from the forcefully removed old township near Hennenman town, which was then used as Ventersburg station.

Odendaalsrus and Kutlwanong: Odendaalsrus was the first town to be established in the Goldfields in 1912. By 1946, this small farming community had only 40 houses and three shops. However, the town exploded into life after the confirmed discovery of the richest gold reef in the world in April 1946 on the farm Geduld,

Situated between Kroonstad, Allanridge and Welkom, Odendaalsrus once formed the centre of mining activities in the area.

Ventersburg and Mmamahabane: Ventersburg was named after a pioneer, PA Venter, of the farm Kromfontein, who died in 1857. Venters burg's early history is closely connected to the history of the Reformed Church, as Ventersburg was Reformed Church congregation established in 1864.

The House of Assembly, on 6 May 1873, declared Ventersburg a town in the Winburg District. The Dutch Reformed Church was built in 1891 and got burnt down in 1900 with the occupation of the British of Ventersburg. A new Dutch Reformed Church was built in 1912. In 1903, Ventersburg Municipality was established. In 1939, Ventersburg was electrified.

Virginia and Meloding: Virginia is situated on the banks of the Sand River. The town originated around the railway station, which was named after the hometown of two American railway surveyors from Virginia in the USA.

The town was established in 1954 and became the second largest town in the Goldfields area within three years. The name was retained when the town mushroomed in the 1950's following the discovery of gold. The farm's name, Merriespruit, was given to a suburb of Virginia.

Virginia is surrounded by some of the largest gold fields in the Free State, and mining, gold-extraction, plants, and the manufacture of sulphuric acid from gold ore dominates its economy. It is also known for having the world's deepest pipe-mine into the earth. Commercial farms in the surrounding area primarily grow maize and raise livestock.

Welkom and Thabong: Welkom has been the centre of the Free State Goldfields, serving several gold and uranium mines, since 1947. Following the discovery of gold in 1946, Welkom was founded in 1947 on the farm Welkom.

Welkom received Municipal status in 1968. It was planned as a model town, with a horseshoe-shaped shopping and administrative district surrounding a park of 11ha. More than one million trees were planted in the town.

Centrally situated, Welkom is place within comfortable distance from other major cities. Johannesburg is only 280 km away, while Bloemfontein is 175 km away. The traffic flow in the city has attracted much attention and experts from all over the world come to study the clever use of traffic circles and the minimal number of stop streets.

The absence of traffic lights in the centre of the city contributes to an effortless flow of traffic Welkom has also earned itself the reputation of being a "city within a garden" due to the number of parks and gardens that lend it an extraordinary number of shady trees and pleasant surroundings.

Total population, number of households and average household size per region

Table 3.1 shows total population, number of households and average households and average household size of Matjhabeng local municipality per region from Census 2011.

Table 3.1: Matjhabeng population per town/village

Regions	Population	Households	% Distribution per region	Average Household size
Allanridge(Including Nyakalong)	19937	4854	4,8%	4
Odendaalsrus(including Kutlwanong)	63743	18720	15,7%	3
Welkom(Including Bronville and Thabong)	211010	65878	51,9%	3
Virginia (Including Meloding)	91963	27724	22,6%	3
Hennenman (Including Phomolong)	9148	2613	2,3%	4
Ventersburg (Including Mmamahabane and Tswelangpele)	11260	3406	2,8%	3

Source: StatSSA Community Surveys , 2016

Average household size in Matjhabeng local municipality found to be 3 whereas only that of Allanridge and Hennenman were the only regions with an average household size more than that of municipality.

Welkom contributes more than 50% of the municipality population with a percentage share of 51.9% followed by Virginia with 22.6%. Matjhabeng NU (Farms, small holdings, etc) and Ventersburg were the least contributors with a percentage share of 2.3% and 2.8% respectively.

Percentage distribution of population per region per functional age groups

Figure 3.1 above indicates population distribution of Matjhabeng local municipality per region by functional age groups. The information is sourced from Census 2011 wherein in all regions including Matjhabeng local municipality, proportion of population aged between 15 and 34 years (Youth) is more than that of 0 – 14 (children), (35 – 64) elderly and (65 +) older persons.

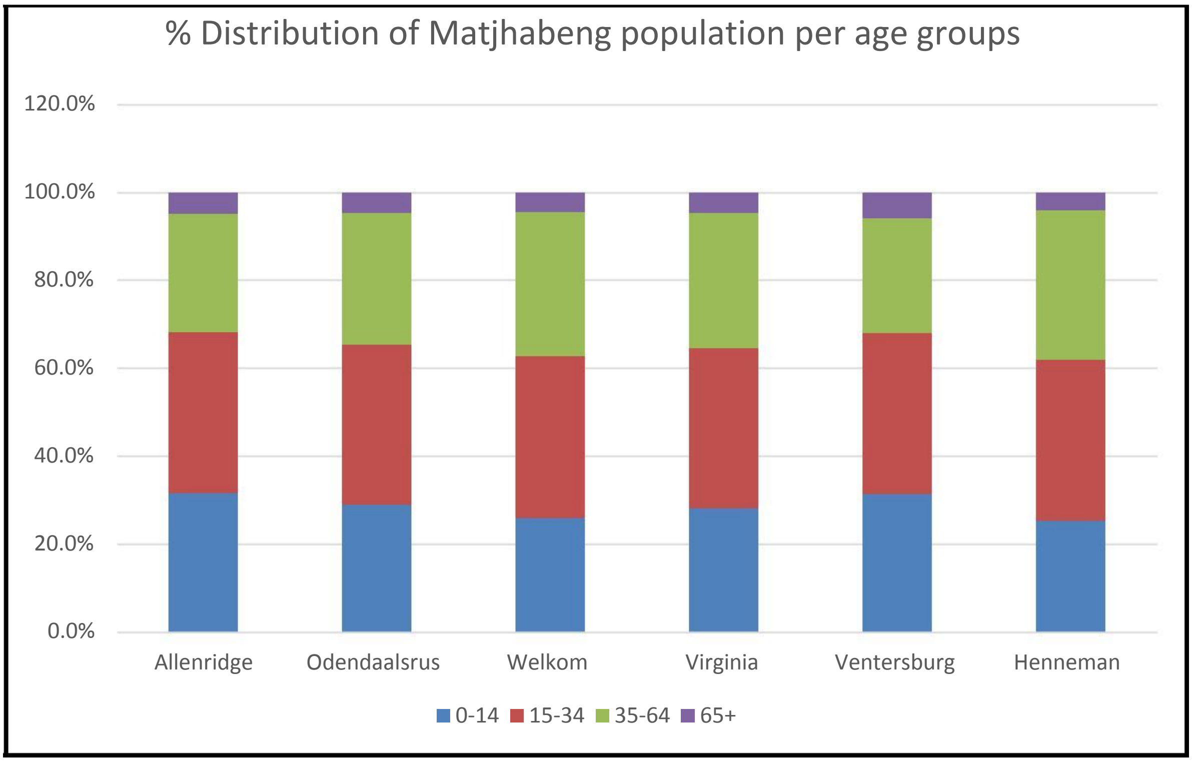


Figure 3.1 : Percentage Distribution of Matjhabeng Population per Age Groups
Source: StatsSA Community Census 2016

Dependency ratio per region

Figure 3.2 below indicates dependency ratios of regions within Matjhabeng local municipality. Population in Matjhabeng NU has a larger working age group i.e. 15 – 64 years as compared to Allanridge, Odendaalsrus and Ventersburg with the lowest dependency ratio of 41.1%. Matjhabeng local municipality has a low dependency ratio of 46.9% which implies that the municipality has a large portion of working age group (15 – 64 years)

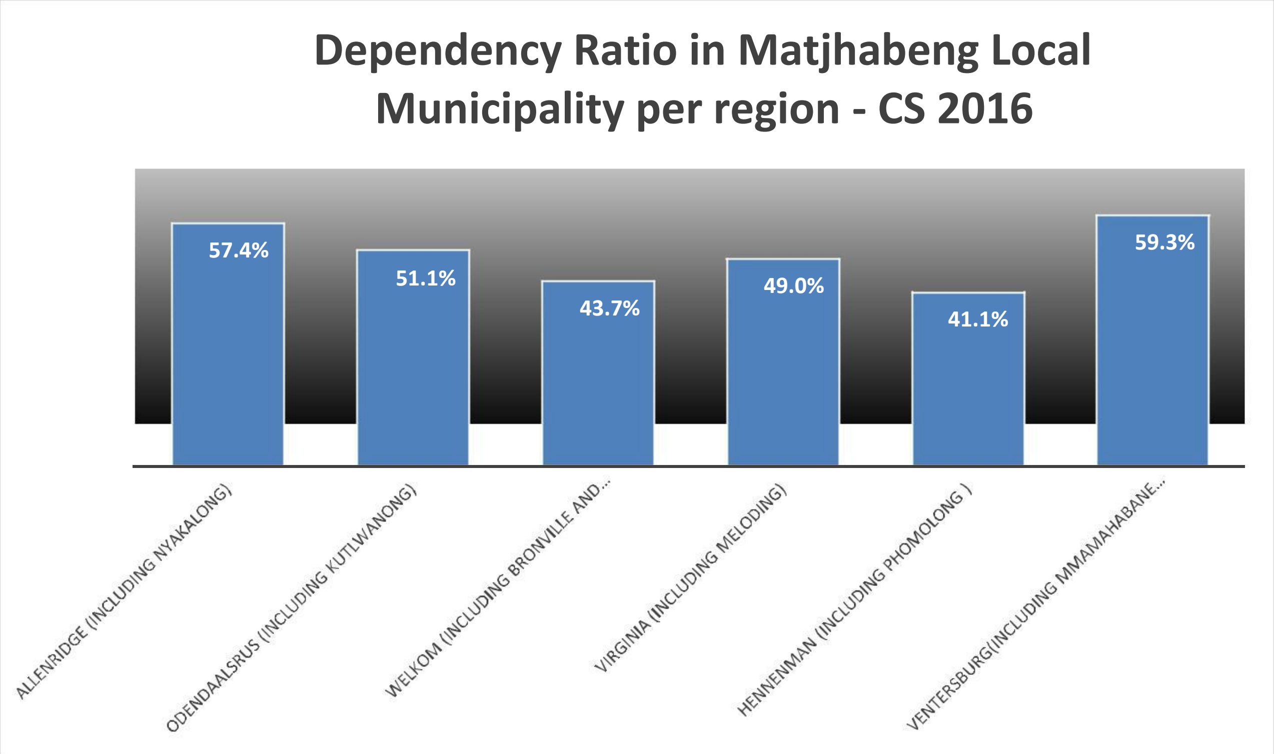


Figure 3.2: Dependency Ratio in Matjhabeng LM per Region
Source: StatsSA Community Surveys 2016

Unemployment rate per region

Figure 3.3 below indicates municipal unemployment rate per region according to census 2011 results.

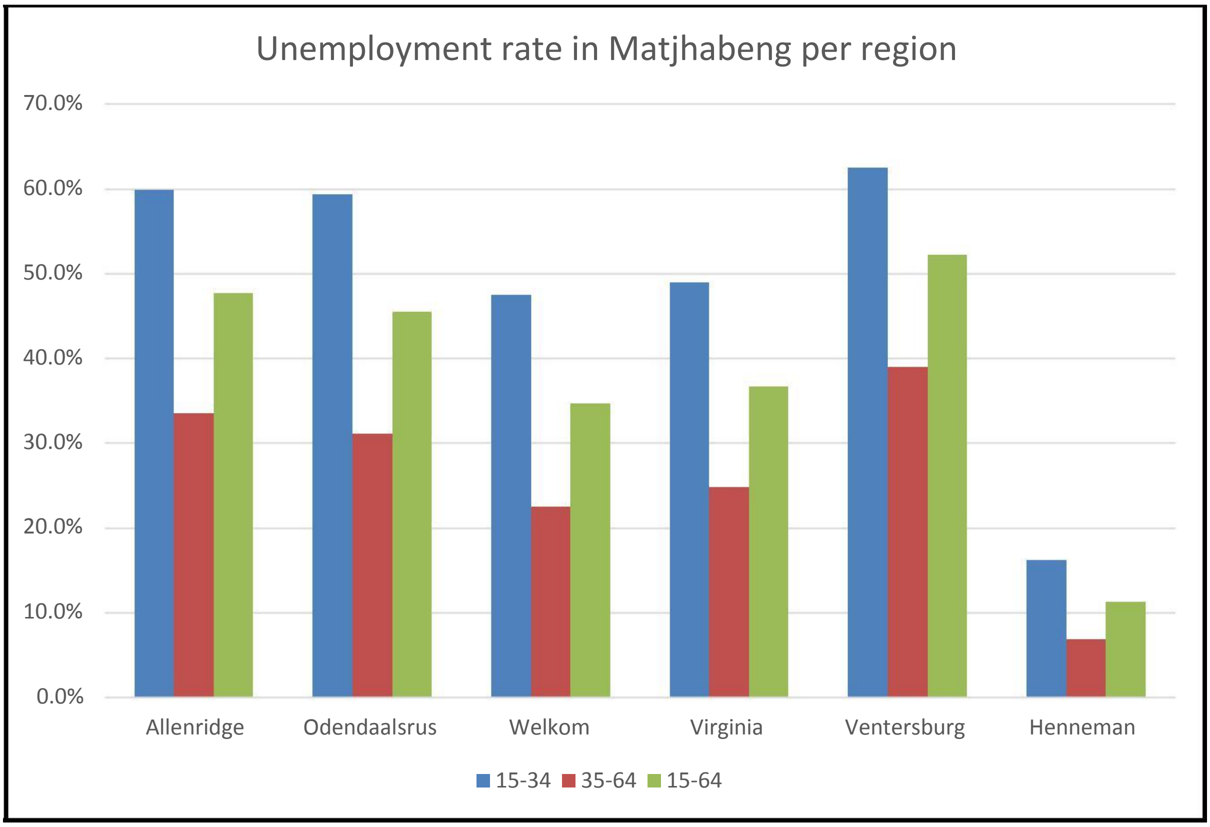


Figure 3.3: Unemployment Rate in Matjhabeng per region
StatsSA Census , 2011

From the **Figure 3.3** above, the region with the highest youth unemployment rate is Ventersburg with 62.4% and the lowest is Matjhabeng NU with 16.2%. Adult unemployment rate was the highest in Ventersburg at 39.0% followed by Allanridge and Odendaalsrus with 33.5% and 31.1% respectively. On average, Ventersburg had the highest unemployment rate of 52.2% followed by Allanridge with 47.7%. Hennenman had the lowest unemployment rate of 11.3%

3.2 Economic Growth

According to the Matjhabeng Integrated Development Plan 2018, Matjhabeng is the largest municipality in the District and it contains most of the mining activities, especially gold mining, followed by Masilonyana with some of the gold mining and diamond mining. However, the mining sector has been on a decline due to apparent high costs of production among others.

The structure of the local economy is very important in influencing broader regional performance around growth and the creation of employment opportunities. Sectoral composition of a district municipality includes all the nine sectors within an economy of a region as classified by the South African Standard Industrial Classification (SIC) of all economic activities (CSS fifth edition). Below is the sectoral composition of the Lejweleputswa District municipality.

Table 3.2: Sectoral composition of Lejweleputswa's economy by local municipalities, 2014.

2014	Lejweleputswa	Masilonyana	Tokologo	Tswelopele	[illegible]	Nala
1 Agriculture	5.6%	6.2%	24.6%	36.9%	[illegible]	17.7%
2 Mining	46.5%	50.3%	21.6%	1.2%	[illegible]	4.7%
3 Manufacturing	**2.5%**	**2.1%**	**2.9%**	**2.2%**	[illegible]	**5.2%**
4 Electricity	1.5%	1.2%	2.9%	2.8%	[illegible]	2.3%
5 Construction	1.7%	2.2%	2.5%	1.8%	[illegible]	2.6%
6 Trade	11.0%	8.3%	12.3%	15.4%	[illegible]	17.6%
7 Transport	**6.3%**	**5.2%**	**5.0%**	**7.8%**	[illegible]	**11.8%**
8 Finance	10.8%	8.4%	7.6%	10.6%	[illegible]	13.9%
9 Community services	14.2%	16.2%	20.7%	21.4%	[illegible]	24.0%
Total Industries	100.0%	100.0%	100.0%	100.0%	[illegible]	100.0%

Source: IHS Global Insight Regional eXplorer, 2015

Table above shows that despite the reported decline in the mining sector, the mining sector is still the major contributor (56%) to the MLM economy followed by community services (11.9%), finance (10.8) and trade (10%).

Tress Index

The tress index measures the level of diversification or concentration of a region's economy. The index ranges between zero and one. A zero index represents an economy that is diversified while higher values represent a less diversified economy. Less diversified economies are more vulnerable to exogenous factors.

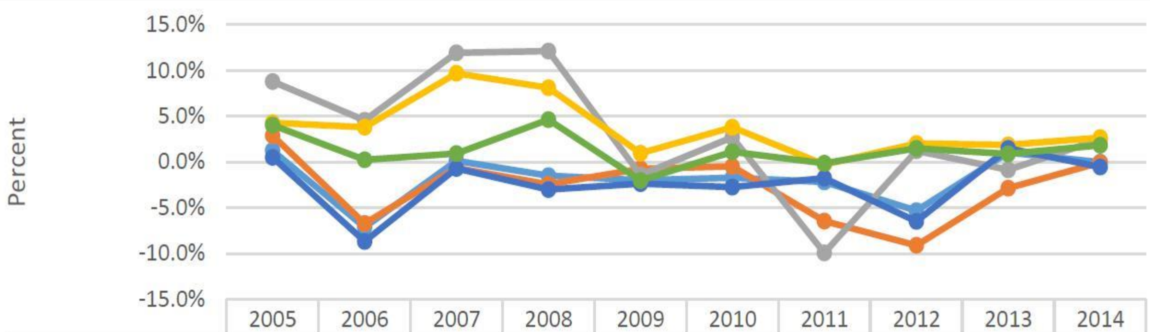
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lejweleputswa	55.01	55.73	57.46	58.07	56.05	59.24	58.79	60.66	61.32	56.93
Masilonyana	61.32	61.62	61.96	60.96	59.04	61.76	61.43	63.20	64.05	60.51
Tokologo	42.38	42.63	44.64	49.17	46.56	44.53	44.10	44.34	44.76	45.83
Tswelopele	56.76	56.79	58.33	62.36	60.89	58.23	57.58	57.31	57.42	58.62
[redacted]										
Nala	42.80	40.37	40.06	41.16	40.87	41.38	41.35	41.26	41.23	41.85

Source: Matjhabeng Local Municipality IDP, 2018.

It can be seen that the MLM's economy has been fluctuating around the 60s between 2005 and 2014. This means the economy is less diversified. This can be further witness by the vulnerability of the economy of the MLM as a result of the declining mining sector. The economy of the MLM will need to be more diversified so that challenges in one sector do not bring the economy of the municipality to a halt.

Economic Growth

The economic growth Gross can be judged by the municipality's Gross Domestic Product (GDP). Below is the GDP of the MLM over the years.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lejweleputswa	1.2%	-7.1%	0.1%	-1.5%	-2.0%	-1.7%	-2.2%	-5.3%	1.0%	0.0%
Masilonyana	2.9%	-6.7%	-0.7%	-2.4%	-0.8%	-0.5%	-6.4%	-9.1%	-2.9%	-0.1%
Tokologo	8.8%	4.5%	11.9%	12.1%	-1.4%	2.7%	-9.9%	1.2%	-0.9%	2.5%
Tswelopele	4.3%	3.8%	9.7%	8.1%	1.0%	3.8%	-0.3%	2.0%	1.9%	2.7%
Matjhabeng	0.5%	-8.7%	-0.7%	-3.0%	-2.4%	-2.7%	-1.8%	-6.5%	1.5%	-0.6%
Nala	4.0%	0.2%	0.9%	4.6%	-2.0%	1.1%	-0.1%	1.5%	0.9%	1.8%

Source: Matjhabeng Local Municipality IDP, 2018.

The GDP of the MLM has been on the decline over the years. This has implications for the MLM, as a declining economy can lead to the municipality losing skilled labour, citizens finding it had to afford the cost of living and the citizens battling to pay for their municipality rates and services. It will also further strain the municipalities, ability to cater for its indigent citizens.

3.3 Spatial Development and Land Use

The following information was sourced from the Matjhabeng LM's Department of town planning.

MATJHABENG: STATUS QUO INFORMATION ON PROCLAIMED RESIDENTIAL ERVEN

AREA	TOTAL NUMBER OF PROCLAIMED STANDS (ALL LAND USES)	TOTAL NUMBER OF PROCLAIMED RESIDENTIAL STANDS	DEVELOPED RESIDENTIAL STANDS (FORMAL STRUCTURES)	DEVELOPED RESIDENTIAL STANDS (INFORMAL STRUCTURES)	VACANT RESIDENTIAL STANDS AVAILABLE UNSERVICED	VACANT RESIDENTIAL STANDS AVAILABLE SERVICED	TOTAL VACANT RESIDENTIAL STANDS AVAILABLE
ALLANRIDGE	1 626	1503	673	830	290	550	840
BRONVILLE	2 368	2291	2155	136	35	97	132
Flaming Lake	362	329	0	329	329	0	329
Flamingopark	1 633	1563	935	628	266	370	636
Havengaville	51	19	17	2	0	3	3
HENNENMAN	1 693	1299	964	335	200	157	357
KUTLWANONG	12 509	11974	11774	200	42	182	224
MELODING	11 124	10525	10446	79	348	43	391
MMAMAHABANE	1 874	1825	1749	76	4	73	77
Naudeville	1 044	1015	683	332	0	334	334
NYKALONG	4 114	4027	405	3622	0	17	17
ODENDAALSRYS	3 511	3055	2212	843	384	458	842
PHOMOLONG	5 081	4871	4840	31	96	0	96
Rheederpark	1 386	1336	567	769	89	682	771
Riebeeckstad	5 619	5191	3091	2100	1463	636	2099
THABONG	30 429	28983	27632	1351	1703	195	1898
Thandanani / 2010	1 809	1746	0	1424	322	1424	1746
Tswelangpele	637	608	597	11	5	6	11
VENTERSBURG	658	532	382	150	0	173	173
VIRGINIA	6 430	5709	4498	1211	335	920	1255
WELKOM	9 114	7789	7562	227	55	199	254
Whites	117	107	59	48	37	15	52
TOTAL	**103 189**	**96 297**	**81 241**	**14 734**	**6003**	**6 534**	**12 537**

The MLM has a total of 103 189 proclaimed stand for incorporating all land uses. The bulk of the proclaimed stand is for residential, which is 96 297. This translates to 93% of proclaimed stands assigned to residential and 7% percent to the other land uses. Most of the proclaimed residential stands are in Thabong (28 983) , Kutlwanong (11 974) and Meloding (10 525).

There are 81 241 already developed formal residential stands and 14 734 developed informal residential stands. This means about 85 % of the proclaimed stands are already developed formal residential stands and 15% of the proclaimed stands are existing informal stands. Most of the proclaimed developed residential stands are in Thabong (27 632) , Kutlwanong (11 774) and Meloding (10 446). In contrast, most of the developed informal stands are in Nyakallong (3 622),Riebeeckstad (2 100), Thabong (1 351), Thandanani (1 424) and Virginia (1 211).

There are 12 537 available stands that are not yet developed. These are made up of 6003 unserviced stands and 6 534 serviced stands. This translates to 48% of the available undeveloped stands not yet serviced and 52% of the undeveloped stands that are already serviced. Thandanani/2010 (1 424) most of the vacant residential stands and Virginia at 920. Thabong has the most vacant unserviced stands (1 703) and Riebeeckstad (1 463).

LARGER CONCENTRATIONS OF PROCLAIMED VACANT RESIDENTIAL ERVEN

AREA	TOTAL VACANT STANDS	SITE CLASSIFICATION	STATUS INTERNAL AND BULK SERVICES
WELKOM			
Naudeville X2	318	High	Fully serviced. Require maintenance. Electricity vandalized
Rheederpark x1	34	Middle	Fully serviced. Require maintenance. Electricity not available.
Rheederpark x2	714	Low	Partially serviced with water and sewage.
Flamingo Park	52	High	Partially serviced with water and sewage.
Flamingo Park X2	488	High	Partially serviced with water and sewage.
Flamingo Lake	358	High	Not serviced
Riebeeckstad	2099	High	Not serviced
BRONVILLE			
Bronville X9	90	Middle	Partially serviced
THABONG			
Thabong T6	889	Low/Middle	Not serviced.
VIRGINIA			
Joel	130	High	Partially serviced
Saaiplaas	186	High	Partially serviced
Kitty	415	High	Partially serviced
MELODING			
- Meloding circle are	34	Low	Bulk in place. No Internal service
- Graveyard area	253	Low	Bulk in place. No Internal service
- Clinic area	61	Low	Bulk in place. No Internal service
VENTERSBURG			
- X6 Jail area	71	Low	Serviced
MMAMAHABANE			
	0		
HENNENMAN			
- X10/12	128	Low	Internally- not serviced
- X 1	46	High	Internal - not serviced
PHOMOLONG			
- School erf	100	Low	Bulk in place
ODENDAALSRUS			
- Odensia	595		Bulk in place
KUTLWANONG			
	0		
ALLANRIDGE			
	0		
NYKALONG			
	0		
TOTAL	**7061**		

Potential Land for Residential Developments

The following tables sourced from the MLM Department of Town Planning indicated potential land for future residenatial developments.

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
LOW INCOME AREAS													
11	BRONVILLE ERVEN 32179, 32180, 32371 (HS PROJECT: PART OF 7000)		168	PEGGED – BEING ALLOCATED	MLM	YES	YES	Y	Y	Y	N	None - Funding committed by Prov HS	Erven to be allocated. **COST IMPLICATIONS:** **Township establishment – HS FUNDED** **Internal Services – HS COMMITTED** **Bulk service - MIG**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	(LOW INCOME)												**TOTAL: NONE**
11	HOMESTEAD 668 (HS PROJECT: PART OF 7000) (LOW INCOME)	515 HA	750	VACANT PEGGED – BEING INVADED	MLM	YES	YES	N	N	N	ESKOM	None - Funding committed by Prov HS	Erven to be allocated. **COST IMPLICATIONS: Township establishment – HS FUNDED Internal Services – HS COMMITTED Bulk service - MIG TOTAL: NONE**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
11	HOMESTEAD 668 (LOW INCOME)	515 HA	4000	VACANT FARMLAND	MLM	NO	NO	N	N	N	ESKOM	No	In line with SDF. Require township establishment towards Masimong complex. Eskom Supply area. **COST IMPLICATIONS:** **Township establishment – HS UNFUNDED** **Internal Services – HS NOT COMMITTED**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													Bulk service - MIG TOTAL: NONE
13	FREEDOM SQUARE RELAYOUT (HS PROJECT: PART OF 7000) (LOW INCOME)		390	OCCUPIED	MLM	YES	YES	Y	Y	Y	ESKOM	None - Funding committed by Prov HS	Registration in progress. Allocation in progress. **COST IMPLICATIONS: Township establishment – HS FUNDED Internal Services – HS COMMITTED**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													Bulk service - MIG **TOTAL: NONE**
13	PORTION OF DOORN PAN 772 (LOW INCOME)	29 HA	220	VACANT FARMLAND	PRIVATE	NO	NO	Y	Y	N	ESKOM	No	In line with SDF. Owner wants to swop for Municipal Game Reserve. ESKOM supply area. Township establishment required. **COST IMPLICATIONS: Township establishment**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													– HS UNFUNDED – HS – R550000 Internal Services – HS NOT COMMITTED – R770000 Bulk service - MIG TOTAL: R1,3M
13/25	PORTION OF KIJKNOU 81	300 HA	500	VACANT FARMLAND - PARTIALLY	MLM	NO	NO	Y	Y	Y	ESKOM	No	In line with SDF. Requires township establishment. ESKOM supply area.

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
	(LOW INCOME)			OCCUPIED									**COST IMPLICATIONS:** Township establishment – HS UNFUNDED – R1,25M Internal Services – HS NOT COMMITTED – R17,5M Bulk service – MIG TOTAL: NONE

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
16	PHOKENG – PORTION OF KAALVALLEY 61 (HS PROJECT: PART OF 7000) (LOW INCOME)		918	OCCUPIED	MLM	YES	YES	Y	Y	Y	ESKOM	None - Funding committed by Prov HS	Allocation in progress **COST IMPLICATIONS:** **Township establishment – HS FUNDED** **Internal Services – HS COMMITTED** **Bulk service – MIG** **TOTAL: NONE**
16	DICHOCOLATENG		1205	OCCUPIED	MLM	YES	YES	Y	Y	Y	ESKOM	No – to be funde	In line with SDF. Requires township

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	(LOW INCOME)											d by MLM	establishment. ESKOM supply area. **COST IMPLICATIONS:** **Township establishment –MLM FUNDED** **Internal Services – MLM / MIG NOT COMMITTED – R42,1M** **Bulk service – MIG**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													TOTAL: NONE
17	ERF 19143 (LOW INCOME)	69928 M	90	VACANT - ZONING - GENERAL RESIDENTIAL	MLM	NO	NO	Y	Y	Y	ESKOM	No to be funded by MLM	In line with SDF. Suitable for denser development – town houses and rental accommodation. ESKOM supply area. **COST IMPLICATIONS: Township establishment MLM -**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													UNFUNDED – R500000 Internal Services – HS NOT COMMITTED – R500000 Bulk service – in place TOTAL: R1m
28	PORTION OF MEALIE BULT 146 (SDF – POTENT	494 HA	4000	VACANT FARMLAND	HARMONY GOLD	NO	NO	N	N	N	MLM	To be funded by MLM	In line with SDF. Harmony busy to investigate township establishment on existing village and to donate

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	IAL LOW INCOME AREA)												rest of land to Municipality. Municipal supply area. **COST IMPLICATIONS:** **Township establishment UNFUNDED – R10M** **Internal Services – R140M** **Bulk service – R170M**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													TOTAL: R320M To be negotiated with Harmony
27	LOTGEVAL 96 (LOW INCOME)	526 HA	4000	VACANT FARMLAND	MLM	NO	NO	N	N	N	MLM	No	In line with SDF. Land was already identified for residential integration towards OD. Old Phakisa project. Municipal electricity supply area. Possible HS funding

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
													COST IMPLICATIONS: Township establishment – HS responsibility to be negotiated -R 10M Internal Services – HS – to be negotiated – R140M Bulk service – MLM/HARMO

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													NY – TO BE DETERMINED **TOTAL: TO BE DETERMINED**
35	RHEEDER PARK (LOW INCOME)		714	OCCUPIED	MLM	YES	YES	Y	Y	Y	Stolen and vandalized electrical infrastructure services must be provided and	Yes – No elect	**COST IMPLICATIONS: Township establishment – Finalized Internal Services – Electricity only Bulk service – R32,8M**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
											installed to an estimated value of R32.8 million		**TOTAL: R32,8M**
	TOTAL		**16955**										
MIDDLE TO HIGH INCOME AREAS													
12	THABONG T6 (MIDDLE INCOME AREA – GAP AND MIDDLE		886	PEGGED AND REGISTERED VACANT AREA –	MLM	YES	YES	Y	Y	Y	ESKOM	No	LAA awarded to developer. **COST IMPLICATIONS: Township establishment – Finalized**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
	INCOME HOUSING)			LAA AWARDED									Internal Services – MLM/Private – R31m Bulk service - None TOTAL: R31M
26	PORTION OF THANDANANI (Thabong X22) (MIDDLE INCOME – GAP		320	PEGGED AND REGISTERED - VACANT FOR GAP HOUSING	MLM	YES	YES	N	N	N	ESKOM	No	Advertised for gap market development COST IMPLICATIONS: Township establishment – HS m- Finalized

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	MARKET)												**Internal Services – R11,2m** **Bulk service – MLM – R7m** **TOTAL: R18,2M**
33	NAUDEVILLE X2 (HIGH INCOME)		318	PARTIALLY DEVELOPED – MAJORITY OF ERVEN VACANT	MLM	YES	YES	Y	Y	Y	N Stolen and vandalized electrical infrastructure	Y but need upgrading	**Recently advertised for gap market development** **COST IMPLICATIONS:**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
											services must be provided and installed to an estimated value of R14.6 million		**Township establishment –Finalized Internal Services – MLM Bulk service – MLM – ELECTRICAL R14,6M TOTAL: R14,6M**
28	PORTION OF BOTHMAS	84 HA	2000 high density	VACANT FARMLAND	CUT UNIVERSITY	NO	NO	N	N	N	ESKOM	No to be funded by MLM	In line with SDF. Very suitable for denser development: student

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	RUST 152 (MIDDLE INCOME – HIGH DENSITY – STUDENT ACCOMMODATION, TOWN HOUSES, SOCIAL HOUSING)												accommodation, social housing, town houses. Municipal supply area.

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
35	FLAMINGO LAKE (HIGH INCOME)		351	VACANT	MLM	YES	YES	OLD SYTEM	WWTW TO BE UGGRADED	N (R9m)	MLM Electrical infrastructure services must be provided and installed to an estimated value of R16.3 million	None - To be funded by MLM	**LAA agreement with Mkhonza.** **COST IMPLICATIONS:** **Township establishment – Finalized** **Internal Services – R17,5M** **Bulk service – MLM – R25M** **TOTAL: R42,5M**
27	FLAMINGO		14	VACANT SITES	MLM	YES	YES	Y	Y	Y	Stolen and vandaliz		Area awarded to Mkhonza on LAA

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	PARK X 5 (HIGH INCOME) (EXISTING LARGE ERVEN CAN BE REDESIGNED FOR GAP MARKET AND MIDDLE										ed electrical infrastructure services must be provided and installed to an estimated value of R0,6 million		

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
	INCOME)												
27	FLAMINGO PARK X 2 (HIGH INCOME) (EXISTING LARGE ERVEN CAN BE REDESIGNED FOR GAP		392	VACANT SITES	MLM	YES	YES	Y	Y	N	Electrical infrastructure services must be provided and installed to an estimated value of R18 million	Y except for roads	Area awarded to Mkhonza on LAA

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	MARKET AND MIDDLE INCOME)												
27	FLAMINGO PARK X 3 (HIGH INCOME) (EXISTING LARGE ERVEN CAN BE REDESI		52	VACANT SITES	MLM	YES	YES	Y	N	N	Electrical infrastructure services must be provided and installed to an estimated value	Y except for roads	Area awarded to Mkhonza on LAA

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	GNED FOR GAP MARKET AND MIDDLE INCOME)										of R2,4 million		
27	FLAMINGO PARK X 4 (HIGH INCOME) (EXISTING LARGE		78	VACANT SITES	MLM	YES	YES	Y	N	N	Electrical infrastructure services must be provided and installed to an	Y except for roads and sewage	Area awarded to Mkhonza on LAA

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	ERVEN CAN BE REDESIGNED FOR GAP MARKET AND MIDDLE INCOME)										estimated value of R1,9 million		
27	WELKOM X 17 (HIGH PRIORITY AREA FOR HIGH		1000 units	VACANT	MLM	SG (REQUIRES REDESIGN	YES	N	N	N	N	None	**COST IMPLICATIONS: Township establishment – MLM – R1m**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	DENSITY HOUSING DEVELOPMENTS (OLD AGE, SOCIAL HOUSING, TOWN HOUSES)					AND REZONING)							**Internal Services – R10 m** **Bulk service – R170MM** **TOTAL: R180M**
25	WELKOM RIEBEECKSTAD		120	VACANT	MLM	YES	YES	Y	Y	Require upgrading	Electrical infrastructure	No sewage	**COST IMPLICATIONS: Township establishment**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	EXTENSION 1 NORMAN STREET (Middle to High Income)										services must be provided and installed to an estimated value of R6 million		**– MLM – Finalized Internal Services – R5 m Bulk service – Electrical R6m TOTAL: R11M**
25	WELKOM RIEBEECKSTAD EXTENSION 1 KOPPIE ALLEEN		78	VACANT	MLM	YES	YES	Y	Y	Require upgrading	Electrical infrastructure services must be provided and	No sewage	**COST IMPLICATIONS: Township establishment – MLM – Finalized**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	school (Middle to high income)										installed to an estimated value of R4 million		**Internal Services – R5 m** **Bulk service – Electrical R4m** **TOTAL: R9M**
25	WELKOM RIEBEECKSTAD EXTENSION 1 LUSETTE (Middle to high income)		159	VACANT	MLM	YES	YES	Y	Y	Require upgrading	Electrical infrastructure services must be provided and installed to an estimate	No sewage	**COST IMPLICATIONS:** **Township establishment – MLM – Finalized** **Internal Services – R5 m**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
											d value of R8 million		**Bulk service – Electrical R8m** **TOTAL: R13M**

Allanridge/Nyakallong

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
LOW INCOME AREAS													
19	R/446 (Part of HS project of 7000		100	VACANT	MLM	YES	YES	YES	YES	YES	YES	To be funded by Prov HS	**COST IMPLICATIONS:** **Township establishment – Finalized** **Internal Services – 10M – Prov HS** **Bulk service – None** **TOTAL: None**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	ZOETSPRUIT 439	51 HA	300	VACANT FARMLAND	MLM	NO	NO	NONE	NONE	NONE	NONE	NONE	Suitability currently investigated
	TOTAL		**400**										
MIDDLE TO HIGH INCOME AREAS													
36	ALLANRIDGE PHASE 1 (SDF – REDEVELOP VACANT ERVEN)		482	VACANT	MLM	YES	YES	Y – BUT REQUIRE UPGRADING	REQUIRE MAINTENANCE	6 KM OF ROADS TO BE CONSTRUCTED R36M	ELECTRICAL INFRASTRUCTURE TO BE INSTALLED AT R22.1M	WATER AND STORMWATER AVAILABLE	**COST IMPLICATIONS: Township establishment – MLM – R1.2M Internal Services – 10M Bulk service – Roads – R36M**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
													Electrical R8m **TOTAL: R55M**
36	ALLANRIDGE PHASE 2 (SDF – REDEVELOP VACANT ERVEN)		286	VACANT	MLM	YES	YES	Y – BUT REQUIRE UPGRADING – R1.5M	WWTW TO BE UPGRADED	1.5 KM OF ROADS TO BE CONSTRUCTED R15M	ELECTRICAL INFRASTRUCTURE TO BE INSTALLED AT R13.1M	None available	**COST IMPLICATIONS:** **Township establishment – MLM – R715000** **Internal Services – 10M** **Bulk service –** **Water – R1.5m** **Wet – R10m** **Roads – R15M**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
													Electrical 13m TOTAL: R40M

ODENDAALSRUS / KUTLWANONG

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
LOW INCOME AREAS													
22	LEEUW BOSCH 285 (PART OF HS PROJECT 0F 7000)		2980	PARTIALLY OCCUPIED	MLM	YES	YES					TO BE PROVIDED BY PROV HS	BULK SERVICES TO BE DETERMINED

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
22	LEEUBOSCH 285 (REMAINDING PORTION		6057	VACANT FARMLAND	MLM	NO	NO	N	N	N	N	NONE	**COST IMPLICATIONS:** **Township establishment – HS – R15.1M** **Internal Services – R211M** **Bulk service – TO BE DETERMINED** **TOTAL:**
	TOTAL		**9037**										
MIDDLE TO HIGH INCOME AREAS													

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
36	ELDORIE (SDF – TO BE REDESIGNED)		356	Partially developed	MLM	YES	YES	Y	Y	UPGRADING R12M	ELECTRICAL INFRASTRUCTURE TO BE INSTALLED AT R16.3M	NONE	**COST IMPLICATIONS:** **Township establishment – MLM R1M** **Internal Services – R12M** **Bulk service –** **Electrical – 16.3m** **TOTAL:R29m**

HENNENMAN / PHOMOLONG

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
LOW INCOME AREAS													
2/3	PHOMOLONG: VENTERSVLAKTE 740. PART OF HS PROJECT OF 7000)		1675	VACANT	MLM	YES	YES					TO BE FUNDED BY PROV - HS	Bulk services to be determined
2/3	PHOMOLONG: VENTERSVLAKT	Remainder of	4510 on remaining portion	VACANT	MLM	NO	NO	N	N	N	N	N	**COST IMPLICATIONS: Township establishment**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	E 740. PART OF HS PROJECT OF 7000)	433 ha											**– PROV HS – R11.2M Internal Services – PROV HS R157M Bulk service – TO BE DETERMINED TOTAL:**
	TOTAL		**6185**										
MIDDLE TO HIGH INCOME AREAS													
3	HENNENMAN (MIDDE TO HIGH		361	VACANT	MLM	YES	YES	Y	Y	N	N	Electricity and roads to be	**COST IMPLICATIONS:**

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	INCOME A0											provided at R16.6 million	**Township establishment – Finalized Internal Services – R5M Bulk service – ELECTRICAL – 16.6M TOTAL:R22M**

VENTERSBURG / MAMMAHABANE

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
LOW INCOME AREAS													
1	MAMMAHABANE : GROENEPUNT 96 (PART OF HS PROJECT OF 7000)		591	VACANT	MLM	YES	YES					To be funded by Prov HS	BULK SERVICES TO BE DETERMINED.

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
1	KROMFONTEIN 209		2000	VACANT	MLM	NO	NO						COST ESTIMATES TO BE DONE
	TOTAL		2591										
MIDDLE TO HIGH INCOME AREAS													
1	VENTERSBURG X6 (Land Restitution project – land subdivided)		62	VACANT	MLM AND PRIVATE	YES	YES	Y	Y	N	N		ELECTRICAL INFRASTRUCTURE TO BE UPGRADED AT R5.3M
1	VENTERSBURG X5		68	VACANT	MLM AND PRIVATE	YES	YES	Y	Y	N	N		ELECTRICAL INFRASTRUCTURE TO BE UPGRADED AT R5.3M

VIRGINIA / MELODING

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
LOW INCOME AREAS													
	REMAINDER OF SCHOONHEID 540 (PRIVATE	211 ha	3014	VACANT FARMLAND	PRIVATE	N	N	N	N	N	N	None	Private land to be purchased

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated
	OWNERSHIP)												
	CHRISTIANA NO. 452 (PRIVATE OWNERSHIP)	593 ha	8471	VACANT FARMLAND	PRIVATE	N	N	N	N	N	N	None	Private land to be purchased
	MOOI UITZIG NO 352 (PRIVATE OWNERSHIP)	300 ha	4285	VACANT FARMLAND	PRIVATE	N	N	N	N	N	N	None	Private land to be purchased

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	DORA NO. 287 (PRIVATE OWNERSHIP)	298 ha	4257	VACANT FARMLAND	PRIVATE	N	N	N	N	N	N	None	Private land to be purchased
	TOTAL		**20027**										
MIDDLE TO HIGH INCOME AREAS													
	VIRGINIA EXTENSION 10 – KITTY PHASE 1 (SDF – AREA CAN BE REDESI		178	VACANT	MLM	Y	Y	Y	WWTW TO BE UPGRADED	Y	REQUIRES UPGRADING – R2.8M	Electricity and roads to be provided	ELECTRICAL INFRASTRUCTURE TO BE UPGRADED AT R2.8M

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	SEWER	ROADS AND SW	ELECTRIC		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	GNESD INTO SMALLERSITES)												
	VIRGINIA EXTENSION 10 – KITTY PHASE 2 (SDF – AREA CAN BE REDESIGNESD INTO SMALLERSITES)		237	VACANT	MLM	Y	Y	Y	WWTW TO BE UPGRADED	Y	REQUIRES UPGRADING – R10.9M	NONE AVAILABLE	ELECTRICAL INFRASTRUCTURE TO BE UPGRADED AT R10.9M

WARD	LAND DESCRIPTION AND SDF PROPOSALS	SIZE	ERF POTENTIAL	CURRENT	OWNERSHIP	SG PLAN	REGISTER OPENED	BULK SERVICES				INTERNAL SERVICES	COMMENT
								WATER	**SEWER**	**ROADS AND SW**	**ELECTRIC**		**Cost estimations: Planning and pegging est @R2500/erf Internal services est @R35000/erf Bulk – to be calculated**
	VIRGINIA - SAAIPLAAS(SDF – AREA CAN BE REDESIGNESD INTO SMALLERSITES)		361	VACANT	MLM	Y	Y	Y	Y	ROADS TO BE CONSTRUCTED AND UPGRADED AT - R12M	REQUIRES UPGRADING – R16.3M	NONE	**COST IMPLICATIONS: Bulk service – ELECTRICAL – 16.3M** **Roads – R12m** **TOTAL:R28M**

DEVELOPMENT PROPOSALS IN RELATION TO SPATIAL DEVELOPMENT IN MATJHABENG:

RESIDENTIAL DEVELOPMENT:

a) That a Technical Housing Planning Committee be established comprising of the Municipality, the Provincial Department of Human Settlement and the Free State Housing Development Agency in order to prepare and present an annual report to Council in relation to all aspects of low cost housing backlogs (land acquisition, erven, services and housing provision) and to jointly formulate/review a five year housing delivery program in Matjhabeng.

b) That the five year delivery program and projects for low cost housing development in Matjhabeng be taken up in the Municipal and Provincial IDP's and budgets.

c) That the provision of both internal and bulk services for all areas of the 7000 Human Settlement Township Establishment Project be prioritized and that an implementation plan be submitted to Council, which also addresses the timeous allocation of erven to beneficiaries as soon as adequate municipal services are available.

d) That the relevant Provincial Sector Departments responsible for the provision of public amenities e.g. schools, clinics and police stations etc. be engaged in the five year delivery plan to ensure the timeous provision of such facilities to communities.

e) That the Municipality will focus on outstanding aspects pertaining to the application for Housing Accreditation.

f) That housing demands, needs and trends and for all housing typologies (student accommodation, rental units, low cost self- help, middle income, gated housing complexes etc.) be monitored in order to make annual recommendations to Council regarding land release for such developments.

g) That the acquisition of land for low cost housing development in Nyakallong, Mmamahabane and Meloding be finalized within six months.

h) That the following areas be declared as priority areas for low cost (low density) housing development and that the Technical Housing Planning Committee prepares business plans for these projects to determine feasibility, to initiate funding for development, to determine the impact and responsibility regarding the provision of bulk services and to prepare implementation plans:

Thabong - Homestead 668 (Low cost)
Thabong - Portion of Kijknou 81 (Low cost)
Thabong Portion of the farm Doornpan 772 (private land) for low cost housing
Thabong - Erf 19143 Thabong (low cost)
Welkom - Mealiebult 146 (Low cost) – Harmony land
Welkom - Lotgeval 96 (low cost)
Allanridge/Nyakallong – Zoetspruit and the redevelopment of existing erven in Phase 1 – Allanridge.
Odendaalsrus/Kutlwanong – Redevelopment of existing erven in Eldorie as well as the further development of Leeuwbosch.

Hennenman/Phomolong – Hennenman X10 and further development of Ventersvlakte 740.

Ventersburg/Mammahabane – Ventersburg X6 (land restitution) as well as the farm Kromfontein 209.

Virginia/Meloding – Land acquisition for at least 3000 erven.

i) That the following areas be declared as priority areas for medium and high density (low and middle income housing development including student accommodation and that the Technical Housing Planning Committee prepares business plans for these projects to determine feasibility, to initiate funding for development, to determine the impact and responsibility regarding the provision of bulk services and to prepare implementation plans:

Bothmas Rust 159 (Medium density – student accommodation, townhouses, rental accommodation) – (CUT land)

Welkom X17 (Medium density – student accommodation, town houses, rental accommodation)

j) That Naudeville X2, the vacant erven in Flamingo Park, a portion of Thabong X22 and Thabong T6 be prioritized for the middle to high income market (gap market housing) for development by the private sector. It is further important that hat the Technical Housing Planning Committee prepares business plans for these projects to determine feasibility. To determine conditions for the submissions of development proposals by the private sector and the evaluation of such development proposals.

k) That existing vacant and serviced residential erven (both high density and single residential erven) be marketed on a regular basis via the Public Bidding Process in terms of the MFMA. In this regard there should be strong emphasis on the creation of gated developments by the private sector – even through the consolidation of single residential erven.

l) That the opportunity be given to the private sector via the MFMA process of competitive bidding to take over the management of all the Municipal owned rental units. (Beneficiary allocation and contract administration, rental collection, services consumption billings and payments and maintenance) in order to ensure the financial viability of these units.

COMMERCIAL/INDUSTRIAL DEVELOPMENT:

a) That a CBD redevelopment and re-vitalization strategy and implementation plan be developed for approval by Council.

b) That the Incentive Scheme for high potential economic growth sectors (industrial, commercial, agricultural, tourism, training and support) be re-instated and actively marketed.

c) That the provision of lacking infrastructure of all vacant industrial areas be addressed in order to create a marketable product.

d) That a strategy for the development of the informal business sector as well as the management thereof (regulations for informal trading, administration procedures, development of facilities) be prioritized.

e) That the necessary communication structures be established between the Municipality and the private sector in order to assist problem identification, the development of strategies and implementation plans.

f) That high potential commercial land be alienated on a continuous basis via the MFMA process of competitive bidding in support of the high potential growth sectors, but that strong emphasis be placed on the financial feasibility of such project in the evaluation of development proposals.

g) That priority be given to the creation of economic activity areas and business areas in all disadvantaged areas to create economic opportunities, employment and to improve the quality of living for these communities.

h) That the creation of industrial areas in all disadvantaged areas be prioritized in order to create economic opportunities and employment in all previously disadvantaged areas.

i) That the potential of the Welkom airport as a regional airport and facility center be actively marketed via the MFMA process of competitive bidding.

j) That the necessary internal capacity be created in order to manage and fast track the land readiness evaluation, marketing, evaluation of proposals and conclusion of the land alienation procedure as required by the MFMA.

k) That development proposals be invited for the show grounds, either to re-instate the agricultural show or for the development of other commercial activities.

4 WATER

4.1 STATUS QUO

4.1. Status Quo

4.1.1. Legislated Reports
4.1.2. Bulk supply
4.1.3. Distribution system
4.1.4. Current demand
4.1.5. Backlogs
4.1.6. Efficiency levels and losses

4.2 Future demand, needs and challenges

4.2.1. Water demand and management
4.2.2. Upgrades and refurbishments
4.2.3. Expansion of networks
4.2.4. Risk assessment

4.3. The Master Plan

4.3.1. Long-term plan (10 years)
4.3.2. Three-to-Five-Year Capital and Operational Plan
4.3.3. One-Year Project and Budget Plan

4.1.1 Legislated Water Reports

The MLM has Water Safety Plans in place for the municipality's six Water Supply systems. These are meant to ensure the safety of drinking water supply through the use of a comprehensive risk assessment and risk management approach. As part of the Water Safety, the following documents are prepared annually:

A Water Safety Plan that include the Water Safety Planning process with a clear reference to the specific Water supply system.
Risk assessment that covers the catchment, treatment and reticulation up to the point of use and the findings of the risk assessment with the control measure for each hazard.
A Risk Defined Monitoring Program to ensure that the drinking water complies with the SANS 241 Standard for Drinking water and meets the health-based targets.
Incident Response Management Protocol to specify the alert levels, response times and required actions are taken.
Annual Water Balance Reports

As part of input to the above, the following documents are updated regularly and signed by management as proof of commitment to the processes:

logbooks system

Treatment plant logbooks

Water safety Plan with all the supporting documents, Risk assessments, water quality, Incident response protocol an risk Defined monitoring program

Water Conservation and Demand Management Plan

Water Services Development Plan update

Water Services Bylaws update in progress

Copy of Contract of Service Level Agreement between WSI and Water Services Provider in place

4.1.2 Bulk Supply

The Sedibeng Water board is responsible for the abstraction, purification and bulk distribution of water to the MLM. It is also responsible for the sampling within the bulk distribution system and point of use samples as per the service level agreement. The Sedibeng Water board has a SANAS accredited laboratory that does most of the analyses, however some of the parameters are analysed at external laboratories.

The Balkfontein and Virginia Water Treatment Plants supply the purified water to the following MLM water distribution systems:

Allanridge (Allanridge, Nyakallong):- Supplied by the Balkfontein Water Treatment Plant.

Hennenman (Hennenman, Phomolong):- Supplied by the Balkfontein Water Treatment Plant.

Odendaalsrus (Odendaalsrus, Kutlwanong):- Supplied by the Balkfontein Water Treatment Plant.

Ventersburg (Ventersburg, Mmamahabane):- Supplied by the Balkfontein Water Treatment Plant.

Virginia (Virginia , Meloding):- Supplied by the Balkfontein Water Treatment Plant and the Virginia Water Treatment Plant . The Virginia WTW supply water to Virginia when there is enough water from Allamemanskaal Dam

Welkom (Welkom, Riebeeckstad, Thabong, Bronville):- Supplied by the Balkfontein Water Treatment Plant.

The Balkfontein water treatment plant is the major supplier of all the six systems. It is a Class B facility with a design capacity of 360 Ml/d. Its annual average production is 197 Ml/d. It is operating at 55% design of its design capacity. The water treatment plant process technology applied includes pumping, flocculation, sedimentation, chlorination and filtration and adjustments in parameters such as stability and corrosion control.

The Virginia water treatment plant is a Class B facility with a design capacity of 120 Ml/d. Currently, it supplies 30ML/d. The Virginia Water Treatment Plant feeds into the Dirksburg Reservoirs. This plant can only supply the Welkom area and Virginia. The treatment process technology includes pumping, flocculation, sedimentation, chlorination and filtration and adjustments in parameters such as stability and corrosion control.

Table 4.1.1 below shows the available Reservoirs and associated capacities that supply the MLM.

Table: 4.1.1 : Available Reservoirs and associated capacities that supply the MLM

	Reservoir Name	Capacity (m^3)	Description	Supplying
1	Allanridge Res.	29,000	In Allanridge Town	Allanridge/Nyakallong
1a	Allanridge Tower	1,000	In Allanridge Town	Allanridge/Nyakallong
2	Koppie Alleen Hi Level Old	120,000	Riebeeckstad	Welkom/Thabong/Bronville
3	Koppie Alleen Hi Level New	90,000	Riebeeckstad	Welkom/Thabong/Bronville
4	Koppie Alleen Middel Level 1	35,000	Riebeeckstad	Welkom/Thabong/Bronville
5	Koppie Alleen Middel Level 2	35,000	Riebeeckstad	Welkom/Thabong/Bronville
6	Koppie Alleen Middel Leve 3	35,000	Riebeeckstad	Welkom/Thabong/Bronville
7	Koppie Alleen Low Level 1	35,000	Riebeeckstad	Welkom/Thabong/Bronville
8	Koppie Alleen Low Level 2	35,000	Riebeeckstad	Welkom/Thabong/Bronville
9	Dirksburg 1	60,000	Near Virginia	Virginia/Meloding
10	Dirksburg 2	30,000	Near Virginia	Virginia/Meloding
11	Brabant Res. No.1	2,273	Near Hennenman	Hennenman/Pomolong
12	Brabant Res. No.2	682	Near Hennenman	Hennenman/Pomolong
13	Ventersburg Res.	5,000	Near Ventersburg	Ventersburg/Mmamabahane
14	Leeubult no.1	20,000	Near Beatrix Mine	Kitty/Saaiplaas
15	Leeubult no.2	20,000	Near Beatrix Mine	Kitty/Saaiplaas
	Total	**552,955**		

Source: Sedibeng Water Board

Sedibeng Water Board highlighted the challenges faced concerning the Phomolong supply line. The Water supply for the Phomolong line comprises of:

- A pump station at Riebeeckstad.
- A pipeline from Riebeeckstad to reservoirs and a pump station near Hennenman. (Brabant)
- A pipeline from Brabant to Ventersburg reservoir.
- A pipeline from Ventersburg to Mmamahabane.

The pipeline from Riebeeckstad to Brabant reached the maximum capacity that it can provide. Although the water demand from all the towns increased gradually over the last five to ten years, however, the demand at Phomolong increased steeply.

The short term solution implemented by the Sedibeng Water board to deal with this situation is to close the Phomolong take-off at 22:00 at night until 04:00 the next morning enough water is accumulated to be pumped to the Ventersburg reservoir to last the consumers until 22:00.

Therefore, Phomolong take-off is closed every night at 22:00 and again opened at 04:00 the next morning.

The long term solution; Sedibeng Water appointed consulting engineers to design a long tern solution for this problem. The project will comprise of the following:

Additional pumping capacity at Riebeeckstad pump station. Augmenting the supply pipeline to Brabant.
Additional storage reservoir at Brabant.
Additional pumping capacity at Brabant pump station.
Augmenting the supply pipeline from Brabant to Hennenman.
Augmenting the supply pipe line from Ventersburg reservoir to Mmamahabane.

The final design is at an advanced stage. It is estimated that the project will cost R270 million. However, it needs to be noted that funding for this project is a challenge for Sedibeng Water due to the non-payment of water accounts by municipalities.

At a later stage the supply pipeline from Hennenman to Phomolong will be augmented. This long term solution is designed for sufficient water supply up to 2035

4.1.3 Distribution System

Matjhabeng Water Supply Systems

The MLM bulk water supply is provided by the Sedibeng Water Board. The internal distribution is also carried out by the Sedibeng Water Board.

The consumers include residential, business, industry and mines in the Free State Gold Fields area.

The overall distribution network of Matjhabeng is divided into six sub-distribution networks, namely:

Welkom distribution network (water supply system)

Virginia distribution network (water supply system)

Odendaalsrus distribution network (water supply system)

Allanridge distribution network (water supply system)

Hennenman distribution network (water supply system)

Ventersburg distribution network (water supply system)

Definition of the supply areas

Welkom (also known as the Central area)

The Welkom area is made up of the following areas Welkom, Riebeeckstad, Bronville, and Thabong. It is supplied from the Balkfontein water treatment plant and is made up of the following:

Bronville, Section of Thabong supplied from Balkfontein and Virginia Plant
) Riebeeckstad supplied from Municipal Pressure Tower

Matjhabeng East

Virginia and Meloding – supplied from the Virginia Plant
(Virginia and Meloding is supplied from the Balkfontein when Virginia Plant is out of operation)
Meloding supplied from the Municipal Reservoir
Hennenman and Phomolong supplied from the Balkfontein Plant
Ventersburg and Mmamahabane supplied from the Balkfontein Plant via the Ventersburg Municipal Reservoir

Matjhabeng West

Allanridge and Nyakallong supplied from the Balkfontein Plant via the Allanridge Municipal Reservoir
Odendaalsrus, Kutlwanong supplied from the Balkfontein Plant

SEDIBENG WATER DISTRIBUTION NETWORK

Figure 4.1.1 below shows the Sedibeng Water Distribution network as well as the Water Supply network Information for Matjhabeng Local Municipality.

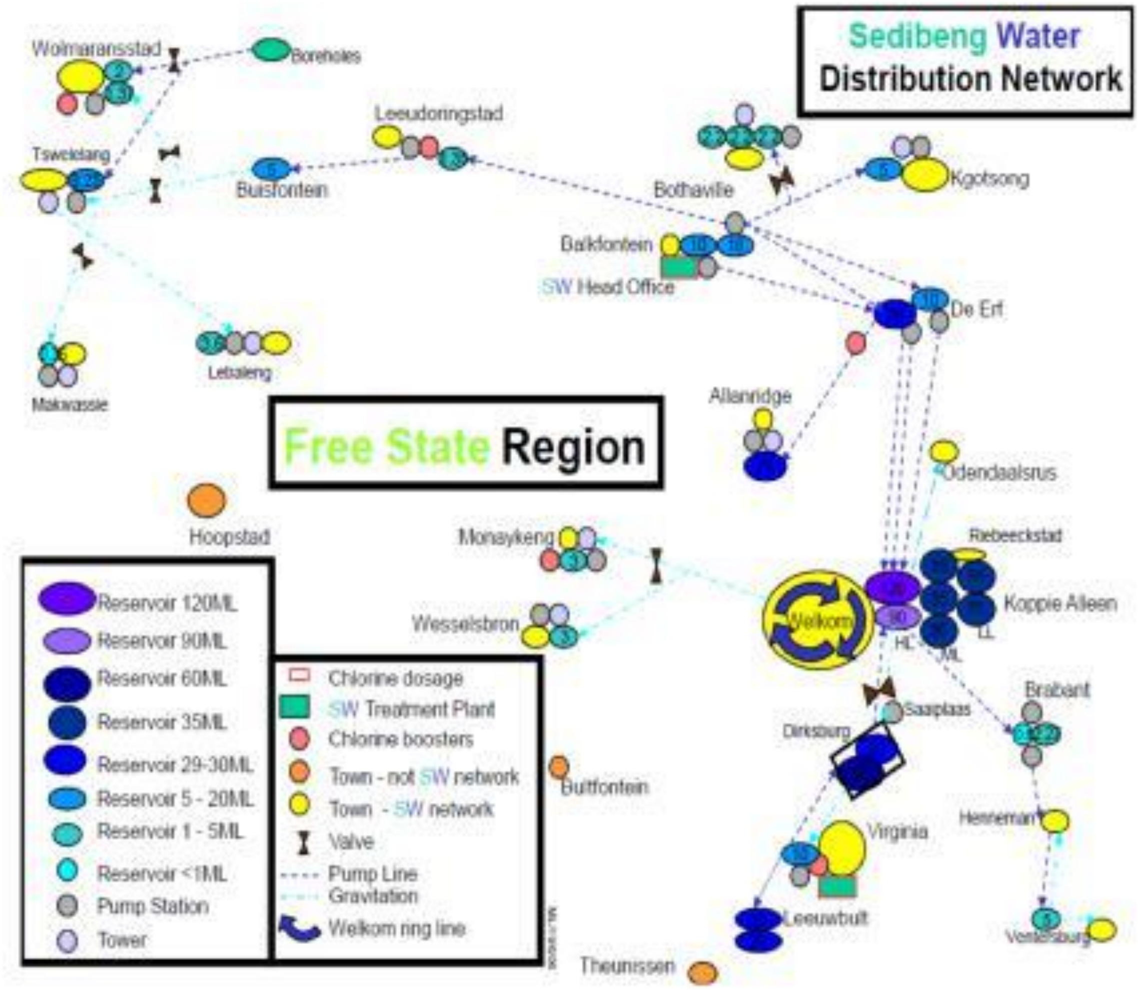


Figure 4.1.1: Sedibeng Bulk Water Network

There are four portable water reticulation reservoirs servicing the municipality. These are situated in Meloding, Nyakallong and Ventersburg respectively. Three out of four reticulation reservoirs are operational.

In addition, there are also three potable water reticulation pressure towers. These are situated in Riebeeckstad, Nyakallong, and in Kutlwanong. Only the Riebeeckstad tower is currently in use. There is also a purified effluent reservoir in Welkom, but is currently not functional, due to mal-functionality of Theronia WWTW and dysfunctional Purified Effluent Pump Station.
The decommissioned reservoir and towers are not influencing potable water supply to any of its consumers.

The reservoirs and towers are in a fairly good condition with an expected remaining useful life of 14 years.

Table 4.1.2 below summarizes the water reticulation reservoirs and pressure tower infrastructure in MLM area of jurisdiction.

Table 4.1.2 below summarizes the water reticulation reservoirs and pressure tower infrastructure in MLM area of jurisdiction

Name	Location	Expected Remaining Useful Life	Estimated replacement value	Physical Condition	Capacity in Ml
Meloding reservoir	Meloding	18	13 510 000	Good	3.86
Nyakallong Tower	Nyakalong	18	857 500	Good, but Decommissioned	0.245
Nyakalong reservoir	Nyakalong		2 240 000	Good	0.64
Kutlwanong Tower	Nyakalong	18	± 857 500	Good, but Decommissioned	± 0.245
Ventersburg Reservoir	Ventersburg	17	6 580 000	Good	1.88 Ml
Ventersburg Borehole Reservoir	Ventersburg	9	± 857 500	Fair, but Decommissioned	Unknown
Riebeeckstad tower	Riebeeckstad	11	1 001 000	Fair	0.286 (Without roof access chamber)
Alma Purified effluent Reservoir	Welkom	18	± 6 580 000	Good, but Decommissioned	± 1.88
TOTALS			**32 483 500**		

Source: Matjhabeng Local municipality Water Services Section 78 Assessments :Status Quo Report ,2016.

Bulk Portable Water Reticulation Water Pipelines

The bulk water pipelines in the municipality covers over 1 650 km in length. The pipelines are made of various materials. These include Asbestos, HDPE,PVC, Steel materials. These are mostly old and need to be replaced. The estimated replacement value is in the order of R275 million. **Table 4.1.3** shows bulk portable reticulation water pipelines.

Table 4.1.3 Bulk portable reticulation water pipelines.

Pipelines		Annual Operating Costs	Annual Maintenance Costs	Estimated Replacement Value
Type	Length (meters)	"Rand"	"Rand"	"Rand"
Asbestos	722 122.8	Budget: 5 721 824.00 Actual Exp: 3 716 053.55	Budget: 7 416 431.0 Actual Exp: 6 304 525.97	110 031 845.67
GRP	3 290.4			4 185 325.68
HDPE	885.7			97 994.93
Steel	127 118.7			17 039 947.44
uPVC	782 975.9			92 423 432.44
Unknown	20 601.1			617 208.15
Grand Total	**1 657 048.8**			224 395 754.31

Source: Matjhabeng Local municipality Water Services Section 78 Assessments :Status Quo Report ,2016.

Water Pump Stations

Table 4.1.4 below shows the number of water pump stations as well as the physical condition in percentage.

Table 4.1.4: Number **of water pump stations and the physical condition in percentage**

Name	Location	Expected Remaining Useful Life	Estimate replacement value	Annual operating cost	Annual maintenance cost	Physical Condition In % functionality
Potable water pump stations						
Nyakallong Tower	Nyakallong	Unknown	Unknown	Unknown	Unknown	30
Riebeeckstad Tower	Riebeeckstad	Unknown	Unknown	Unknown	Unknown	Good
Virginia Plant	Virginia	Unknown	Unknown	Unknown	Unknown	28
OR Tambo	Virginia	Unknown	Unknown	Unknown	Unknown	67
Borehole Ventersburg	Ventersburg	Unknown	Unknown	Unknown	Unknown	44
Bay Road	Hennenman	Unknown	Unknown	Unknown	Unknown	61
Purified effluent water pump stations						
Rowers club	Welkom	Unknown	Unknown	Unknown	Unknown	Vandalized
Virginia WWTW	Virginia	Unknown	Unknown	Unknown	Unknown	74
Harvinia	Virginia	14	Unknown	Unknown	Unknown	41
Voortrekker	Virginia	Unknown	Unknown	Unknown	Unknown	67
Government	Virginia	Unknown	Unknown	Unknown	Unknown	67
Hentie Cilliers	Virginia	Unknown	Unknown	Unknown	Unknown	67
Hentie Sports fields	Virginia	Unknown	Unknown	Unknown	Unknown	28
Volkskool	Virginia	Unknown	Unknown	Unknown	Unknown	67
Storm water pump stations						
Duikweg	Virginia	Unknown	Unknown	Unknown	Unknown	55
Drain	Virginia	Unknown	Unknown	Unknown	Unknown	Unknown
Klip pan	Welkom	Unknown	Unknown	Unknown	Unknown	69

Source: Matjhabeng Local municipality Water Services Section 78 Assessments :Status Quo Report ,2016.

Water Supply Network Information

Table 4.1.5: ALLANRIDGE NETWORK SUPPLY SYSTEM

	Aspect		Comments for 2016-2017
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage	Yes	
	- Human/animal faeces	No	
	- Solid waste	No	
	- Excessive algal growth	No	
	- Recreational use by the community	Yes	
	- Other (specify)	No	
2	Does the primary main pass through stagnant water?	No	
	Valve Boxes/Chambers (Additional)		%
1	Are the valves operational?		60
2	Is the valve box cover cracked?		40
3	Is the valve corroded?		50
4	Does the valve leak?		30
5	Is there debris or faecal matter in the valve box/chamber?		70
6	Is the valve box designed without a washout?		
7	Is there stagnant water in the valve box?		25
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	Yes	
2	Is there a valve box within 1 meter of a road crossing?	Yes	
3	Is the supply pipe close to the road crossing?	Yes	
4	Is there evidence of faecal matter in the area surrounding the pipe?	No	
5	Is there evidence of leaks around the pipe?	Yes	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	

2	Does surface water collect around any standpipe?	Yes	
3	Are the supply pipes in the vicinity of the standpipes exposed?	No	
4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Table 4.1.6: HENNENMAN NETWORK SUPPLY SYSTEM

	Aspect		Comments for 2016-2017
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage	Yes	
	- Human/animal faeces	Yes	
	- Solid waste	No	
	- Excessive algal growth	No	
	- Recreational use by the community	Yes	Parks, sport fields
	- Other (specify)	Yes	
2	Does the primary main pass through stagnant water?	No	
	Valve Boxes/Chambers (Additional)		did not change during 2016
1	Are the valves operational?		35
2	Is the valve box cover cracked?		40
3	Is the valve corroded?		55
4	Does the valve leak?		35
5	Is there debris or faecal matter in the valve box/chamber?		85
6	Is the valve box designed without a washout?	No	Empty with external pump
7	Is there stagnant water in the valve box?		
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	Yes	
2	Is there a valve box within 1 meter of a road crossing?	Yes	
3	Is the supply pipe close to the road crossing?	Yes	
4	Is there evidence of faecal matter in the area surrounding the pipe?	Yes	Animal grazing in vicinity
5	Is there evidence of leaks around the pipe?	Yes	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	
2	Does surface water collect around any standpipe?	Yes	

3	Are the supply pipes in the vicinity of the standpipes exposed?	No	
4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Table 4.1.7: ODENDALSRUS NETWORK SUPPLY SYSTEM

	Aspect		Comments for 2016-2017
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage	Yes	
	- Human/animal faeces	Yes	
	- Solid waste	No	
	- Excessive algal growth	No	
	- Recreational use by the community	Yes	Parks, sport fields
	- Other (specify)	Yes	
2	Does the primary main pass through stagnant water?	No	
	Valve Boxes/Chambers (Additional)		%
1	Are the valves operational?		60
2	Is the valve box cover cracked?		40
3	Is the valve corroded?		50
4	Does the valve leak?		30
5	Is there debris or faecal matter in the valve box/chamber?		70
6	Is the valve box designed without a washout?	No	
7	Is there stagnant water in the valve box?	Yes	
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	Yes	
2	Is there a valve box within 1 meter of a road crossing?	Yes	
3	Is the supply pipe close to the road crossing?	Yes	
4	Is there evidence of faecal matter in the area surrounding the pipe?	Yes	Animal grazing in vicinity
5	Is there evidence of leaks around the pipe?	Yes	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	
2	Does surface water collect around any standpipe?	Yes	
3	Are the supply pipes in the vicinity of the standpipes exposed?	No	

4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Table 4.1.8: VENTERSBURG NETWORK SUPPLY SYSTEM

	Aspect		Comments for 2016
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage	Yes	
	- Human/animal faeces	Yes	
	- Solid waste	No	
	- Excessive algal growth	No	
	- Recreational use by the community	Yes	
	- Other (specify)	Yes	
2	Does the primary main pass through stagnant water?	No	
	On-Site Service Reservoir/s		
1	Are the vents covered?	Yes	
2	Are the inspection covers or concrete around cover damaged or corroded?	No	
3	Is there any observable part of the inside of the tank corroded or damaged (including: ladders, roof struts, walls)?	Yes	
4	Is there evidence of leakage/cracks on the walls?	No	
5	Can run-off form stagnant pools close to the reservoir?	No	
6	Can stagnant or dirty water collect in valve boxes or washout chambers?	No	
7	Is the reservoir fenced and secure?	No	Need to be upgraded
8	Is there evidence of human/animal faecal material around the valve box/chamber, reservoir vents and/or inspection covers?	No	
9	Is the reservoir cleaned? If so, how often?	Yes	Was cleaned in 2015
10	Are there any valve leaks?	No	

	Valve Boxes/Chambers (Additional)	Yes	%
1	Are the valves operational?		40
2	Is the valve box cover cracked?		40
3	Is the valve corroded?		60
4	Does the valve leak?		35
5	Is there debris or faecal matter in the valve box/chamber?		85
6	Is the valve box designed without a washout?		
7	Is there stagnant water in the valve box?		30
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	No	
2	Is there a valve box within 1 meter of a road crossing?	No	
3	Is the supply pipe close to the road crossing?	No	
4	Is there evidence of faecal matter in the area surrounding the pipe?	No	
5	Is there evidence of leaks around the pipe?	No	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	
2	Does surface water collect around any standpipe?	Yes	
3	Are the supply pipes in the vicinity of the standpipes exposed?	No	
4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Table 4.1.9: VIRGINIA NETWORK SUPPLY SYSTEM

	Aspect		Comments for 2016-2017
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage		
	- Human/animal faeces	Yes	
	- Solid waste	Yes	
	- Excessive algal growth	No	
	- Recreational use by the community	No	
	- Other (specify)	Yes	
2	Does the primary main pass through stagnant water?	Yes	
	On-Site Service Reservoir/s	No	
1	Are the vents covered?	Yes	
2	Are the inspection covers or concrete around cover damaged or corroded?	No	
3	Is there any observable part of the inside of the tank corroded or damaged (including: ladders, roof struts, walls)?	Yes	
4	Is there evidence of leakage/cracks on the walls?	No	
5	Can run-off form stagnant pools close to the reservoir?	No	
6	Can stagnant or dirty water collect in valve boxes or washout chambers?	No	
7	Is the reservoir fenced and secure?	Yes	
8	Is there evidence of human/animal faecal material around the valve box/chamber, reservoir vents and/or inspection covers?	No	
9	Is the reservoir cleaned? If so, how often?	No	Planned 2017Res Cleaning Scedule
10	Are there any valve leaks?	No	

	Valve Boxes/Chambers (Additional)		No changes
1	Are the valves operational?		45
2	Is the valve box cover cracked?		45
3	Is the valve corroded?		60
4	Does the valve leak?		35
5	Is there debris or faecal matter in the valve box/chamber?		85
6	Is the valve box designed without a washout?		
7	Is there stagnant water in the valve box?		30
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	Yes	
2	Is there a valve box within 1 meter of a road crossing?	Yes	
3	Is the supply pipe close to the road crossing?	Yes	
4	Is there evidence of faecal matter in the area surrounding the pipe?	Yes	
5	Is there evidence of leaks around the pipe?	Yes	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	
2	Does surface water collect around any standpipe?	Yes	
3	Are the supply pipes in the vicinity of the standpipes exposed?	No	
4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Table 4.1.10: WELKOM NETWORK SUPPLY SYSTEM

	Aspect		Comments 2016 - 2017
	Primary Mains		
1	Is there evidence of the following in the vicinity of the pipe?		
	- Leakage	Yes	
	- Human/animal faeces	Yes	
	- Solid waste	No	
	- Excessive algal growth	No	
	- Recreational use by the community	Yes	Parks, sport fields
	- Other (specify)	Yes	Swiming pools
2	Does the primary main pass through stagnant water?	No	
	On-Site Service Reservoir/s Pressure Tower		
1	Are the vents covered?	Yes	
2	Are the inspection covers or concrete around cover damaged or corroded?	No	
3	Is there any observable part of the inside of the tank corroded or damaged (including: ladders, roof struts, walls)?	No	
4	Is there evidence of leakage/cracks on the walls?	No	
5	Can run-off form stagnant pools close to the reservoir?	No	
6	Can stagnant or dirty water collect in valve boxes or washout chambers?	No	
7	Is the reservoir/ Tower fenced and secure?	Yes	
8	Is there evidence of human/animal faecal material around the valve box/chamber, reservoir vents and/or inspection covers?	No	
9	Is the reservoir/ Tower cleaned? If so, how often?	No	
10	Are there any valve leaks?	No	
	Is the Power supply in operation?	Yes	
	Is the pumps in operation?	Yes	
	Booster Stations		
1	Is disinfectant added to the water at the booster station?	No	
2	Is any observable part of the booster station corroded or damaged (including: ladders, roof struts, walls)?	No	

3	Is there evidence of leakage/cracks at the booster station?	No	
4	Can run-off form stagnant pools close to the booster station?	No	
5	Can stagnant or dirty water collect in valve boxes?	No	
6	Is the booster station fenced and secure?	No	
7	Is there evidence of human/animal faecal material around the valve box/chamber?	No	
8	Is the booster station cleaned? If so, how often?	No	
9	Are there any valve leaks?	No	
10	Is the connecting main leaking?	No	
11	Are backflow preventers installed in the supply main?	Yes	

	Valve Boxes/Chambers (Additional)		(Did not Change)
1	Are the valves operational?		55%
2	Is the valve box cover cracked?		50%
3	Is the valve corroded?		65%
4	Does the valve leak?		50%
5	Is there debris or faecal matter in the valve box/chamber?		80%
6	Is the valve box designed without a washout?		
7	Is there stagnant water in the valve box?		30%
	Pipes In the Vicinity of Roads, Drains and Ditches		
1	Are there evident standpipes connected to the valves?	Yes	
2	Is there a valve box within 1 meter of a road crossing?	Yes	
3	Is the supply pipe close to the road crossing?	Yes	
4	Is there evidence of faecal matter in the area surrounding the pipe?	Yes	
5	Is there evidence of leaks around the pipe?	Yes	
6	Does the pipe cross an open trench/ditch?	Yes	
7	Is there waste material around the pipe?	No	
8	Is the pipe submerged in stagnant water?	No	
9	Is the pipe visibly damaged/cracked/leaking?	Yes	
	Standpipes/House Connections		
1	Do any standpipes leak?	Yes	
2	Does surface water collect around any standpipe?	Yes	
3	Are the supply pipes in the vicinity of the standpipes exposed?	No	
4	Is there any faecal matter on the ground within 10 meters of any standpipe?	No	
5	Is the main supply pipe submerged in stagnant water?	No	
6	Are there solid waste dumps within 10 meters from the standpipes?	No	
7	Does the main supply pipe pass through sewage/pit latrines/septic tank/foul water bodies?	No	
8	Does the main pipe cross a drain/ditch?	No	

Condition Assessment

The following four Reservoirs/ Water Towers which are managed by Matjhabeng Municipality :

Riebeeckstad Municipal Tower: Capacity = 0,286 ML
Meloding Municipal Reservoir : Capacity = 3,86 ML
Ventersburg Municipal Reservoir : Capacity = 1,88 ML
Nyakallong Municipal and Water Tower : Capacity = 0,64 ML (Currently not operating)

Sedibeng Water Infrastructure:

The Balkfontein Purification(Capacity=360ML) plant is the main source of water at Matjhabeng Municipality, with Virginia Purification Plant(Capacity=120ML) also supplying certain parts of Matjhabeng.

Both Purification plants are in good working condition and regular maintenance is conducted by Sedibeng Water.

There are 16 Water Towers / Reservoirs that are managed by Sedibeng Water and are supplying water to Matjhabeng Municipality (Including the Mines).

The general conditions of all these infrastructure is good and regular maintenance is conducted by Sedibeng Water.

The main challenge is the vandalism and pipe blockages caused on the main pipelines.

According to the Sedibeng Water Board, the following are potential future anticipated challenges with regards to MLM water supply:

The ageing main pipe lines which have were installed about 40 years ago will need to be replaced in most of the areas

The sewer spillages which in certain areas are covering main water pipe lines/valves may contaminate water if there is any openings or leakages.

The pipeline from Koppie Allen to Ventersburg has reached its capacity and an expansion of the infrastructure will be needed in order to cater for the growing population.

Allanridge Bulk Water Infrastructure

Allanridge reservoir

Allanridge reservoir, no issues

Allanridge tower

Pump station at Allanridge, pump working

Allanridge Reservoir

Brabandt 1 and 2 Reservoirs

Brabandt 2

Old hennenman pump station inside yard

Top view brabandt1, no issues

Brabandt 2

Brabandt2, no issues

Brabandt 1&2 Reservoir

Koppie Allen Hi Old and New Reservoirs

Koppie Alleen Hi level old

Koppie Alleen Hi level new

Top view of Old Koppie Allen

Top view for new Koppie Alleen

Koppie Allen tower old and new, no issues

Sealed furrow on top Koppie Allen

Koppie Allen Old & New Reservoir

Koppie Allen Middle and Low level Reservoirs

2 pumps at Koppie Allen middle and low level

Inside pump station, no issues

Hennenman pump station inside Koppie Allen

Two pump inside Henneman pump station, both working

Inside Henneman pump station

Low level Koppie Allen 1and 2

Koppie Allen Middle & low level 1,2 &3 Reservoir

Koppie Allen middle 1 and 2

Koppie Allen middle 1 and 2, top view

Koppie Allen middle, 1

Koppie Allen low

Koppie Allen Middle & low level 1,2 &3 Reservoir

Dirksburg Reservoir 1 and 2

Key changed, no access

Dirksburg 1 and 2 are divided by a brick wall

The view from the outside

Dirksburg 1 & 2 Reservoir

Leebult Reservoir 1 and 2

Electrical gate around the two reservoirs

Valves for both reservoirs

Another valve, no vandalism found on it

Inside room with valves

Electrical fencing around the two reservoirs

Leeubult 1 & 2 Reservoir

Outside the building with valves

The two reservoirs

Grit channels around reservoirs
fully operational

Leeubult 1

Leeubult 2

Leeubult 1 &2 Reservoir

Ventersdorp Reservior

Ventersburg reservoir, no faults were found

Another view

Municipal tower

Ventersburg Reservoir

4.1.4 Current Demand

Monthly Water Consumption (demand) Figures

The monthly water consumption figures are shown below as obtained from the Sedibeng Water, the supplier of water services to the MLM.

Table 4.1.11: Matjhabeng LM Monthly Water Consumption for 2018

SEDIBENG WATER

Monthly Water Consumption(Kl) for 2018

CONSUMER	METER	JAN	FEB	MCH	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
MUNICIPALITIES														
ALLANRIDGE	I01	29 070	19 580	20 320	16 360	17 210	18 900	19 590	20 520					161 550
	I07	0	0	0	0	0	0	0	0	0	0	0	0	0
	I10	1 479	1 173	1 330	1 128	1 100	1 250	1 202	1 237					9 899
TOTAL		30 549	20 753	21 650	17 488	18 310	20 150	20 792	21 757	0	0	0	0	171 449
NYAKALLONG	I13	96 770	77 430	85 560	79 010	78 730	83 850	78 780	88 540					668 670
ODENDAALSRUS	G07	151 480	120 490	170 200	168 160	184 380	196 260	186 830	228 680					1 406 480
	H08	1 362	1 434	1 621	1 070	1 064	1 857	1 725	1 265					11 398
	J07A	0	0	0	0	0	0	0	0	0	0	0	0	0
	J07B	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		152 842	121 924	171 821	169 230	185 444	198 117	188 555	229 945	0	0	0	0	1 417 878
KUTLWANONG	O01	574 900	463 400	510 900	423 400	360 000	407 800	370 200	442 000					3 552 600
VIRGINIA	F01	157 840	111 880	121 460	92 930	98 140	129 900	116 150	140 430					968 730
	F02	179 000	124 420	144 270	123 530	133 300	148 170	121 440	160 230					1 134 360
	L09	14 672	9 939	12 593	9 923	10 553	11 282	8 982	11 790					89 734
	L11	408	375	575	600	733	2 353	1 941	260					7 245
	L23	203 810	8 630	3 490	1 600	207 310	281 890	253 190	297 320					1 257 240
TOTAL		555 730	255 244	282 388	228 583	450 036	573 595	501 703	610 030	0	0	0	0	3 457 309
MELODING	F28	282 520	221 510	266 550	231 650	229 480	260 470	218 320	281 940					1 992 440
WELKOM	D01	155 060	113 170	89 000	81 420	87 530	115 810	107 750	111 830					861 570
	D02	115 980	68 270	81 570	59 970	74 830	85 910	69 170	94 060					649 760
	F03	41 400	32 430	34 150	36 910	36 970	37 610	31 250	37 770					288 490
	F29	97 570	77 160	85 730	91 910	95 290	106 670	85 330	117 650					757 310
	G01	150 330	169 590	181 750	172 720	168 850	211 140	169 080	155 450					1 378 910
	G02	155 250	119 950	151 790	121 640	121 610	206 790	170 180	218 080					1 265 290
	G03	194 310	160 450	206 840	168 790	152 110	172 940	129 920	152 720					1 338 080
	G04	919	324	510	247	284	303	2 210	0					4 797
	G05	130 820	85 960	102 150	72 580	80 240	96 570	78 240	96 490					743 050
	G08	27 470	31 160	33 780	38 480	34 860	40 150	35 310	41 950					283 160
	G09	258 280	270 870	189 820	207 220	226 370	258 000	229 720	221 840					1 862 120
	G18	0	0	0	0	0	0	0	0					0
	G37	10 450	7 280	8 210	7 280	7 070	6 770	6 220	7 060					60 340
	G41	324 430	255 430	233 320	165 980	166 290	168 160	145 820	165 670					1 625 100
	G42	355 980	226 500	181 510	140 860	200 070	292 460	261 880	282 860					1 942 120
	N02	27 030	18 690	24 780	19 750	22 520	5 800	0	0					118 570
TOTAL		2 045 279	1 637 234	1 604 910	1 385 757	1 474 894	1 805 083	1 522 080	1 703 430	0	0	0	0	13 178 667
THABONG	F25	75 580	55 620	65 160	54 240	51 210	60 410	71 740	44 170					478 130
	F32	7 159	2 934	3 259	3 114	2 881	4 088	7 276	7 276					37 987
	G32	0	0	0	0	0	0	0	0	0	0	0	0	0
	N03	719 450	476 670	589 450	483 430	406 310	464 630	472 940	649 040					4 261 920
	N04	642 700	628 000	777 700	632 500	596 300	729 600	586 900	613 900					5 207 600
TOTAL		1 444 889	1 163 224	1 435 569	1 173 284	1 056 701	1 258 728	1 138 856	1 314 386	0	0	0	0	9 985 637
HENNENMAN	E25	84 050	79 150	92 930	56 000	55 290	65 750	57 160	72 950					563 280
PHOMOLONG	E19	132 750	98 250	132 850	105 370	102 610	119 930	116 040	145 210					953 010
VENTERSBURG	E26	18 490	11 773	14 921	18 021	6 889	16 650	16 766	19 882					123 392
MMAMAHABANE	E27	64 508	45 384	57 434	47 625	49 719	57 060	48 190	59 506					429 426
TOTAL: MATJHABENG		**5 483 277**	**4 195 276**	**4 677 483**	**3 935 418**	**4 068 103**	**4 867 183**	**4 277 442**	**4 989 576**	**0**	**0**	**0**	**0**	**36 493 758**

Source: Sedibeng Water

There is a significant fluctuation in consumption from month to month. For example, in Allanridge, the consumption in January was 30 549kl and in February 20 753. These reading can be considered to be both in the summer season. However, the difference is over 10 000kl, their variation is around 32%. The June, July and August figures seem to be fairly consistent in the order of 20 000kl.

If we look at Thabong as another example, there figures fluctuate significantly from month to month throughout the seasons.

It can also be noted that there other meters(in green) that did not show any reading such as meter I107 in Allanridge.

In total the MLM water consumption for 2018 is 36 493 758 thus far from January 2018 to August 2018.

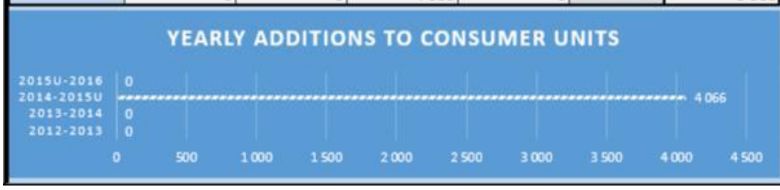
Portable water Level of Service

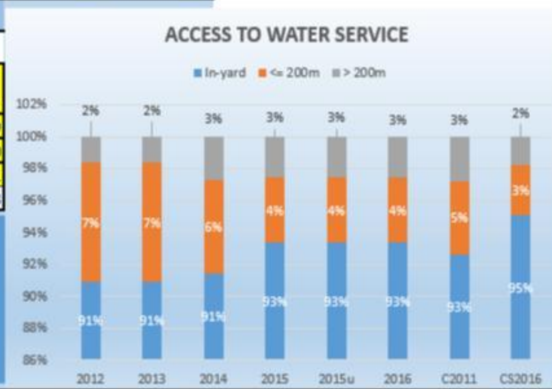
The **Table 4.1.12** below shows the statistics for access to water for the Matjhabeng Municipality for various years

Table 4.1.12: Access to water for Matjhabeng Local Municipality

NON-FINANCIAL CENSUS OF MUNICIPALITIES - CONSUMER UNITS							HOUSEHOLDS	
ACCESS TO WATER SERVICE							CENSUS	CS2016
	Select year							
Water service	2012	2013	2014	2015	2015u	2016	C2011	CS2016
In-yard	84 855	84 855	85 352	90 951	90 951	90 985	111 799	140 344
<= 200m	7 000	7 000	5 500	3 967	3 967	3 933	5 581	4 633
> 200m	1 500	1 500	2 503	2 503	2 503	2 503	3 337	2 581
In-yard	91%	91%	91%	93%	93%	93%	93%	95%
<= 200m	7%	7%	6%	4%	4%	4%	5%	3%
> 200m	2%	2%	3%	3%	3%	3%	3%	2%

NON-FINANCIAL CENSUS OF MUNICIPALITIES - CONSUMER UNITS						
Yearly additions to water consumer units					Households	
Level of Service	2012-2013	2013-2014	2014-2015u	2015u-2016	Sparkline	(2016-2011)/a
In-yard	0	497	5 599	34		5 709
<= 200m	0	-1 500	-1 533	-34		-190
> 200m	0	1 003	0	0		-151
	0	0	4 066	0		5 368





The **Table 4.1.12** shows that the percentage of households with access to water in-yard was 91% in 2012 and stayed the same until 2014. It was 93% in 2014 and stayed the same until 2016. It improved in 2016 to 95%. This data shows that a steady increase in the number of households with access to water in yard. However, it also shows a backlog of 5% (about 7 500 units) to get to the situation where every citizen can access water in-yard.

Percentage of households with access to water (outside yards at distances of equals to or less than 200m) was at 7% in 2012 and 2013. It decreased to 6% in 2014 and further decreased to 4% in 2015. It stayed the same in 2016. This decrease shows that more households in this category have moved into the category of households with access to water in-yard.

The percentage of households with access to water (outside yards at distances over 200m) was 2% in 2012 and 2013. It increased to 3% in 2014 and stayed the same until 2016. This increase will have to be reversed.

4.1.5 Backlogs

As stated in this report, there has been a steady increase in the number of households with access to water in yard. However, it also shows a backlog of 5% (about 7 500 units) to get to the situation where every citizen can access water in-yard.

Due to excessive water losses, the Municipality embarked on a project to reduce water losses. Detailed investigations on existing water meters were done to determine reason why meters were not functional and associated repairs thereof were not undertaken.

Faulty valves were identified and replaced to minimise water loss during maintenance actions. Indigent households with the highest water usage were identified and leakages of taps and toilet cisterns were repaired.

A 2-year Leak Detection and Repairs Project commenced from May 2017, whereby the entire water network was assessed for visible and invisible leakages. All the identified leakages will be repaired and water losses be reduced.
Maintenance of water networks in old high-income areas became difficult as little funding is available to maintain and upgrade such.

4.1.6 Efficiency levels and losses

Matjhabeng has a Water infrastructure consisting mostly of four reservoirs and ninety nine km of bulk pipelines from Sedibeng Water Board, five pump stations and 1,540,862 m of reticulation pipeline. It is estimated that over a third of the reticulation system is over 40 years old and 36% of water reticulation consists of old AC pipe which is prone to damage.

The National Development Plan (NDP) makes reference to the need for vigorous Water Conservation and Water Demand Management (WC/WDM) programmes to ensure that the national and regional water loss reduction targets are met in view of the water scarcity challenges facing the country.

These challenges are multi-dimensional in nature ranging from limited resource availability to limitations in access due to inappropriate infrastructure management and maintenance.

Furthermore the NDP makes mention of the need for a dedicated national WC/WDM programme which will assist in setting progressive water loss reduction targets for 2017 and 2022, thus highlighting the critical requirement of sound management information upon which to make prudent decisions regarding the future and strategic options for sustainable water supply in the country.

It is therefore important that municipalities have proper understanding of the system input volume, authorised consumption, water losses and nonrevenue water of all urban and rural potable water distribution systems.

The International Water Association (IWA) has developed the standard water balance to evaluate the performance of water distribution systems and it is being promoted across the world as best practice. The IWA standard water balance was slightly modified for South Africa to allow for free basic water. The modified IWA water balance is shown in **Figure 4.1.2** below.

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Free basic
			Billed Unmetered Consumption	Revenue Water
		Unbilled Authorised Consumption	Unbilled Metered Consumption	Non Revenue Water
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorised Consumption	
			Customer Meter Inaccuracies	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Storage Tanks	
			Leakage on Service Connections up to point of Customer Meter	

Figure 4.1.2: Modified IWA Water Balance

In the South African context the system input volume (SIV) is the some of free basic water and Revenue water and non-revenue water. Where the:

free basic water is linked to the right to basic water

Revenue water is billed metered and unmetered consumption

Non-revenue water (NRW) is made of water losses (e.g unauthorised consumption and system leakages) and unbilled authorised consumption

Table 4.1.13: 2017-2018 Water Demand

Province	Free State		WSA
District Municipality	Lejweleputswa DM		Yes
Municipality	Matjhabeng LM	Municipal Code: FS184	Category
Water Supply System	All systems		B5
Water Supply System No. (1,2,3..)	1,2,3,4,5,6	Total Number of Water Supply Systems: 6	
Settlements	Allanridge, Hennenman, Odendaalsrus, Welkom, Ventersburg, Virginia,Bronville, Thabong, Nyakallong, Allanridge		

		Month	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	ANNUAL Jul 2017-Jun 2018
Input Data	Population served	No	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461	406 461
	Households served	No	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195	123 195
	Connections - total	No	108 644	108 643	108 366	108 370	108 366	108 365	108 367	108 368	108 368	108 346	108 346	108 346	108 408
	Connections - metered	No	90 546	90 546	90 546	90 550	90 551	90 551	90 689	90 819	90 846	90 869	90 906	90 939	90 697
	Domestic	No	84 563	84 563	84 563	84 567	84 568	84 568	84 706	84 833	84 859	84 882	84 918	84 951	84 712
	Non-domestic	No	5 983	5 983	5 983	5 983	5 983	5 983	5 983	5 986	5 987	5 987	5 988	5 988	5 985
	Connections - unmetered	No	18 098	18 097	17 820	17 820	17 815	17 814	17 678	17 549	17 522	17 477	17 440	17 407	17 711
	Households / connection	No	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	Length of mains	km	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657	1 657
	Connections / km	No / km	66	66	65	65	65	65	65	65	65	65	65	65	65,42
	Average system pressure	m	30	30	30	30	30	30	30	30	30	30	30	30	30
	Time system pressurised	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Apparent losses	%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	23%	27%
	Consumer meter age	%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
	Illegal connections	%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
	Data transfer	%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	5%	9%

Source: Matjhabeng MLM 2017/2018 Water Balance Report

Table 4.1.14: 2017-2018 Water Supply

Water Ba ance Calculations	**System input volume**	**kl/annum**	**3 883 461**	**4 433 069**	**4 786 508**	**4 318 062**	**5 313 652**	**3 713 296**	**5 483 277**	**4 195 276**	**4 677 483**	**3 935 418**	**4 068 103**	**4 867 183**	53 674 788
	Own sources	kl/annum	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other sources	kl/annum	3883461	4433069	4786508	4318062	5313652	3713296	5483277	4195276	4677483	3935418	4068103	4867183	53 674 788
	Authorised Consumption	**kl/annum**	**2 505 528**	**1 831 127**	**1 840 572**	**2 060 949**	**1 922 344**	**1 729 105**	**2 049 242**	**1 854 086**	**2 025 042**	**1 971 109**	**2 141 902**	**1 998 035**	23 929 041
	Billed authorised	**kl/annum**	**2 469 160**	**1 794 759**	**1 804 204**	**2 024 581**	**1 885 976**	**1 692 737**	**2 012 874**	**1 817 718**	**1 988 674**	**1 934 741**	**2 105 534**	**1 961 667**	23 492 625
	Billed metered	kl/annum	**2 419 375**	**1 750 016**	**1 957 559**	**1 968 439**	**1 838 675**	**1 671 904**	**1 960 895**	**1 800 943**	**1 971 899**	**1 917 966**	**2 088 759**	**1 944 892**	23 291 322
	Domestic	kl/annum	2 038 772	1 560 337	1 648 850	1 636 345	1 551 694	1 464 200	1 636 428	1 500 999	1 646 048	1 604 294	1 725 760	1 619 275	19 633 002
	Non-domestic	kl/annum	380 603	189 679	308 709	332 094	286 981	207 704	324 467	299 944	325 851	313 672	362 999	325 617	3 658 320
	Export volume	kl/annum	0	0	0	0	0	0	0	0	0	0	0	0	0
	Billed unmetered	kl/annum	49 785	44 743	-153 355	56 142	47 301	20 833	51 979	16 775	16 775	16 775	16 775	16 775	201 303
	Unbilled authorised	**kl/annum**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	**36 368**	436 416
	Unbilled metered	kl/annum													0
	Unbilled unmetered	kl/annum	36 368	36 368	36 368	36 368	36 368	36 368	36 368	36 368	36 368	36 368	36 368	36 368	436 416
	Water Losses	kl/annum	1 377 933	2 601 942	2 945 936	2 257 113	3 391 308	1 984 191	3 434 035	2 341 190	2 652 441	1 964 309	1 926 201	2 869 148	29 745 747
	Commercial / Apparent losses	kl/annum	372 042	702 524	795 403	609 421	915 653	535 732	927 189	632 121	716 159	530 363	520 074	659 904	7 932 199
	Physical / Real losses	kl/annum	1 005 891	1 899 418	2 150 533	1 647 692	2 475 655	1 448 459	2 506 846	1 709 069	1 936 282	1 433 946	1 406 127	2 209 244	21 813 548
	UARL	kl/annum	106 526	106 526	106 323	106 326	106 323	106 323	106 324	106 325	106 325	106 309	106 309	106 309	1 276 248
	Potential real loss saving	kl/annum	899 365	1 792 892	2 044 210	1 541 366	2 369 331	1 342 137	2 400 521	1 602 744	1 829 957	1 327 637	1 299 818	2 102 935	20 537 300
	Revenue water	kl/annum	2 469 160	1 794 759	1 804 204	2 024 581	1 885 976	1 692 737	2 012 874	1 817 718	1 988 674	1 934 741	2 105 534	1 961 667	23 492 625
	Non-Revenue water	kl/annum	1 414 301	2 638 310	2 982 304	2 293 481	3 427 676	2 020 559	3 470 403	2 377 558	2 688 809	2 000 677	1 962 569	2 905 516	30 182 163

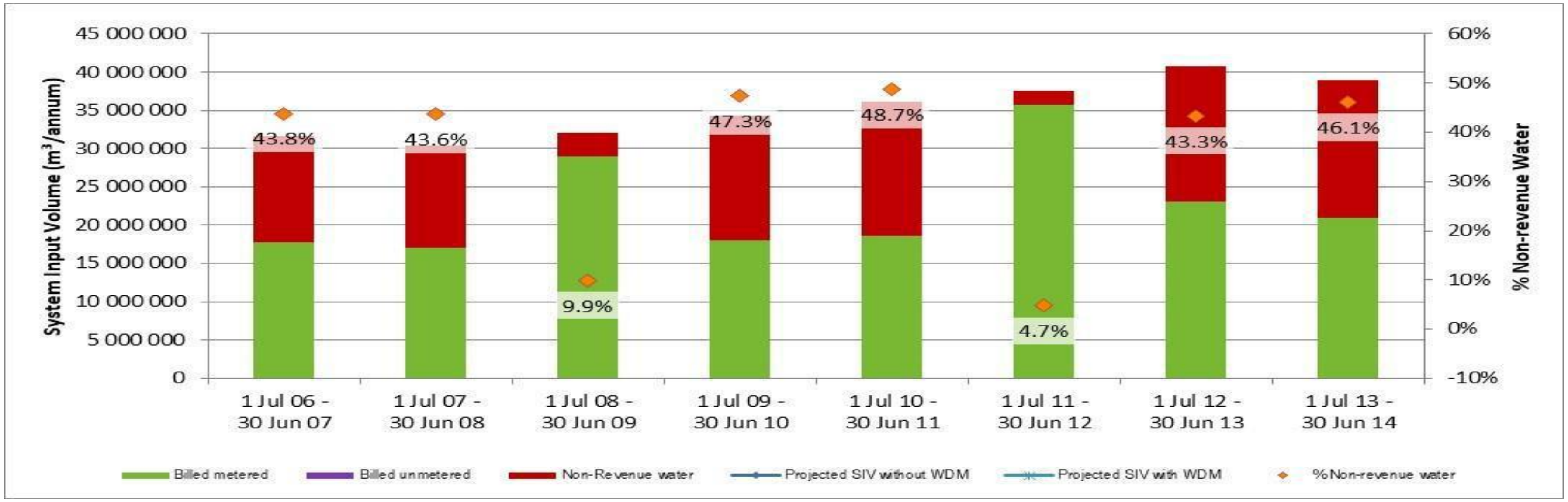
Source: Matjhabeng MLM 2017/2018 Water Balance Report

Table 4.1.15: 2017-2018 Water Demand

	Month	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul 2017-Jun 2018
Key performance indicators	Indicator as % of system input volume													
	% Revenue water	63,6%	40,5%	37,7%	46,9%	35,5%	45,6%	36,7%	43,3%	42,5%	49,2%	51,8%	40,3%	43,8%
	% Non-revenue water	36,4%	59,5%	62,3%	53,1%	64,5%	54,4%	63,3%	56,7%	57,5%	50,8%	48,2%	59,7%	56,2%
	% Water Losses	35,5%	58,7%	61,5%	52,3%	63,8%	53,4%	62,6%	55,8%	56,7%	49,9%	47,3%	58,9%	55,4%
	System input volume unit consumption													
	Litres / capita / day	314	359	387	349	430	300	444	339	378	318	329	394	362
	m^3 / household / month	32	36	39	35	43	30	45	34	38	32	33	40	36
	m^3 / connection / month	36	41	44	40	49	34	51	39	43	36	38	45	41
	Authorised Unit Consumption													
	Litres / capita / day	203	148	149	167	155	140	166	150	164	159	173	162	161
	m^3 / household / month	20	15	15	17	16	14	17	15	16	16	17	16	16
	m^3 / connection / month	23	17	17	19	18	16	19	17	19	18	20	18	18
	Domestic m^3 / connection / month	24	18	19	19	18	17	19	18	19	19	20	19	19
	Non-domestic m^3 / connection / month	64	32	52	56	48	35	54	50	54	52	61	54	51
	Water loss indicators													
	Litres / capita / day	111	210	238	183	274	160	278	189	215	159	156	232	200
	m^3 / household / month	11	21	24	18	28	16	28	19	22	16	16	23	20
	m^3 / connection / month	13	24	27	21	31	18	32	22	24	18	18	26	23
	UARL : Losses (litres / connection / day)	3	3	3	3	3	3	3	3	3	3	3	3	32
	CARL : Losses (litres / connection / day)	25	48	54	42	63	37	63	43	49	36	36	56	551
	Infrastructure Leakage Index (ILI)	9,4	17,8	20,2	15,5	23,3	13,6	23,6	16,1	18,2	13,5	13,2	20,8	17,1
	CARL : Losses (m^3 / km mains / day)	20,0	37,7	42,7	32,7	49,1	28,7	49,7	33,9	38,4	28,5	27,9	43,8	36,1

Source: Matjhabeng MLM 2017/2018 Water Balance Report

Water Balance Trends

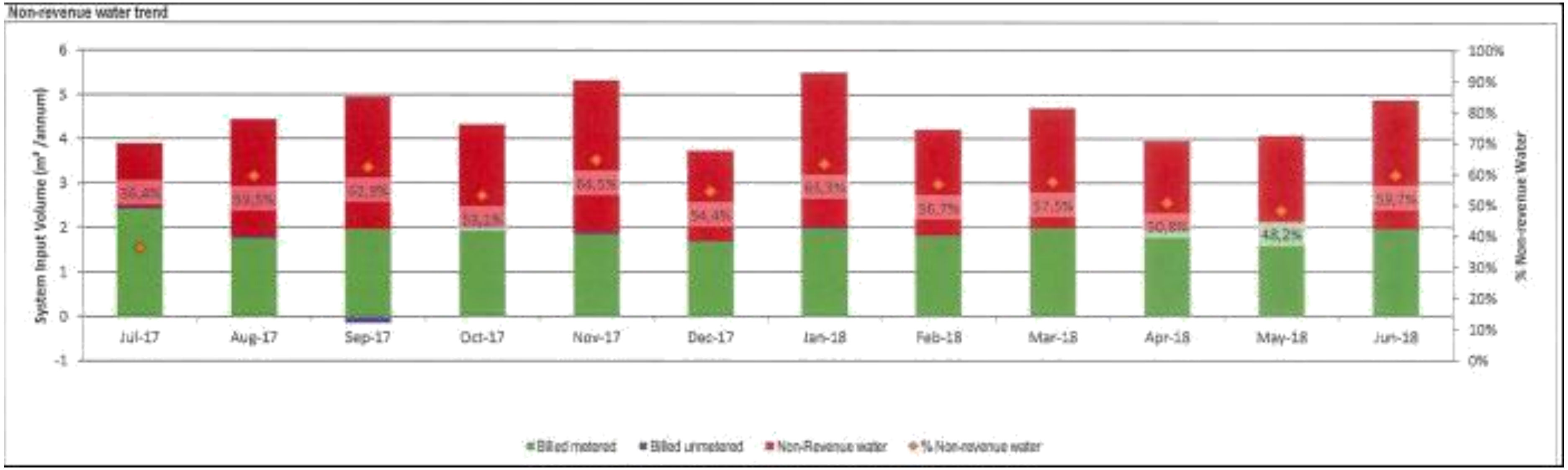


Source: Matjhabeng MLM 2017/2018 Water Balance Report

Figure 4.1.3: Water Balance Trends 2006-2014

Figure 4.1.3 shows that NRW has been hovering around the 40% range over between 2006 and 2014.

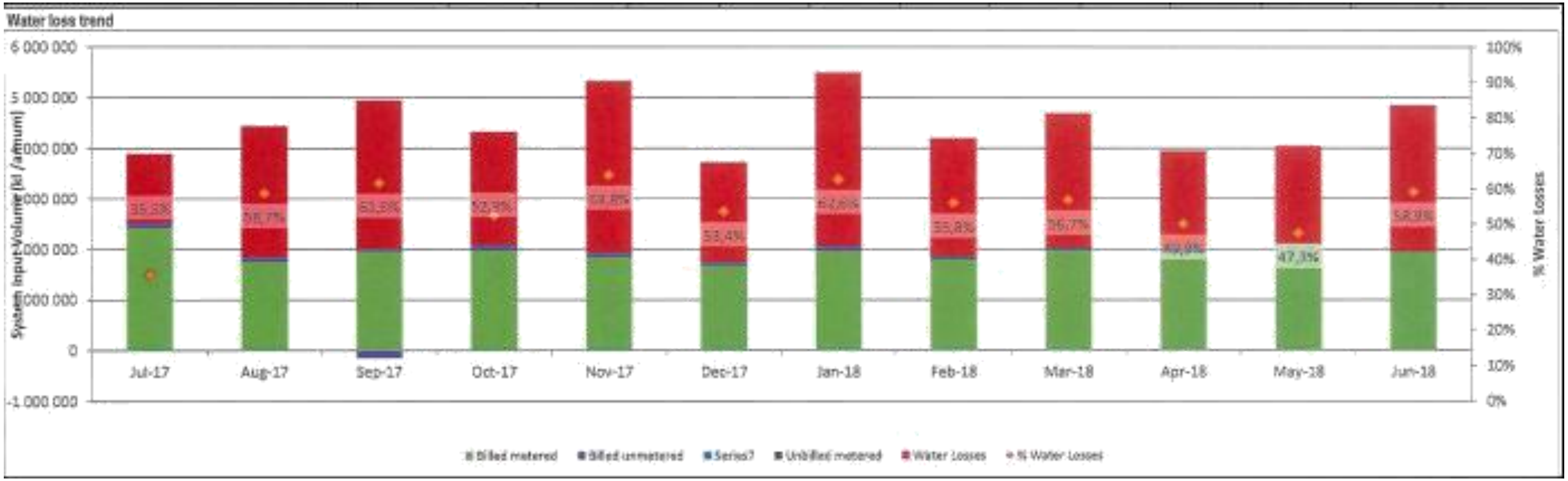
The trends show an increase since 2006 to 2018. These high NRW are means loss of revenue to the municipality and poor water management.



Source: Matjhabeng MLM 2017/2018 Water Balance Report

Figure 4.1.4: 2017/2018 Non Revenue Water Trend

The 2017-2018 Non-Revenue water trend shows the high NRW numbers with highest number at 63% by January 2018. The figure also shows signs of decline in the trend from January 2018 (63.3%) to June 2018 (59.7%). These MLM NRV water trend figures are high and need to be attended to with a view of reducing them significantly.

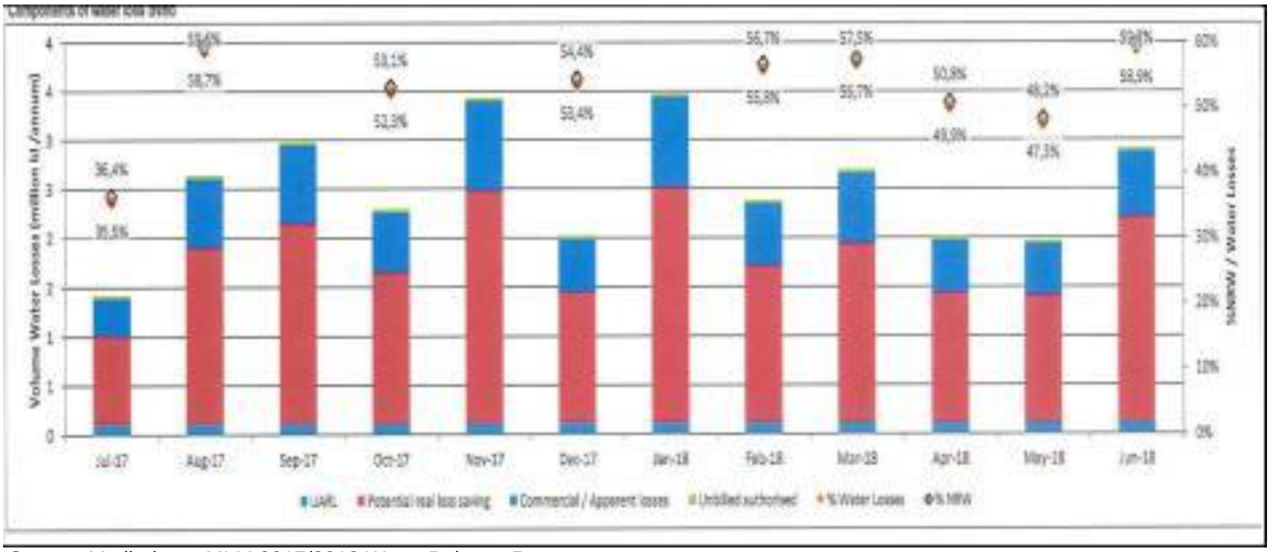


Source: Matjhabeng MLM 2017/2018 Water Balance Report

Figure 4.1.5: 2017/2018 Water Loss Trend

The 2017-2018 Water Loss trend shows the high water loss figures with the peak in November 2017 (63.8%). Like the NRW numbers, the figure also shows signs of decline in the trend from November 2017 (63.8%) to June 2018 (58.9%). These MLM Water Loss Trend figures need to be reduced significantly.

Components of the 2017-2018 Water Loss Trend



Source: Matjhabeng MLM 2017/2018 Water Balance Report

Figure 4.1.6: Components of the 2017-2018 Water Loss Trend

Figure 4.1.6 shows that the highest component of the water loss trend potential real loss savings followed by the commercial/apparent losses.

The following has been identified as the main contributors to physical losses:

mainly associated with leakages.
Illegal miners

Apparent losses are mainly due to:

Non-billing of water use for the irrigation of parks; reading are not taken.
Unmetered connections;
Non-metering of communal standpipes; those who are metered are not read
Non-metering of some stands in Phomolong, Meloding, Thabong and Bronville. Inaccurate data
High level of no accesses

Metering

The total numbers of water meters available is 85987. This constitutes 81% of stands connected with water. The difference can be attributed to the following reasons:

No meters
A number of connections are not metered due to the following reasons:
Stolen water meters – Theft and vandalism is increasing;
Meters not installed during the housing development projects by Contractors appointed by the Provincial Department of Human Settlements;
Illegal removal of meters by consumers in order not to pay for water;

No meters due to previous decisions (The municipality inherited areas without water meters after amalgamation and little efforts were made to address the problem);
Most communal stand-pipes are not metered and billed. (Must be billed to an internal vote and must be budgeted for in order not to register as non-revenue water).

Damaged Meters

Deliberate damage to water meters. As some household- and most bulk water meters, especially bulk water meters are situated on the boundary of stands, most owners do not take responsibility for the safeguarding of water meters;

Leaking meters

Old and dilapidated infrastructure is a major contributor to meter leakages;
Poor and substandard infrastructure also contributes to leakages.

No access

As a lot of water meters are situated inside the yard, access to properties to inspect and read water meters have become a major challenge also.
Deliberate obstruction of water meters by property owners are also a contributing factor.
With the closing of the Pest Control Section in the municipality, the removal of bees from water meters has become a major challenge.

Table 4.1.16: Meters per Area

	Meters Per Area
Allanridge	1306
Hennenman	2504
Kutlwanong	10554
Mmmahabane	1547
Nyakalong	3840
Odendaalsrus	4384
Thabong	23670
Tswelangpele	642
Ventersburg	800
Virginia	8750
Welkom	20551
Bronville	1958
Riebeeckstad	5481
Available meters	**85987**

Phomolong

Phomolong is one of the areas where the municipality inherited the area without water meters after amalgamation. Phomolong currently has approximately 5000 stands connected with water. However, most of these meters need to be replaced as they do not have readers.

Meloding

Meloding also have areas where the municipality inherited the area without water meters after amalgamation. Meloding currently have approximately 11124 stands connected with water.

Other Water Infrastructure

There are 6376 valves and 4 309 valves within the municipality.

4.2 Future demand, needs and challenges

The **Table 4.2.1** shows the Projected Water Demand (ML) for Matjhabeng Local Municipality for 2019-2029

Table 4.2.1: Projected Water Demand

MATJHABENG WATER PREDICTIONS (2019-2029) in ML/d											
WWTW	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Al l a nri dge	4,4	4,8	5,1	5,4	5,5	5,8	6,1	6,5	6,8	7,5	7,5
Odenda a l s rus	3,3	3,5	3,7	4,0	4,2	4,5	4,7	4,9	5,2	5,4	5,7
Kutl wa nong	10,5	11,3	12,1	12,8	13,6	14,4	15,1	15,9	16,7	17,5	18,2
Theroni a	14,2	15,3	16,3	17,3	18,4	19,4	20,5	21,5	22,6	23,6	24,6
Wi tpa n	19,9	22,6	25,2	27,9	30,6	33,3	36,0	38,7	41,4	44,1	46,8
Tha bong	43,5	45,8	48,0	50,3	52,5	54,7	57,0	59,2	61,4	63,7	65,9
Vi rgi ni a	14,9	16,0	17,0	18,1	19,2	20,3	21,4	22,5	23,6	24,7	25,8
Hennenma n	1,5	1,6	1,7	1,8	1,9	2,0	2,1	2,2	2,3	2,4	2,5
Phomol ong	4,3	4,6	4,9	5,2	5,5	5,9	6,2	6,5	6,8	7,1	7,4
Whi tes	0,09	0,09	0,10	0,11	0,11	0,12	0,12	0,13	0,14	0,14	0,15
Venters burg	0,5	0,6	0,6	0,6	0,7	0,7	0,8	0,8	0,8	0,9	0,9
Mma ma ha ba ne	1,8	1,9	2,2	2,4	2,5	2,7	2,8	3,0	3,1	3,3	3,4
TOTALS	**118,8**	**127,8**	**137,0**	**146,0**	**154,8**	**163,8**	**172,8**	**181,9**	**190,9**	**200,2**	**208,9**

Given that the Balkfontein water purification has a design capacity of 360 Ml/d, it can be concluded that it will be able to cater for 2029 water demand of approximately 209 Ml/d.

4.2.1 Water Demand and Management

Matjhabeng Local Municipality(MLM) gets its water supply from Sedibeng Water Board(SWB).

It has been reported that there is an amount of about R12 Billion which MLM owes the SWB which is a major problem and can affect any implementation plans to upgrade the current distribution network by the SWB.

The MLM prepared a water demand management strategy to deal with the challenges identified in the status quo section of this report and the growth in population.

Reducing the demand for water is a critical tool of managing the water demand.
The aims of the Strategy are:

- To build on current demand management activities;
- To achieve significant and sustained water savings by consumers;
- To minimize losses and non-revenue water in the distribution network;
- To continue to build a water conservation culture in the community;
- To improve water billing via metering, data management and reporting; and
- To ensure the municipality positively contribute to the National Water Conservation targets set by the National and Provincial Department of Water and Sanitation.

The Water Demand Management Strategy details the key activities, in line with the approved budget, that all relevant stakeholders intends to undertake over the next 2 years to assist in reducing the demand for water and improving water use efficiency in the Matjhabeng Municipal area.

The following list outlines the key demand management actions outlined in the Strategy and the corresponding objectives to be achieved.

Table 4.2.2: Water Demand Strategy Sector/System and Objectives

No	Sector / System	Objective
1	Households (excluding Indigent Users)	Ensure metering of all households;
2	Indigent Water Users	Ensure metering of all households; Effective water use measures and implement water restriction measures to Indigent Water Users, to ensure usage within the approved 6Kl Free Basic Water;
3	Commercial and Industrial	Ensure metering of all commercial and industrial users and encourage the sector to engage in water conservation initiatives.
4	Non-Revenue Water	Ensure proper metering of all municipal owned buildings and parks. Minimize water used in municipal properties.
5	Administrative losses	Ensure submission of water meter information to the Revenue Department for updating of the financial system.
6	Public Education and Communication	Engage with the community to improve understanding of water supply and demand issues and reduce water consumption.

4.2.2 Upgrades and Refurbishments

The following refurbishments and upgrades are required

- Replace of old worn out water pipes to reduce water loss and service disruption. (R 20m/a 138 km of pipe exist 15km already replaced)
- Replace old worn-out dilapidated galvanized steel pipes .
- Service and refurbish 500 hydrants and valves once in 5 year, and replace that cannot be repaired. (500 hydrants exist target is to refurbish 100 hydrants/a at R1.5m/a)
- Replace 5 000 water meters that is dysfunctional. (5 000 meters exist target is to replace 1 000 new meters at R1.5m/a)
- Investigate and register 4 000 existing water meters not on Finance system at R500 000/a
- Create zones in water reticulation network and monitor by implementing 40 zonal meters and valves . (R4.6m MIG) over the next 5 years.
- Conduct leak detection investigation and analysis to determine priority list and develop water loss monitoring database at R4m.

4.2.3 Expansion of Networks

The municipality is expected to have new developments over time as outlined in Section 3.3 of this report. Below are network expansion that have been identified.

- Kutlwanong X9, K2, Block 5 Water connections and meters (200 stands) target is to connect and meter all 200 stands at R1.5m)
- Thabong X20 (Hani Park): Extension of network, house connections and meters (180 stands) (it follows that extension apply to sewer as well).
- Ventersburg

Reticulation Network Expansion due to new township establishment applications.

There are several new township establishments approved or in the process of being approved by the municipality. These will require both water and sewer reticulation networks to be expanded to cover these areas once they are ready for development. These need to be catered for in the future planning for the networks.

The said developments include:

- Bronville/Thabong/Welkom low income areas
  - Bronville erven 32179,32180 and 32371, township establishment of 167 residential units
  - Welkom Thabong Homestead proposed township, 782 erven.
  - Freedom Square, Thabong extension 23, new township establishment, 299 erven
  - Thabong Phokeng new township establishment, 918 erven.
  - Dichocolateng ,Thabong T11 extension 5-11, new township establishments
  - Mealiebult 146
  - Lot geval 96 o
- Bothmas Rust
  - Rheeder Park extension2

Thabong/Welkom middle to high income areas
- Thabong T6
- Thabong Extension 22,Thandanani GAP market township establishment
- Naudeville extension 2
- Portion of Bothmas Rust 152
- Flaming Lake
- Flamingo Park
- Welkom extension 7
- Rhiebeeckstad extension 1

Allanridge/Nyakallong low income areas
- Nyakallong ERF R/446, new township establishment ,100 erven
- Zoetspruit 439

Allanridge middle to high income areas
- Ondendaalsrus, Hestersrus
- Kutlwanong, Leeubosch 285
- Kutlwanong new township establishment
- Ondendaalsrus ,Eldorie

New township establishments in Hennenman
New township establishment in Phomolong
Mmamahabane new township establishment
Virginia/Meloding low income areas
Virginia/Kitty
Virginia/Saaiplaas

4.2.4 Risk Assessment

This section is based on the Blue drop data 2017, received from the MLM.

Sedibeng Water implements a weekly compliance monitoring, monthly catchment monitoring and biannual full SANS 241 monitoring programmes. These are based on SANS 241. The monitoring is carried out on raw, final and specific reservoir samples within the distribution system for both Balkfontein and Virginia Water Treatment Plants.

The Sedibeng Water carries out the analyses at their SANAS accredited Scientific Services laboratory at the Balkfontein Plant however. Analyses helps to establish both the risks and possible sources of pollution.

FREE STATE REGION – BALKFONTEIN PLANT

The abstraction point at Balkfontein is downstream of the confluence of the Vaal and Vals Rivers. The water in the Vaal River consists mainly of industrial discharges, mine water, effluent from wastewater treatment plants and agricultural run-off.

Results from samples taken in the catchment and at the Balkfontein abstraction point indicates high levels of Turbidity during the last Full SANS 241 assessment in 2015 as well as for Ammonia in previous assessments (2012). Although the analyses of source water during the last three full SANS assessments did indicate that this risk is no longer valid, a decision was taken to still analyse for it as it may become a risk again.

Reduction in such levels would thus be required for the final water to comply with the SANS 241 requirements for drinking water. Organic carbon, specifically when coinciding with the presence of specific algal species could result in impaired removal of turbidity and metals.

Ferric-chloride in combination with an aluminium based poly-electrolyte is used as coagulant at the plant. Disinfection is done by the process of Chlorination.

Monitoring activity 1

pH Turbidity Electrical conductivity Acid soluble aluminium (treatment chemical) Acid soluble iron (treatment chemical)	Heterotrophic Plate Counts Total Coliform organisms *E.coli* Free (Residual) chlorine

Monitoring activity 2

Due to upstream pollution of the Vaal River the following additional analyses is conducted on the raw water sources, final water and selected reservoirs.

Based on catchment results Turbidity will be analysed daily on the river, raw water and final water.

Ferric-chloride in combination with an aluminium based poly-electrolyte is used as coagulant at the plant, therefore Iron and Aluminium will be included into monitoring activity

Total organic carbon will be analysed monthly as results are also used for research purposes.

FREE STATE REGION – VIRGINIA PLANT

The raw water to the plant is supplied from the Allemanskraal Dam via the Sand Canal into a balancing dam situated outside Virginia Town. Due to an annual quota allocated to the plant, the raw and final water is only monitored when the plant is in operation. Results from samples taken in the catchment and the Sand Canal have indicated high levels of Turbidity.

Reduction in Turbidity levels would thus be required for the final water to comply with the SANS 241 requirements for drinking water. Disinfection is also done by the process of Chlorination.

During times when the plant is out of operation water is supplied from the Balkfontein plant and weekly monitoring of reservoir and municipal take-off points proceed as normal.

Monitoring activity 1

pH Turbidity Electrical conductivity Acid soluble aluminium (treatment chemical)	Heterotrophic Plate Counts Total Coliform organisms *E.coli* Free Chlorine (Residual chlorine)

Monitoring activity 2

In the rare event of abstraction from the Sand River a Full SANS 241 will be done to determine the risks.

High concentrations of Turbidity is present in the canal; therefore daily monitoring is done on the raw and final water and weekly on all reservoirs

An aluminium based poly-electrolyte is used as coagulant at the plant, therefore Aluminium will be included into monitoring activity 1.

Total organic carbon will be analysed monthly as results are also used for research purposes.

Parasites and Somatic Coliphages will be analysed for monthly – results are also used for research purposes.

POINT OF USE (POU) SAMPLES

POU samples are collected and analysed for as per individual Service Level Agreements with the different Local Municipalities (Water Services Authorities).

Reticulation networks

Water is analysed in the reticulation network and compared with SANS 241 for compliance.

Reservoirs:

Reservoirs and Water towers in the Matjhabeng Local Municipality at Riebeeckstad, Allanridge, Meloding and Ventersburg are analysed as compliance sample points.

Nyakallong Municipal Reservoir is supplied from the Sedibeng Water Reservoir in Allanridge.

The Riebeeckstad Municipal Water Tower is supplied from the Sedibeng Water High Level Reservoir at Koppie Alleen.

The Municipal Reservoir in Ventersburg is supplied from both the Ventersburg and Brabant reservoirs of Sedibeng Water.

Meloding Municipal Reservoir is supplied from the Sedibeng Water Dirksburg Reservoir.

Monitoring activity 2

Total organic carbon is analysed by Sedibeng Water (on their Critical Control Points) as per sampling program and the results made available to the Municipality as per Service Level Agreement.

Parasites, and Coliphages is analysed by Sedibeng Water (on their Critical Control Points) as per sampling program and the results made available to the Municipality as per Service Level Agreement.

POINT OF USE (POU) SAMPLES

POU samples taken and analysed for by the Service Provider (Sedibeng Water) as per Service Level Agreements.

CRITICAL DISTRIBUTION SAMPLING POINTS IN THE MATJHABENG SYSTEMS

A Full SANS analyses carried out at Critical Distribution Sampling Points in all the Supply Systems on an annually basis.

Table 4.2.3 : Summary of the samples and determinants done by MLM

Sample Identification	**Allanridge Supply system CDP** **ALL 02 NYA 02**	**Odendaalsrus Supply system CDP** **ODE 03 KUT 02**	**Welkom supply system CDP** **WEL 07**	**Virginia Supply system CDP** **VIR 01 MEL 03**	**Hennenman Supply System CDP** **HEN 01 PHO 03**	**Ventersburg Supply system CDP** **VEN 02**	**Allanrdige, Odendaalsrus, Welkom, Virginia, Hennenman, Ventersburg POU**
Determinant	**Annually**	**Annually**	**Annually**	**Annually**	**Annually**	**Annually**	**Bi Weekly – 14 days**
pH	√	√	√	√	√	√	√
Turbidity	√	√	√	√	√	√	√
Electrical conductivity 25 C	√	√	√	√	√	√	√
Colour	√	√	√	√	√	√	
Free/Total Chlorine	√	√	√	√	√	√	√
Aluminium	√	√	√	√	√	√	√
Antimony	√	√	√	√	√	√	
Arsenic	√	√	√	√	√	√	
Cadmium	√	√	√	√	√	√	
Calcium	√	√	√	√	√	√	
Chloride	√	√	√	√	√	√	
Chromium (total)	√	√	√	√	√	√	
Cobalt	√	√	√	√	√	√	
Copper	√	√	√	√	√	√	
Cyanide (recoverable)	√	√	√	√	√	√	
Fluoride	√	√	√	√	√	√	
Iron	√	√	√	√	√	√	√
Lead	√	√	√	√	√	√	
Magnesium	√	√	√	√	√	√	
Manganese	√	√	√	√	√	√	
Mercury	√	√	√	√	√	√	
Nickel	√	√	√	√	√	√	
Nitrate	√	√	√	√	√	√	
Nitrite	√	√	√	√	√	√	
Phenolic Compounds	√	√	√	√	√	√	
Potassium	√	√	√	√	√	√	
Selenium	√	√	√	√	√	√	
Sodium	√	√	√	√	√	√	
Sulphate	√	√	√	√	√	√	
Uranium	√	√	√	√	√	√	
Vanadium	√	√	√	√	√	√	
Zinc	√	√	√	√	√	√	
Total dissolved solids 180 C	√	√	√	√	√	√	
Ammonia nitrogen	√	√	√	√	√	√	
Total Alkalinity	√	√	√	√	√	√	
Ortho phosphate	√	√	√	√	√	√	
Heterotrophic plate count	√	√	√	√	√	√	√
(i).1 ***E. coli*** **and Total coliforms**	√	√	√	√	√	√	√
(i).2 Somatic Coliphages	√	√	√	√	√	√	
Trihalomethanes	√	√	√	√	√	√	
Total organic carbon	√	√	√	√	√	√	
Microcystin as LR	√	√	√	√	√	√	

Sample Identification	Allanridge Supply system CDP ALL 02 NYA 02	Odendaalsrus Supply system CDP ODE 03 KUT 02	Welkom supply system CDP WEL 07	Virginia Supply system CDP VIR 01 MEL 03	Hennenman Supply System CDP HEN 01 PHO 03	Ventersburg Supply system CDP VEN 02	Allanrdige, Odendaalsrus, Welkom, Virginia, Hennenman, Ventersburg POU
Determinant	Annually	Annually	Annually	Annually	Annually	Annually	Bi Weekly – 14 days
Parasites	√	√	√	√	√	√	

The treated water quality in the different water distribution networks was assessed in terms of its Microbiological, Chemical Acute and Chronic Health, Physical, Aesthetic and Operational water quality parameters. The test was done in line with requirements of SANS 241.

Table 4.2.4 below shows the risk compliance levels of the MLM water quality based on the water quality parameters assessed.

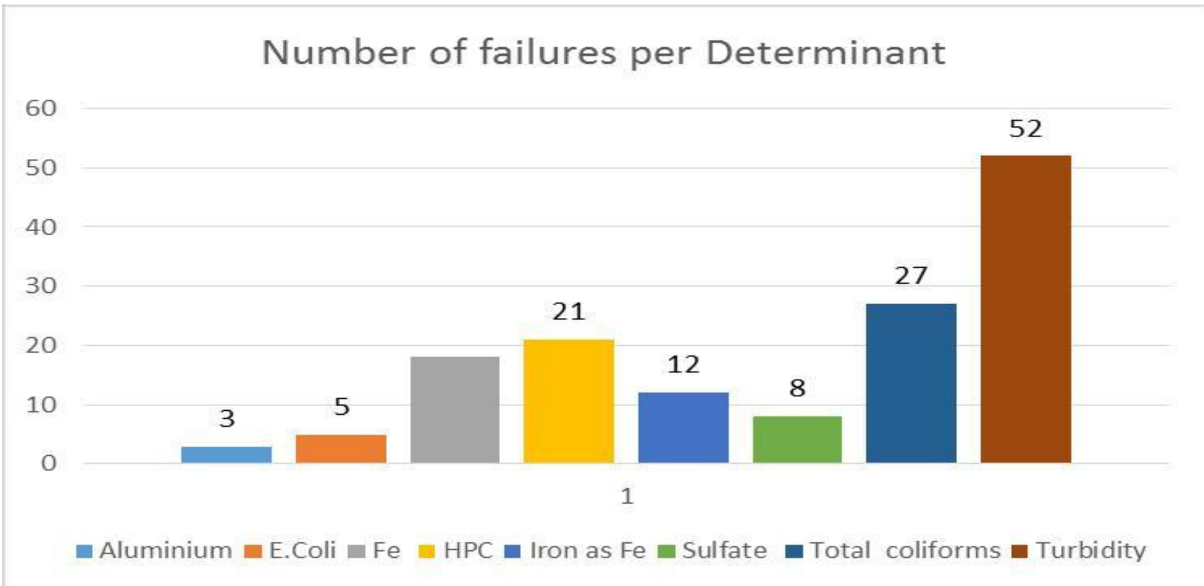
Table 4.2.4: Water Quality Risk Compliance for the MLM

Risk Parameter	Total Samples analysed	Failed samples	Compliant Samples	% Compliant Samples
Microbiological:Acute health	3182	10	3172	99.7%
Chemical:Acute health	80	0	80	100.0%
Chemical: Chronic health	3352	2	3350	99.9%
Chemical-non health:Aesthetic	9576	82	9494	99.1%
Operational	15704	180	15524	98.9%
Disinfectant	5208	68	5140	98.7%

Source: MLM Blue Drop data ,2017

Table 4.2.4 shows that water quality is highly compliant with SANS 241 requirements. Microbiological, chemical acute health, chemical chronic health and chemical aesthetics parameters are all within 1% to be 100% compliant. The operational and disinfectant parameters are within 2% of being 100% compliant.

Figure 4.2.1 below shows the number of failures in the overall MLM network.



Source: MLM Blue Drop data ,2017

Figure 4.2.1 : Number of failures per determinant

The highest failures are operational failures namely, Turbidity, Total coliforms, and HPC. The high turbidity levels in the system could be due to relatively high chlorine levels, iron levels and maintenance works. Chemical failures are also high because of iron due to the old infrastructure.

Ondendaalsrus Supply System Drinking Water Quality

Table 4.2.4: Ondendaalsrus Supply System Drinking Water Quality Results

Odendaalsrus Water Supply System			
Determinant			
		Distribution	
	Analysis	Fail	%
Microbiological : Acute Health			
E.coli (Minimum Risk)	524	4	99.2%
Chemical - Non Health : Aesthetic			
Conductivity at 25º C (Minimum Risk)	520	0	99.9%
Turbidity (Minimum Risk)	1040	12	98.8%
Operational			
Heterotrophic Plate Count (Minimum Risk)	520	0	99.9%
pH at 25º C (Minimum Risk)	520	0	99.9%
Turbidity (Minimum Risk)	1040	12	98.8%

Table 4.2.5 above shows that compliance for Ondendaalsrus is average 99% across all relevant parameters. No samples failed when tested for conductivity, HPC and pH. Only 4 out of 524 samples failed when tested for E.coli.

Hennenman Supply System Drinking Water Quality

Table 4.2.6: Hennenman Supply System Drinking Water Quality Results

Hennenman Water Supply System			
Determinant			
		Distribution	
	Analysis	Fail	%
Microbiological : Acute Health			
E.coli (Minimum Risk)	250	0	99.9%
Chemical - Non Health : Aesthetic			
Conductivity at 25º C (Minimum Risk)	250	0	99.9%
Turbidity (Minimum Risk)	500	22	95.6%
Operational			
Heterotrophic Plate Count (Minimum Risk)	250	2	99.2%
pH at 25º C (Minimum Risk)	250	0	99.9%
Turbidity (Minimum Risk)	500	22	95.6%

Table 4.2.6 above shows that compliance for Hennenman is average 99% across all relevant parameters except for Turbidity which is at 95.6%. No samples failed when tested for E coli, conductivity, and pH.

Ventersburg Supply System Drinking Water Quality

Table 4.2.6: Ondendaalsrus Supply System Drinking Water Quality Results

Risk Defined Compliance			
Ventersburg Water Supply System			
Determinant			
		Distribution	
	Analysis	Fail	%
Microbiological : Acute Health			
E.coli (Minimum Risk)	306	0	99.9%
Chemical - Non Health : Aesthetic			
Conductivity at 25º C (Minimum Risk)	306	0	99.9%
Turbidity (Minimum Risk)	612	18	97.1%
Operational			
Heterotrophic Plate Count (Minimum Risk)	306	4	98.7%
pH at 25º C (Minimum Risk)	306	0	99.9%
Turbidity (Minimum Risk)	612	18	97.1%

Table 4.2.6 above shows that compliance for Ventersburg is average 99% across all relevant parameters except for Turbidity which is at 97.1%. No samples failed when tested for E coli, conductivity, and pH.

Virginia Supply System Drinking Water Quality

Table 4.2.7 : Ondendaalsrus Supply System Drinking Water Quality Results

Virginia Water Supply System			
Determinant			
		Distribution	
	Analysis	Fail	%
Microbiological : Acute Health			
E.coli (Minimum Risk)	568	0	99.9%
Chemical - Non Health : Aesthetic			
Conductivity at 25º C (Minimum Risk)	566	0	99.9%
Turbidity (Minimum Risk)	1107	14	98.7%
Operational			
Heterotrophic Plate Count (Minimum Risk)	568	0	99.9%
pH at 25º C (Minimum Risk)	566	0	99.9%
Turbidity (Minimum Risk)	1107	14	98.7%

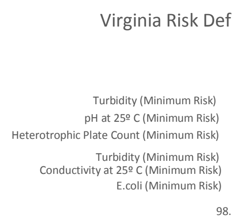


Table 4.2.7above shows that compliance for Virginia is average 99% across all relevant parameters except for Turbidity which is at 98.7%. No samples failed when tested for E coli, conductivity, HPC and pH.

Welkom Supply System Drinking Water Quality

Table 4.2.8: Ondendaalsrus Supply System Drinking Water Quality Results

Welkom Water Supply System

Determinant	Distribution		
	Analysis	Fail	%
Microbiological : Acute Health			
E.coli (Minimum Risk)	1248	4	99.7%
Chemical - Non Health : Aesthetic			
Conductivity at 25º C (Minimum Risk)	1234	2	99.8%
Turbidity (Minimum Risk)	2443	34	98.6%
Operational			
Heterotrophic Plate Count (Minimum Risk)	1234	4	99.7%
pH at 25º C (Minimum Risk)	1234	0	99.9%
Turbidity (Minimum Risk)	2443	34	98.6%

Table 4.2.8 above shows that compliance for Welkom is average 99% across all relevant parameters except for Turbidity which is at 98.6%. No samples failed when tested for pH. Turbidity had the highest number of failed samples at 34.

4.3 The Masterplan 2019-2029

The Upgrades , expansion and water demand of the reticulation network for Matjhabeng municipality can be summarised as shown in **Table 4.3.1** The estimated costs associated with the upgrades have been included with the proposed Project Implementation period

Table 4.3.1: Estimated costs associated with the upgrades

UPGRADE, EXPANSION AND WATER DEMAND MANAGEMENT OF THE RETICULATION NETWORK		**Term of Implementation**
This will need require the expansion of waterborne sanitation and water network to cater for 1300 stands and a sewer pump station.	R61 899 139,00	long term
Expand the water and sewer reticulation network as a result of servicing 54 stands in Mmamahabane.	R591 128,00	1- 2 years
Upgrading of current T8 pump station to accommodate new developments and new serviced stands that are approximately 14 500.	R 14 300 000,00	3-5 years
The eradication of bucket system to 173 stands in Thabong extension 15 Bronville will need the network to be expanded to include those stands.	R 6 000,00	3-5 years
The eradication of bucket system to 391 stands in Thabong extension 26 will need the network to be expanded to include those stands.	R 14 000 000,00	1- 2 years
The eradication of bucket system to Kutlwanong K10 will need the network to be expanded to include those stands.	R 16 000 000,00	1-2 years
TOTAL ESTIMATED COST	**R 106 796 267,00**	

5 SANITATION

Section 4 - Sanitation
4.1 Status Quo

5.1.1. Legislated reports
5.1.2. Bulk capacity
5.1.3. Collection systems
5.1.4. Current loading
5.1.5. Backlogs
5.1.6. Efficiency levels and losses

5.2 Future demand, needs and challenges
5.2.1. Levels of services
5.2.2. Load reduction
5.2.3. Bulk collection and processing
5.2.4. Expansion of reticulation network
5.2.5. Alternative technologies
5.2.6. Risk assessment

The Master Plan
5.3.1. Long-term plan (10 years)
5.3.2. Three-to-Five-Year Capital and Operational Plan
5.3.3. One-Year Project and Budget Plan

5.1 Status Quo

5.1.1 Legislated Reports

Sanitation Reports

The MLM prepares annual Wastewater Risk Abatement Plans (W2RAP's) for the municipality's Eleven (11) Water Treatment Works.

A Wastewater Risk Abatement Plan is site specific and discuss the effective management of a treatment facility, sewer reticulation network and Pump Stations. The W2RAPs include:

- Include a comprehensive risk Assessment to identify the risks with measures to mitigate inefficiency that result in non-compliance.
- A Compliance Monitoring Program as per Authorization.
- Incident Response Management Protocol to specify the alert levels, response times and required actions taken.

The following reports are prepared annually by the municipality as part of the W2RAPs:

- Wastewater Risk Abatement Planning
- Wastewater System Assessment
- Hazard and Risk Assessment
- Control Measures & Corrective Actions
- Monitoring & Verification
- Management Procedures & Supportive Programmes
- Documentation & Communication Procedures
- Wastewater Risk Abatement Plan Review

5.1.2 Current Loading and Bulk Capacity

Below is the table that shows the design capacity against the current loading. Flow measurement devices are not functional in most of the waste water treatment plants. In 2017, the municipality estimated the current loading based on population figures. The results are shown in the 2017 column on the Table. The population figures were projected to estimate 2018 and 2018 figures.

Table 5.1.1: Design Capacity VS Estimated Flows

Design Capacity vs Flow readings

WWTW	Design Capacity on GDS	2017 Operating with calculations	2017 % Operation	2018 Operating with calculations	2018 % Operation	2019 Operating with calculations	2019 % Operation
Allanridge	4.0	3.1	0.77	3.3	0.83	3.6	0.90
Odendaalsrus	6.0	2.20	0.37	2.42	0.40	2.61	0.44
Kutlwanong	6.0	5.68	0.95	8.41	1.40	9.03	1.50
Theronia	27.0	9.7	0.36	10.5	0.39	11.4	0.42
Witpan	12.0		0.00	12.9	1.08	14.9	1.24
Thabong	12.0	7.74	0.65	19.22	1.60	20.74	1.73
Virginia	26.0	10.1	0.39	11.0	0.42	11.9	0.46
Hennenman	4.0	1.00	0.25	1.08	0.27	1.17	0.29
Phomolong	4.0	3.3	0.81	3.3	0.83	3.3	0.83
Ventersburg	0.5	0.4	0.80	0.4	0.78	0.4	0.84
Mmamahabane	0.6	1.4	>100%	1.5	>100%	1.6	
	* Measured						

From the Table 5.1.1 above, it can be seen that only Mmamahabane was operating above design capacity. It is estimated that Kutlwanong, Witpan and Thabong are also now operating above design capacity.

5.1.3 Collection System

Sanitation Network Issues

Certain residents illegally building houses on top of sewer lines, putting pressure on the pipes underground and causing them to break.

It is alleged that the main cause of spillages in Matjhabeng is the Illegal Miners who are constantly blocking and damaging the sewer pipes in order to do their mining.

Other retail stores are also alleged to contribute to blockages to fat deposited in the network

Collapsed outfall sewer lines (Bruine / Van der Vyfer / Ross / Cook / Ross)

Rising main at Eldorette School - Sleeve carrying the rising main through the storm water channel was stolen.

Rising main coming from Hospital Park Sleeve carrying the rising main through the storm water channel was stolen.

Lack of resources to attend to issues stated above speedily.

Waste Water Treatment Works Issues

Most WWTW do not comply with effluent management principles due to lack of chlorination at the WWTW.

Most WWTW do not comply with sludge management principles

No flow measurements at most of the WWTW

Equipment at most of the WWTW (except the newly refurbished) are in poor state

Most of the WWTW are not fully functional.

Vandalism and theft is prevalent due to lack of adequate security measures.

Waste Water Pumps Stations Issues

- Missing/Stolen Components in pump stations e.g Motors ,rotating assemblies, etc.
- Vandalised Pump stations
- Vandalised Pump houses
- Cable theft at the pump stations
- No proper fencing and lockable gates at the pump stations
- Most pump stations have a fraction of the installed pumps operational

Sewer Collection and Reticulation Network Risk Assessment

This section looks at the risk items concerning the sewer collection and reticulation network risk assessment for the various towns and townships. A few has been highlighted as high risk in virtually all the towns and townships in the MLM. These include degradation of sewer pipe material, negligence from the community, infiltration of tree roots into the sewer lines (old non plastic pipes), financial constraints and limited skilled personnel.

Table 5.1.2: Allanridge and Nyakallong Network

Collection and Reticulation System											
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile	Control Measures	Control measures in Place	Control Measures Effective
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	**Medium Risk**	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	**Medium Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Likely	4	Moderate	3	12	**Medium Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	**Medium Risk**	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	**Medium Risk**	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No

Table 5.1.3: Kutlwanong Network

Collection and Reticulation System											
	Potential Hazards or Hazardous Events	**Category**	**Likelihood**	**Rating**	**Consequence**	**Rating**	**Risk Rating**	**Risk Profile**	**Control Measures**	**Control measures in Place**	**Control Measures Effective**
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	Medium Risk	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Almost certain	5	Major	4	20		Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.4: Odendaalsrus Network

Collection and Reticulation System											
	Potential Hazards or Hazardous Events	**Category**	**Likelihood**	**Rating**	**Consequence**	**Rating**	**Risk Rating**	**Risk Profile**	**Control Measures**	**Control measures in Place**	**Control Measures Effective**
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Major	4	20		Collapsed sewer lines Anthony and vd Vyfer To be replaced	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Almost certain	5	Major	4	20		Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.5: Hennenman Network

Collection and Reticulation System											
	Potential Hazards or Hazardous Events	**Category**	**Likelihood**	**Rating**	**Consequence**	**Rating**	**Risk Rating**	**Risk Profile**	**Control Measures**	**Control measures in Place**	**Control Measures Effective**
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	Medium Risk	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	Medium Risk	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.6: Whites Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	**Medium Risk**	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	**Medium Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	**Low Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	**Medium Risk**	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	**Medium Risk**	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No

Table 5.1.7: Phomolong Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	**Category**	**Likelihood**	**Rating**	**Consequence**	**Rating**	**Risk Rating**	**Risk Profile**			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	**Medium Risk**	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	**Medium Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	**Low Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	**Medium Risk**	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	**Medium Risk**	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No

Table 5.1.8: Theronia Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	Medium Risk	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	Medium Risk	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.9: Witpan Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	**Medium Risk**	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	**Medium Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	**Low Risk**	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Major	4	20		Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	**Medium Risk**	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	**Medium Risk**	Health and Hygiene Awareness	Yes	No

Table 5.1.10: Thabong Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	Medium Risk	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	Medium Risk	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.11: Ventersburg and Mmamahabane Network

Collection and Reticulation System									Control Measures	Control measures in Place	Control Measures Effective
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile			
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Moderate	3	15	Medium Risk	Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Contrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competant personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	Medium Risk	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Table 5.1.12: Virginia Network

Collection and Reticulation System											
	Potential Hazards or Hazardous Events	Category	Likelihood	Rating	Consequence	Rating	Risk Rating	Risk Profile	Control Measures	Control measures in Place	Control Measures Effective
SD	**Sewerage Discharge - Sewer Blockages**										
1	Degradation of pipe material		Almost certain	5	Major	4	20		Repair when needed.	Yes	No
2	Damage Sewer Pipes		Likely	4	Major	4	16	Medium Risk	Repair when needed.	Yes	No
3	Topography		Likely	4	Moderate	3	12	Medium Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
4	Increased loading from extensions of Dwellings		Moderately likely	3	Minor	2	6	Low Risk	Proper Design to take in Topography in account - PMU (Network and Pump stations)	Yes	Yes
5	Aging sewer lines		Almost certain	5	Major	4	20		Replace pipes	Yes	No
6	Negligence from Community		Almost certain	5	Major	4	20		Community awareness	Yes	No
7	Poor hygiene		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
8	Infiltration of tree roots into sewer lines		Almost certain	5	Major	4	20		Regular Maintenance	Yes	No
9	Financial Constrains		Almost certain	5	Catastrophic	5	25		Source additional Funding	Yes	No
10	Limited Personnel		Almost certain	5	Catastrophic	5	25		Appoint competent personnel	Yes	No
S	**Toilet and drain blockages on premise**										
1	Foreign material		Likely	4	Major	4	16	Medium Risk	Inform community with correct	Yes	No
2	Negligence of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
3	Poor hygiene practices		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
4	Poor maintenance on toilets by community		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No
5	Poor Storm water management of owners		Likely	4	Major	4	16	Medium Risk	Health and Hygiene Awareness	Yes	No

Condition Assessment for Waste Water Treatment Works

Nyakallong WWTW Condition Assessment

NAME OF WWTW	**Nyakalong Sewer Treatment Plant**	
ADDRESS/LOCATION	Nyakalong	
COORDINATES	27°46'8.99"S	26°39'48.27"E

	Description	YES/NO	Number
PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
	Design Capacity	n/a	
	Staff organogram	yes	n/a

	Description	Type of Operation	Y/N	Number	Condition
PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Good,working
		mechanical	Y	2	Good,working
	Grit Removal	manually cleaned channels	N		
		mechanically cleaned channels	Y	2	Good,working
		automated de-griters	N		
	Flow measuring devise		Y	1	Good,working
	Flow balance/equalization basin/tank		N		
PRIMARY TREATMENT PROCESS	Primary Settling		Y	2	Good,working
	Oxidation Pond System		Y	1	Good,working
	Flow balancing/equalization basin/tank		N		
SECONDARY TREATMENT PROCESSES	Trickling Filters		N		
	Activated sludge		Y		
	Rotating biological contactors		Y	2	Good,working
	Secondary Settler	humus tank	Y	1	Good,working
		clarifier	Y	2	Good,working
TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Good,working
	Constructed Wetlands		N		
	Maturation pond/s		Y	1	Good,working
SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
		drying beds	N		
	Thickening	gravity	Y	1	Good,working
		dissolved air floatation	N		
	Digestion		Y	3	Good,working
FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,completely vandalised by Zamazamas
	Lockable gate		N		Bad,no lockable gates
	Electrified		N		
	Yard		Y		In bad condition
	Staff facilities		Y		In bad condition
	Sludge licence		N		
	Contract for sludge disposal		N		
REMARKS	Plant is operating very well and currently under refurbishment.				

Nyakallong WWTW Condition Assessment Pictures

Under refurbishment

Inlet 1 fully operational.

Mechanical screen

Manual screen

Grit channels

Refurbishment in progress

Activated sludge screen

Aeration basin operational

Nyakallong WWTW

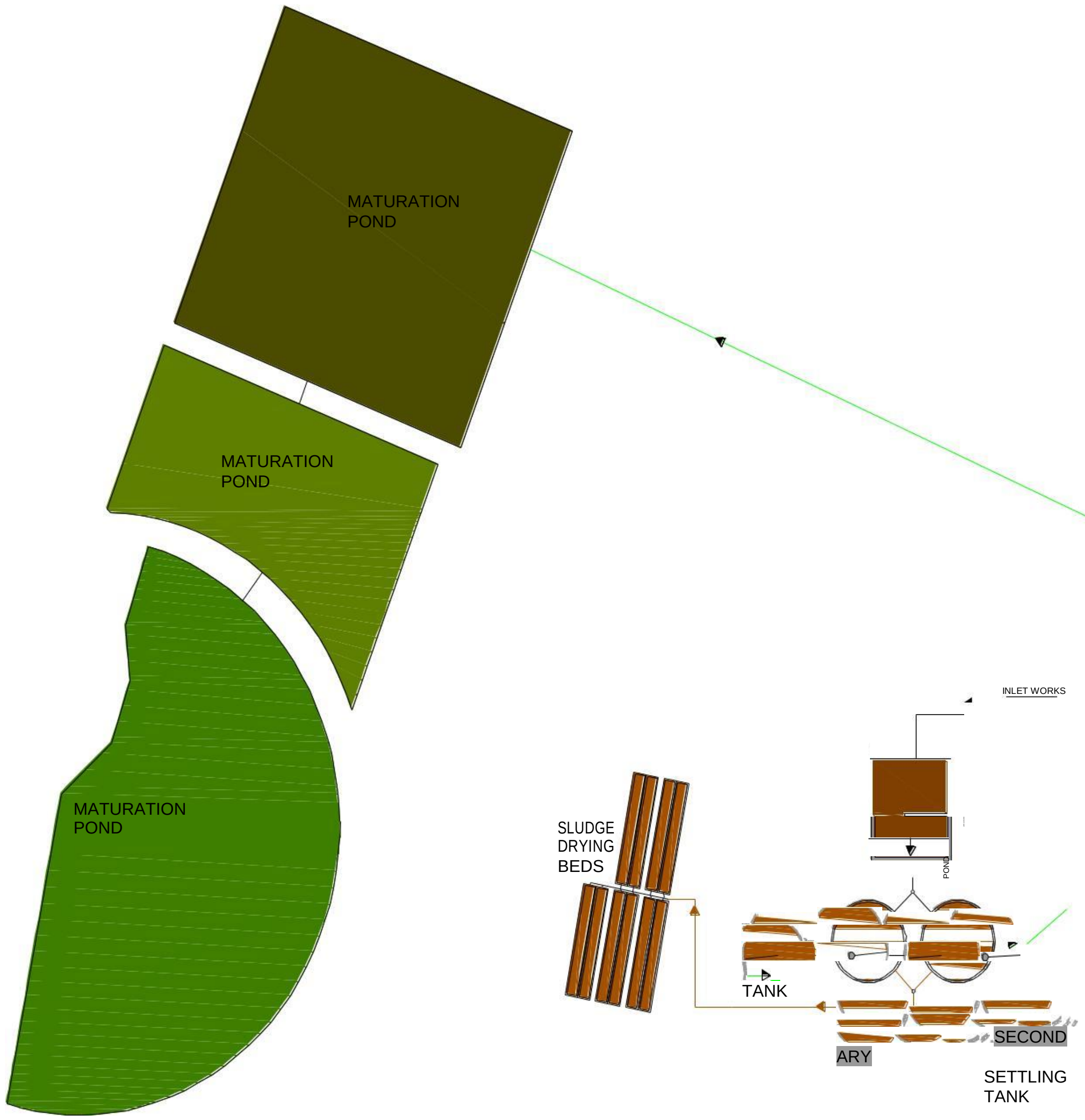
Secondary settling tank 1, fully operational

Secondary settling tank 2, fully operational

Scum box for the two SST, fully operational

Nyakallong WWTW (continued)

Nyakallong WWTW Process



Hennenman WWTW Condition Assessment

NAME OF WWTW	**Hennenman Sewer Treatment Plant**			
ADDRESS/LOCATION	Hennenman			
COORDINATES	28° 0'3.22"S	27° 1'10.48"E		

Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	4 Ml/d
		Staff organogram	yes	n/a

Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	2	Good,working
			mechanical	N		
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N		
			automated de-griters	N		
		Flow measuring devise		Y	1	Bad,not working
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		Y	2	
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		Y		
		Rotating biological contactors		Y	2	
		Secondary Settler	humus tank			
			clarifier	Y	2	Bad,not working
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	Y		
			drying beds	Y	12	Good,working
			gravity	N		
			dissolved air floatation	N		
		Thickening		N		
		Digestion		N		
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Good
		Lockable gate		Y		Yes
		Electrified		N		
		Yard		Y		In bad condition
		Staff facilities		Y		In bad condition
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	The plant is 50% operational with one aeration and one sludge removal pump working. There is alot of missing components in the plant which need to be reinstalled and also alot of cracks on the concrete structures resulting in leakages				

Hennenman WWTW Condition Assessment Pictures


Hennenman WWTW


Inlet


Manual screen 1


Manual screen 2


Very old inlet, concrete structure cracked


Flowmeter not functioning


No sluice gates at channel


Concrete walls falling in

Hennenman WWTW


Cracked concrete structure


Anoxic dam.


Gearbox at anoxic dam not functional


12 old drying beds


Aeration basin


½ sludge removal pumps functional


Pump not turning

Hennenman WWTW (continued)

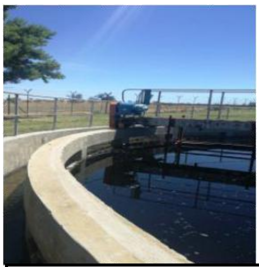
Brush aerator, motor not functional

Aeration tank functional

Secondary settling tank not functional

Contact tank fully operational

Irrigation pump fully operational



Burnt motor at secondary settling tank

Return activated sludge pumps, both functional

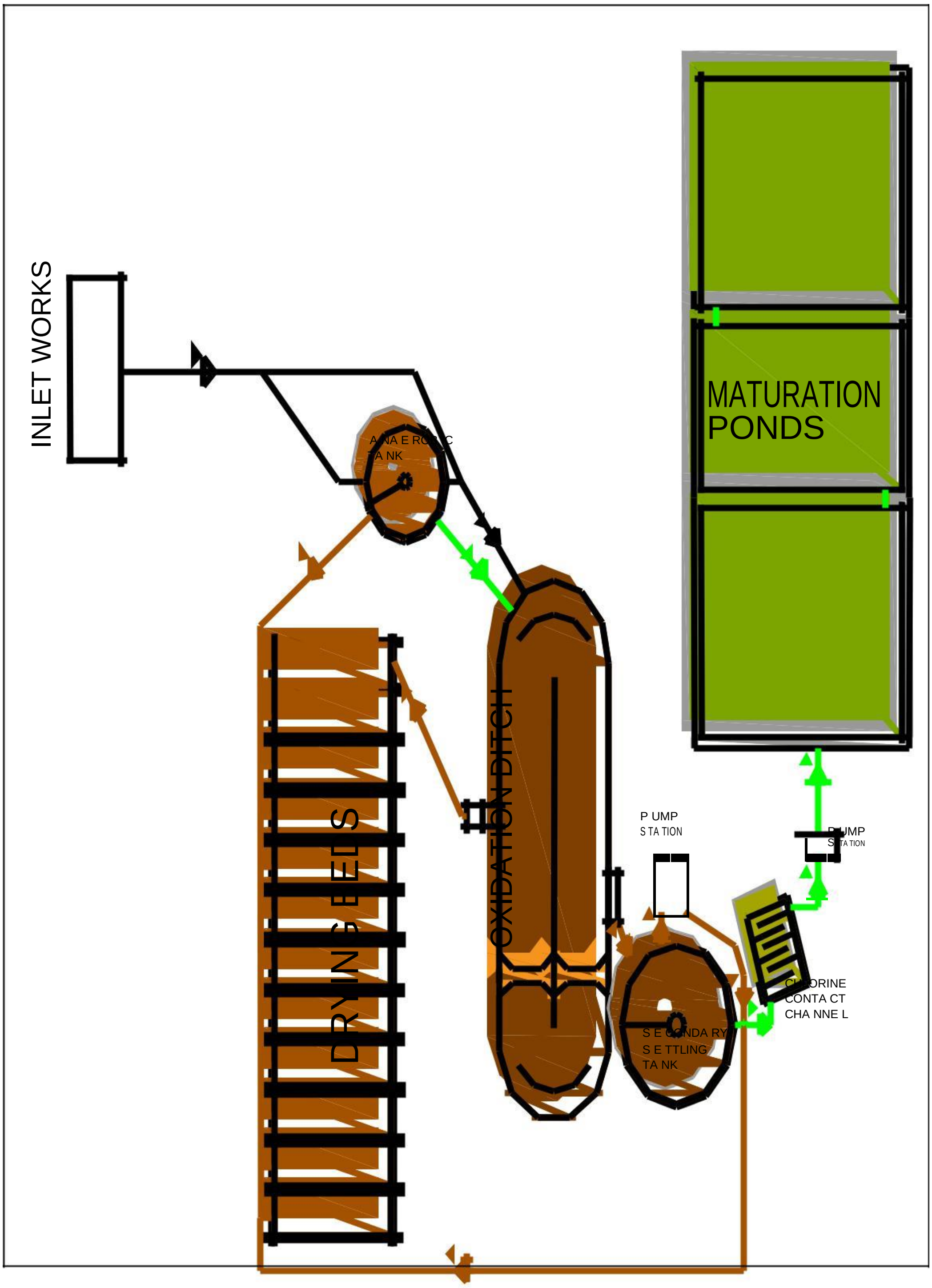
Chlorination system not functional, there is no chlorine.

Hennenman WWTW (continued)

Three maturation ponds

Hennenman WWTW

Hennenman WWTW Plant Process



Kutlwanong WWTW Condition Assessment

NAME OF WWTW	**Kutlwanong Sewer Treatment Plant**		
ADDRESS/LOCATION	Welkom		
COORDINATES	27°49'58.92"S	26°45'19.31"E	

Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	
		Staff organogram	yes	n/a

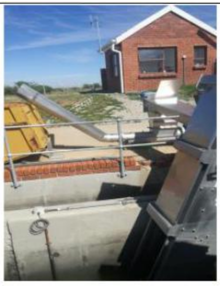
Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	N	1	Good,Working well
			mechanical	N	2	Working well in inlet 1 and screen in inlet 2 not working,broken chain
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N		Good,Working well
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		N	2	Stirrers in anarobic tanks not working due to cable theft
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		Y	2	ok
		Rotating biological contactors		Y	2	Stirrers in anarobic tanks not working due to cable theft
		Secondary Settler	humus tank			
			clarifier	Y	2	
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	ok
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	Y	1	ok
			drying beds	Y	6	ok
			gravity	N		
			dissolved air floatation	N		
		Thickening		N		
		Digestion				
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Electrical Fence ,not working
		Lockable gate		N		Bad,no lockable gates
		Electrified		Y		Electrical Fence ,not working
		Yard		Y		In good condition
		Staff facilities		Y		In good condition
		Sludge licence		Y		
		Contract for sludge disposal		Y		
8	REMARKS	Plant is about 30% operational mainly due to the cable theft and vandalism				

Kutlwanong WWTW Condition Assessment Pictures


Inlet 1, 2 mechanical screen not functional and chains broken


Sluice gate, fully operational and manual screen submerged


Screw conveyor, full operational


Compactor, fully operational

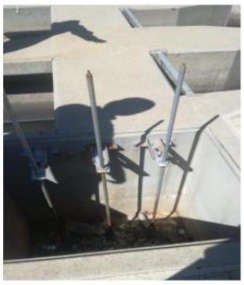

Vortex degritter, pump not functiona


Classifier, fully operational


¼ motors not working in pump station pumping water from inlet 1 to 2, pulley missing


Batteries for the generator stolen

Kutlwanong WWTW


Valve for removing sand


Inlet 2, manual channels fully operational


Screw conveyor, fully operational


Mechanical screen not functiona, damaged chain


Compactor, fully operational


Manual screen, fully operational


Flowmeter, fully operational


Stirrers in anaerobic tanks not functiona due to cable theft

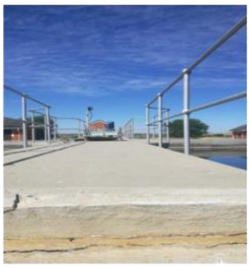

Anoxic tanks x 2

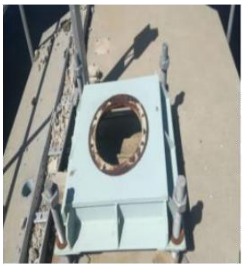

All 6 stirrers not functional due to cable theft

Kutlwanong WWTW (continued)


sludge return pump not functional, V belts damaged


Aerators not functional, all 6 of them

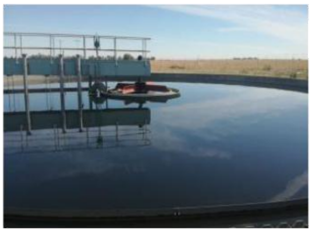

One aerator removed by the contactor for repairs


Aerator removed here


Cable theft at aerators


Return sludge screw pump, both not functional. V belts damaged


Clarifier 1 not functional, damaged centre bearing

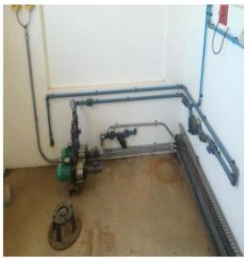

Clarifier 2, have electrical problems


Sludge lagoons x 2

Kutlwanong WWTW (continued)

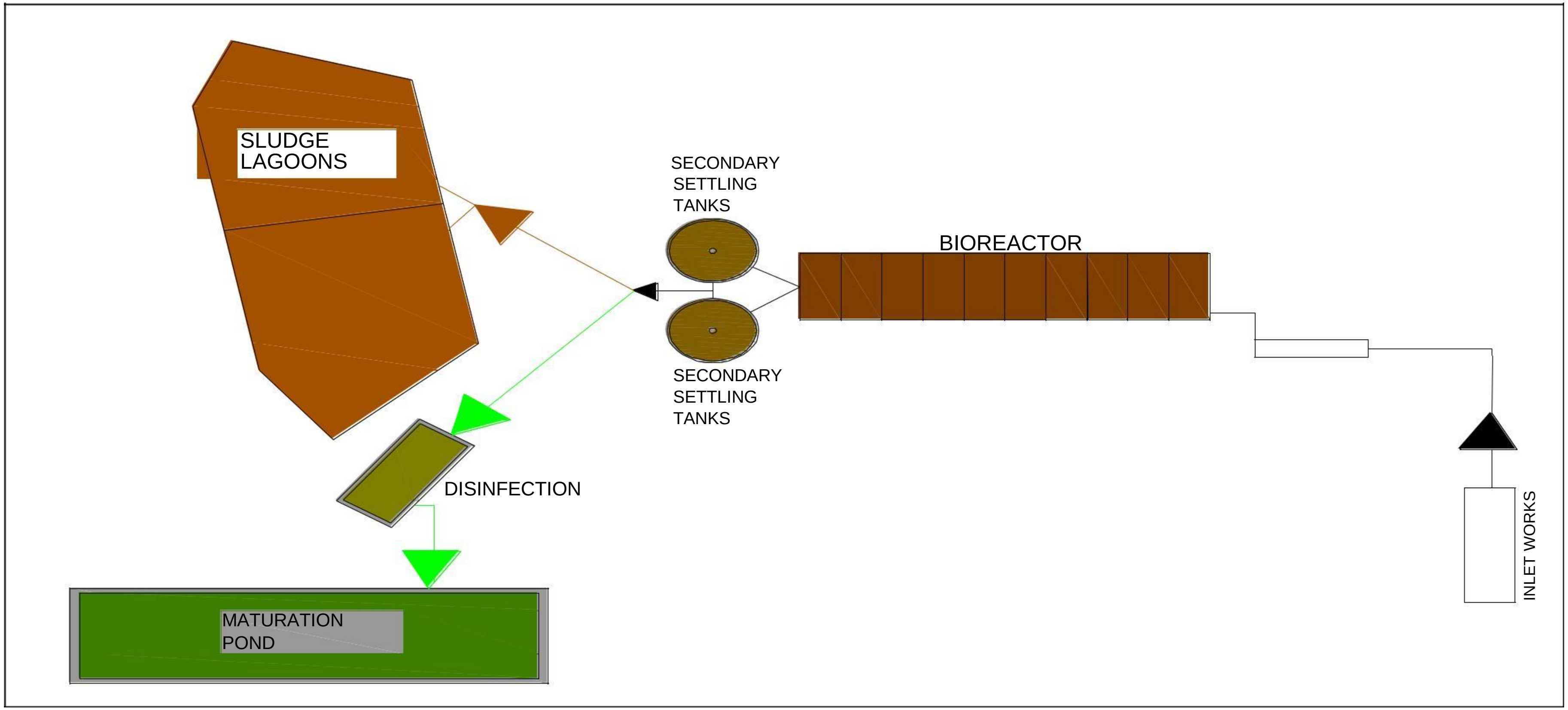

Disinfection, contact channel


Outflow meter, fully operational


Boaster pump, fully operational

Kutlwanong WWTW (continued)

Kutlwanong WWTW Process



Mmamahabane WWTW Condition Assessment

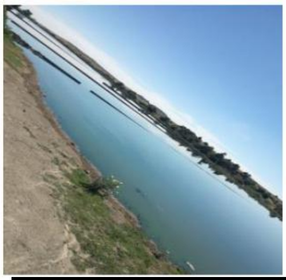
	NAME OF WWTW	**Mmahabane Sewer Treatment Plant**				
	ADDRESS/LOCATION	Welkom				
	COORDINATES	28° 6'4.93"S	27° 8'15.00"E			
Item		Description		YES/NO	Number	
1	PROCESS CONFIGURATION	Flow diagram of the WWTW		yes	n/a	
		Design Capacity		n/a	0.6 Ml/d	
		Staff organogram		yes	n/a	
Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Good,working
			mechanical	Y		
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N		
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		N		
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		N		
		Rotating biological contactors		N		
		Secondary Settler	humus tank	Y	1	
			clarifier	N		
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		N		
		Constructed Wetlands		N		
		Maturation pond/s		Y	1	Good,working
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
			drying beds	Y	2	
		Thickening	gravity	n		
			dissolved air floatation	y		Good,working
		Digestion		N		
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,completely vandalised by Zamazamas
		Lockable gate		N		Bad,no lockable gates
		Electrified		N		
		Yard		Y		In bad condition
		Staff facilities		Y		In bad condition
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	Plant is operating and consists of Anoxic dam and Rid dam				

Mmamahabane WWTW Condition Assessment Pictures

Inlet 1

2 drying beds

Anoxic dam



Rid dam

Sludge in rid dam

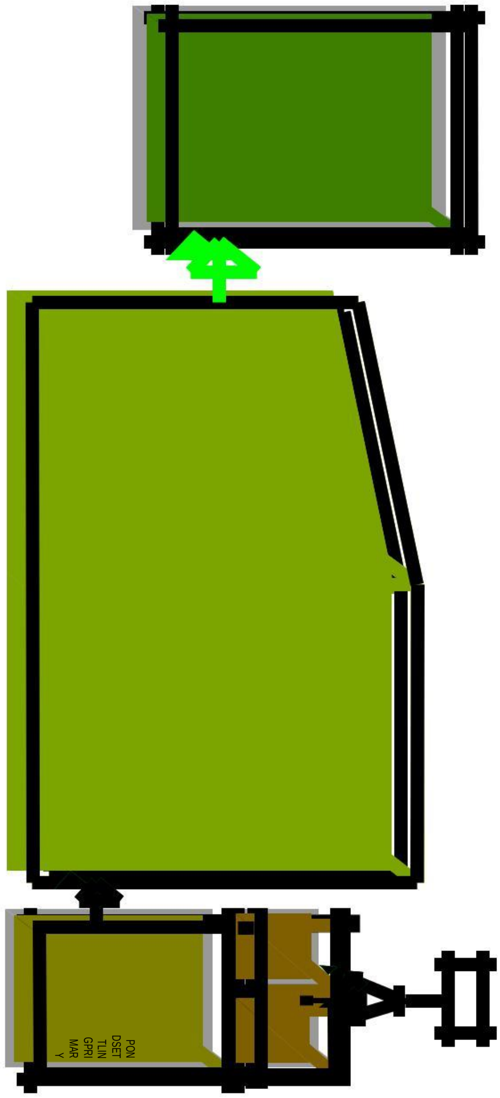
Rid inside dam

Final dam ponds

Outlet from rid dam to final

Mmamahabane WWTW

Mmamahabane WWTW Plant Process



Odendaalsrus WWTW Condition Assessment

NAME OF WWTW	**Odendaalsrus Sewer Treatment Plant**	
ADDRESS/LOCATION	Welkom	
COORDINATES	27°51'3.99"S	26°40'5.17"E

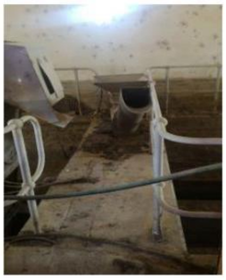
Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	6 Ml/d
		Staff organogram	yes	n/a

Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Bad,not working
			mechanical	N		
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N	2	Bad,not working
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		Y	2	Bad,not working
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PROCESSES	Trickling Filters		N		
		Activated sludge		Y		
		Rotating biological contactors		Y	7	Bad,not working
		Secondary Settler	humus tank	Y	3	Bad,not working
			clarifier	N		
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Bad,not working
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
			drying beds	Y		Bad,not working
		Thickening	gravity	N		
			dissolved air floatation	N		
		Digestion		Y	1	Bad,not working
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,completely vandalised by Zamazamas
		Lockable gate		N		Bad,no lockable gates
		Electrified		N		
		Yard		Y		In bad condition
		Staff facilities		Y		In bad condition
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	This palnt is about 30% operational with most componets not functioning bacause they are broken/vandalised and neeed to be replaced.				

Odendaalsrus WWTW Condition Assessment Pictures

Inlet 1

Inlet 1, mechanical screen broken not functional



Compactor not functional

channel

Vortex degritter not functional

Pumps from inlet to anaerobic tank, ½ pump work

Anaerobic dam

Effluent recirculation pump 1 and 2 from anaerobic dam to biofilter, pump 2 not functional

5 drying beds

Odendaal WWTW

Biofilter

Digester not functional

Humus tank, fully operational

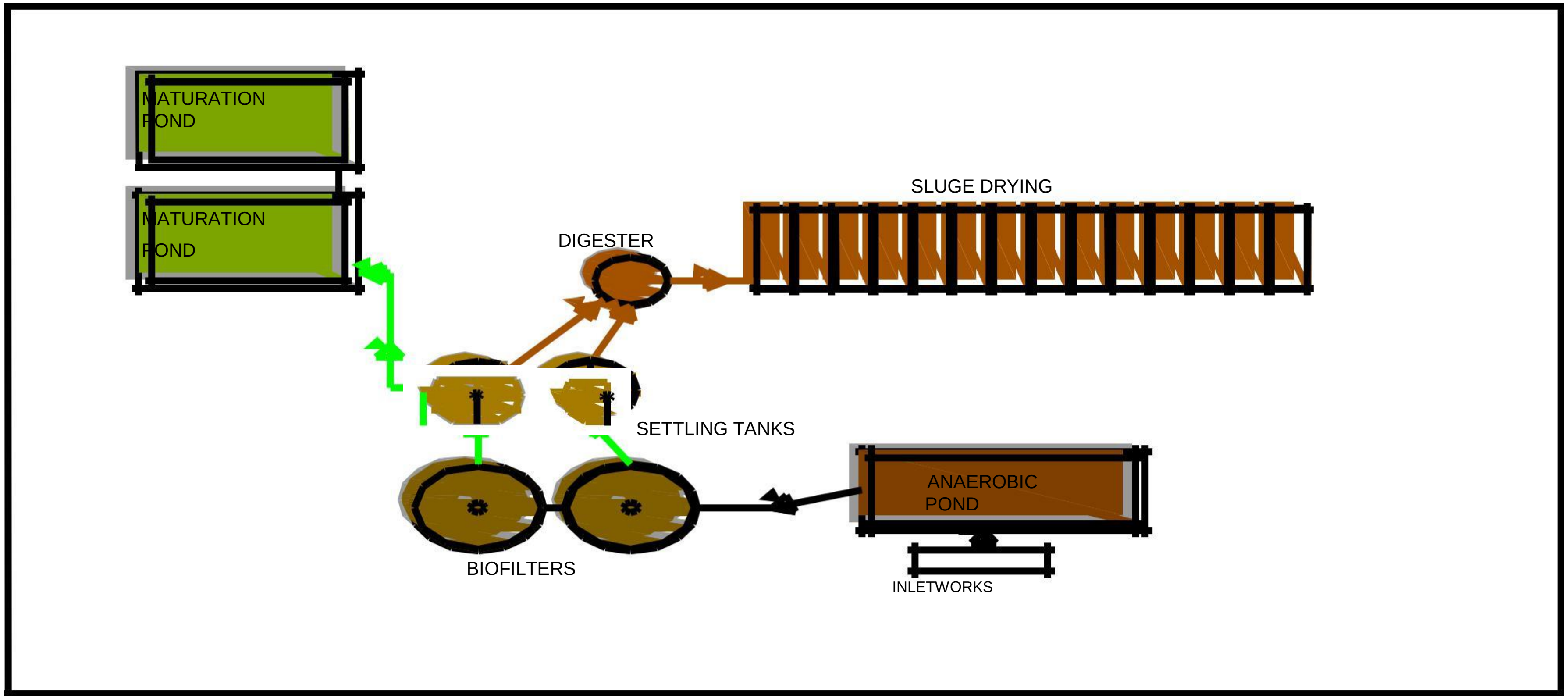
Old humus tank, no longer being used

Distribution box, fully operational

Biofilter not functional

Odendaal WWTW (continued)

Odendaalsrus WWTW Plant Process



Phomolong WWTW Condition Assessment

Phomolong WWTW Condition Assessment Pictures

Inlet with 3 manual screen

Channel from inlet one, with manual screen

Small leakage on the concrete channel

Grit channels fully operational

Sluice gates at grit channel, no issues

Flow meter fully operational

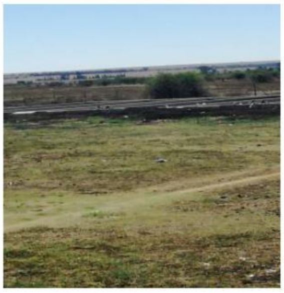
Mixer not working

Two Aerators not working

Aeration basin running properly

Aeration basin fully operational

Phomolong WWTW



Drying beds

Sludge return reticulation pumps, ½ functional

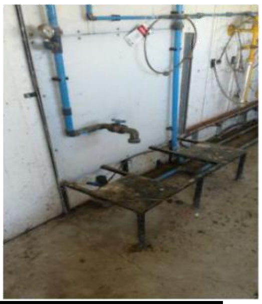
Secondary settling tank fully operational

Scum plate and buffer plate missing

Scum box missing in SST

Chlorine room

Phomolong WWTW (continued)



Chlorine tank missing, booster pump stolen, still waiting for the order.

Anaerobic pond not operational

Chlorine tank

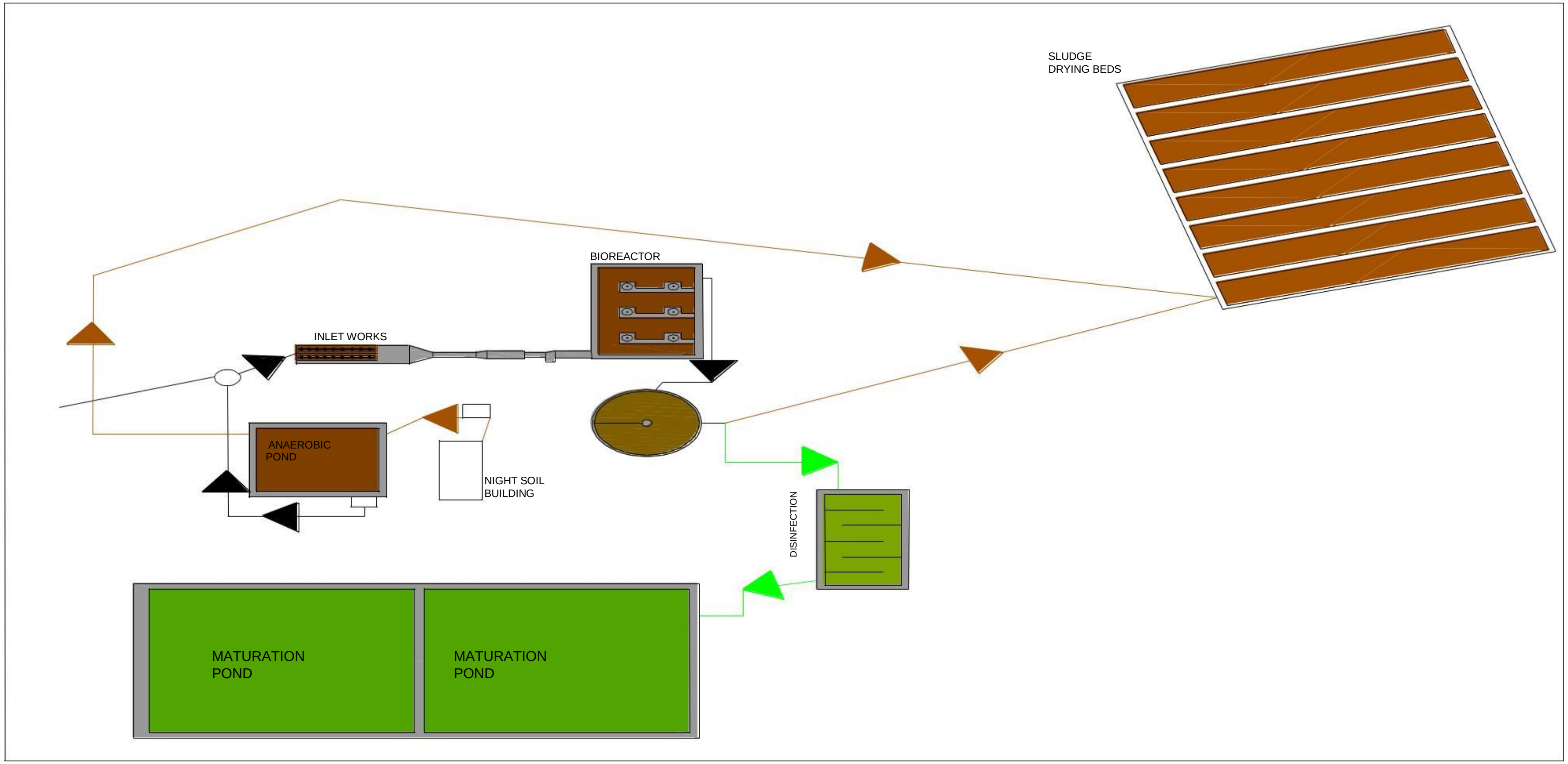
Out flow fully operational

Stolen rails chlorine tank

Fan stolen

Phomolong WWTW

Phomolong WWTW Process



Thabong WWTW Condition Assessment

NAME OF WWTW	**Thabong WWTW**	
ADDRESS/LOCATION	Welkom	
COORDINATES	27°58'40.37"S	26°48'3.43"E

Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	12Ml/d
		Staff organogram	yes	n/a

Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Good,working
			mechanical	Y	2	Bad,Not working
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	Y	2	Good,working
			automated de-griters	N		
		Flow measuring devise		Y	1	Good,working
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		Y	2	Bad,Not working
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		Y		
		Rotating biological contactors		Y	2	Bad,Not working
		Secondary Settler	humus tank			
			clarifier	Y	2	Good,working
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Bad,Not working
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
			drying beds	N		
		Thickening	gravity	Y	1	Good,working
			dissolved air floatation	N		
		Digestion		Y	3	Bad,Not working
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,vandalised by Zamazamas
		Lockable gate		N		Bad,no lockable gates
		Electrified		N		
		Yard		Y		In bad condition
		Staff facilities		Y		In bad condition
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	Plant has not been working for the past 6 months. The facility has been vandalised by the Zamazamas who gain free access because there is no proper fencing or lockable gates and it is a serious safety hazard. There is a lot of cable theft which has been occured in this facility and as a result most electrical components are not working.				

Thabong WWTW Condition Assessment Pictures


Inlet 1


Broken sluice gate


Both screw pumps are not functional


One Screw pumps


Inside inlet 1

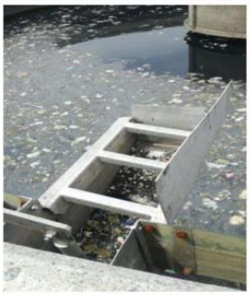

Broken sluice gate at


Broken concrete pipe


Conveyor belt operating


Centre bearing is not operational.

Thabong WWTW


Scum hoper is broken


Broken fibre glass


Buffer plates and Vnotch stolen


Buffol and V notch plates stolen


Inlet 2, One Screw pump working


Broken sluice gate


Oil leakage from damaged screw pump


Mechanical Screen not working, damaged chain

Thabong WWTW (continued)

The screen is working properly

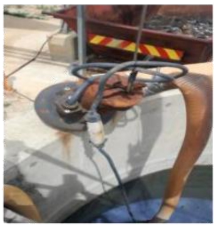
Manual screen functioning properly

Sluice gate from inlet 2 to grit channel operates.

Vortex degritter is operating

Broken sluice gates at grit channel

Vortex degritter 2



Damaged pump at vortex degritter 2

Operating Grit classifier

Channel to primary sedimentation tank (PST) is operating

Flow measuring device is working

Thabong WWTW (continued)

Raw sludge pumps ration not working, motors stolen.

Damaged wheel bearing at rotating bridge for PST 2

Anaerobic tanks functioning properly

Anoxic tank operates

V-belts for sludge return pumps are damaged

Anaerobic tanks functioning properly

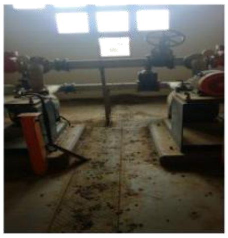
Thabong WWTW (continued)


SST 2 operating


4/6 generators at aerobic tanks not working due to cable theft


Water booster pump not operating


Broken scum hoper SST 2


No electricity at the digesters pump station


4 X digesters


Stolen pipes at digesters


Damaged wheel on secondary sedimentation, SST 2 bridge

Thabong WWTW (continued)


Dewatering press is stopped


Stripped panel box

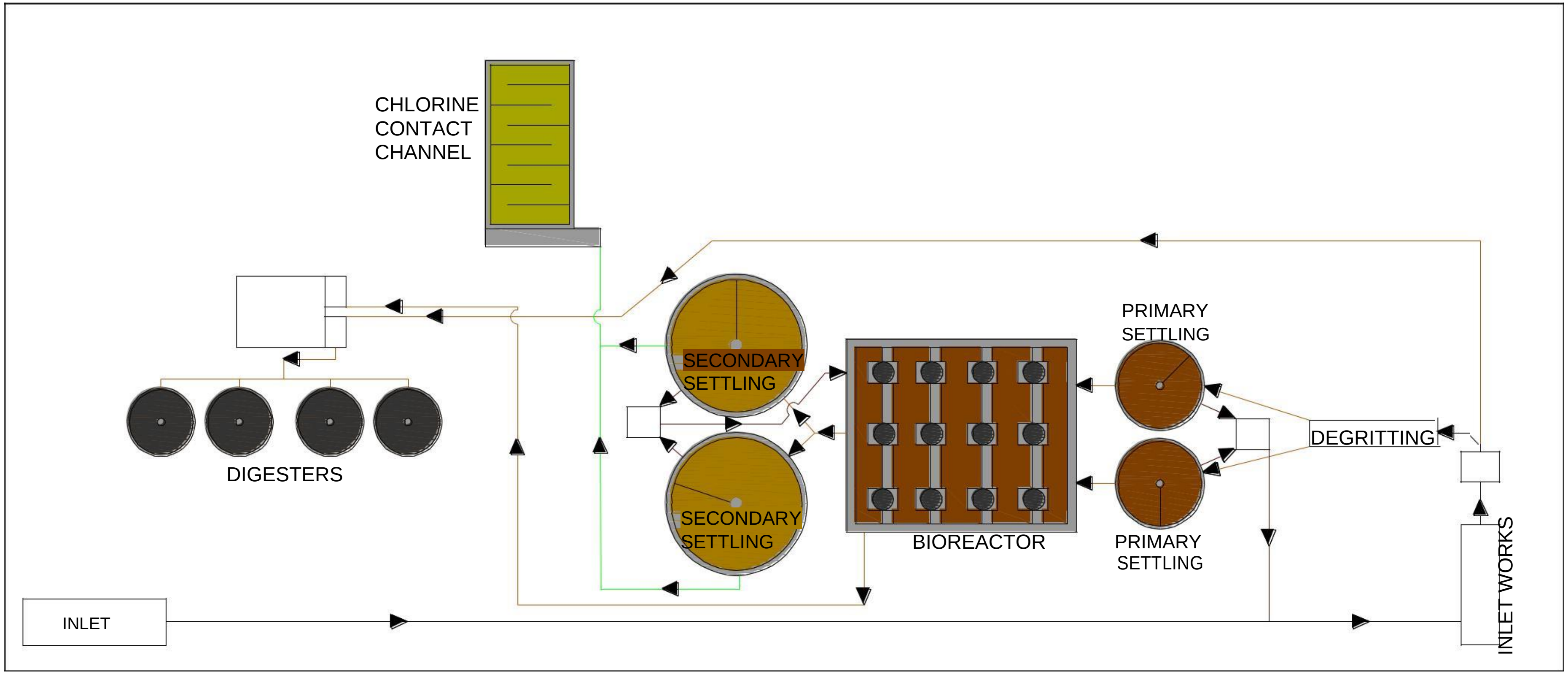

Sludge mixers, cable stolen


Chlorine room, gas controller is missing


Pipe supplying chlorine burnt by vandalism

Thabong WWTW (continued)

Thabong WWTW Process



Theronia WWTW Condition Assessment

NAME OF WWTW	**Therenia WWTW**	
ADDRESS/LOCATION	Welkom	
COORDINATES	27°59'59.00"S	26°41'33.42"E

Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	27Ml/d
		Staff organogram	yes	n/a

Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Bad,not working
			mechanical	N		
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N	2	Bad,not working
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		Y	9	Bad,not working
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		Y		
		Rotating biological contactors		Y	7	Bad,not working
		Secondary Settler	humus tank	Y	3	Bad,not working
			clarifier	N		
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Bad,not working
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
			drying beds	Y		Bad,not working
		Thickening	gravity	N		
			dissolved air floatation	N		
		Digestion		Y	8	Bad,not working
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,completely vandalised by Zamazamas
		Lockable gate		N		Bad,no lockable gates
		Electrified		N		
		Yard		Y		In bad condition
		Staff facilities		Y		In bad condition
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	Plant has not been working for the past 6 years. The facility has been vandalised by the Zamazamas who gain free access because there is no proper fencing or lockable gates and it is a serious safety hazard. There is a lot of cable theft which has been occured in this facility and as a result most electrical components are not working.				

Theronia WWTW Condition Assessment Pictures




Inlet 1 manual screen.

Inlet 2, manual screen

Chanel 2

Chanel 2




Broken sluice gates

Broken old valves

Broken sluice gates

Broken flow meter

Theronia WWTW




SST's, all of them are not working. Seven in total.

Bio filters. Nine in total.





The two pictures are for humus tanks. There are three in total and are 50 years old.

The three pictures are inside the pumpstation which is very old. It has been vandalised.

Theronia WWTW (continued)

Vandalised transformer.

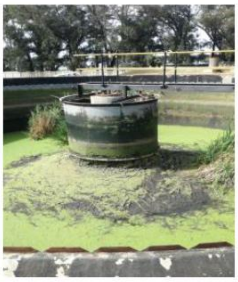
Electrical connection stripped due to cable theft, no electricityat all.

Second pumpstation also vandalised

Disinfection room vandalised

The pictures is of the digesters, there are 8 in total and all of them are vindalized.

Theronia WWTW (continued)

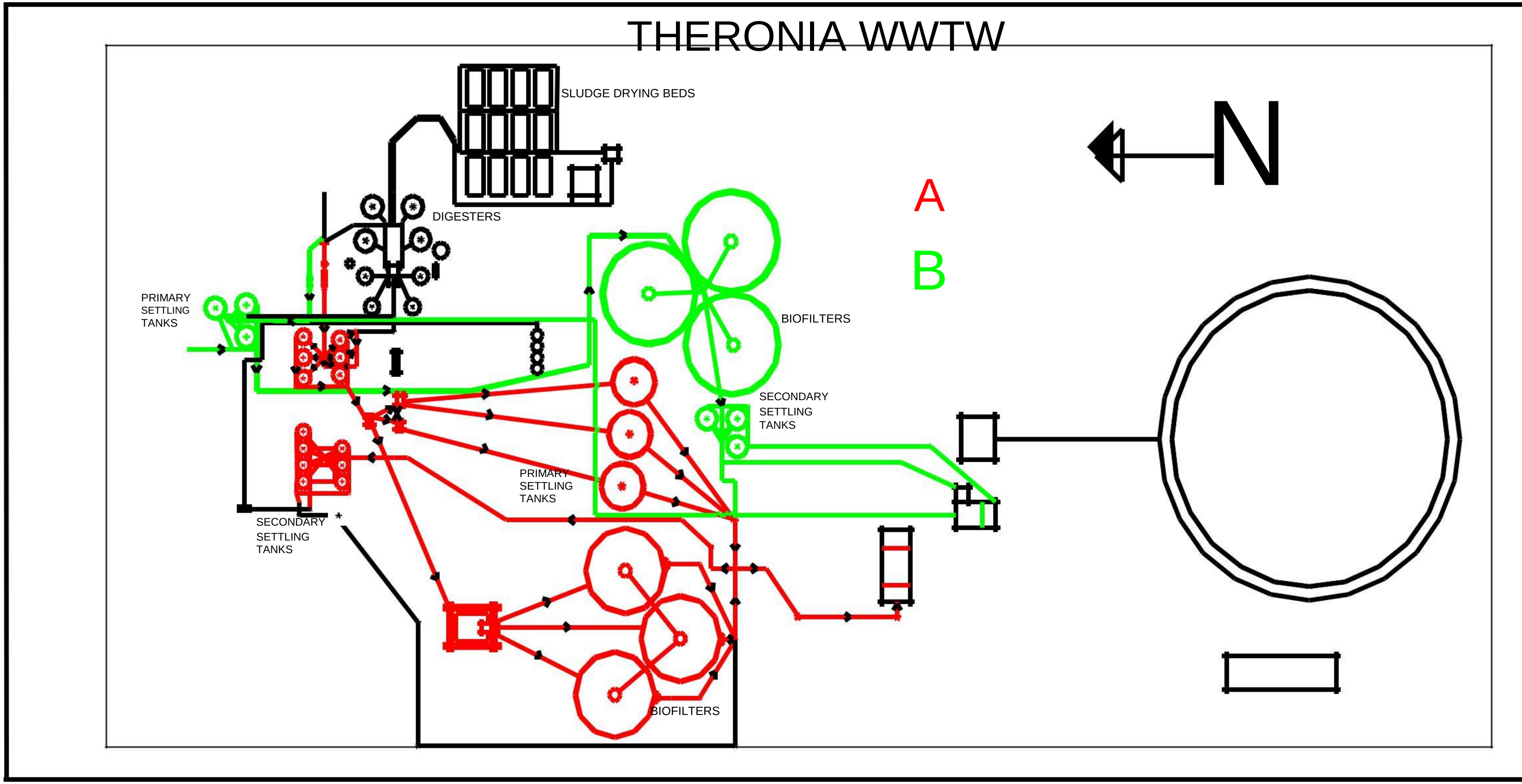


Theronia WWT (continued) : All the above pictures are the primary settling tanks (pst's). There are nine of them in total. There are all not working and old.

Drying beds

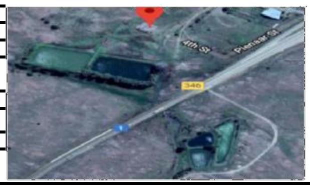
Theronia WWTW (continued)

Theronia WWTW Condition Assessment Pictures



Ventersburg WWTW Condition Assessment

NAME OF WWTW	**Ventersburg Sewer Treatment Plant**		
ADDRESS/LOCATION	Ventersberg		
COORDINATES	28° 5'30.11"S	27° 8'7.04"E	



Item		Description	YES/NO	Number
1	PROCESS CONFIGURATION	Flow diagram of the WWTW	yes	n/a
		Design Capacity	n/a	
		Staff organogram	yes	n/a

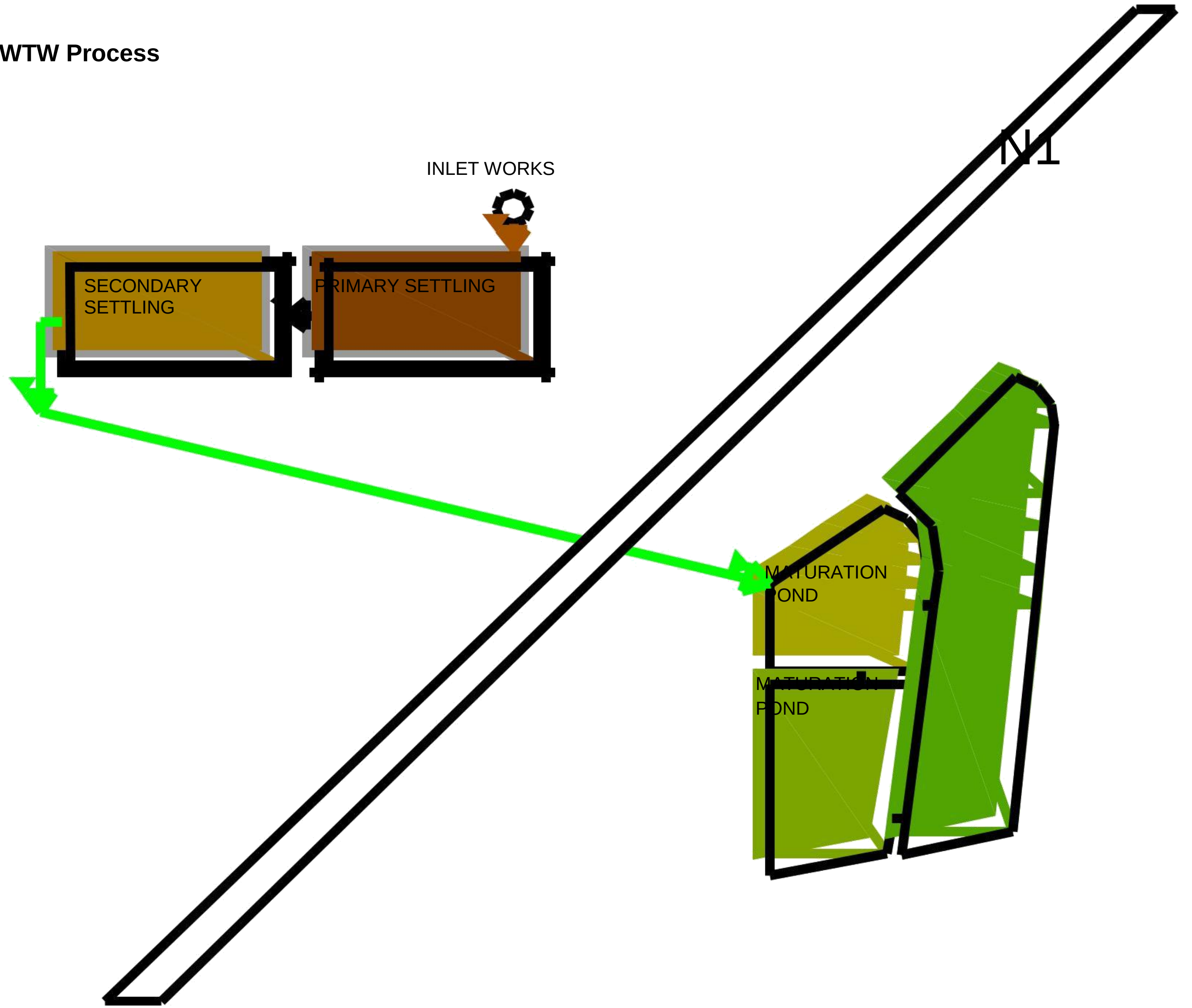
Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	N		
			mechanical	N		
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	N		
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		N		
		Oxidation Pond System		Y	4	Bad,Working
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		N		
		Rotating biological contactors		N		
		Secondary Settler	humus tank	N		
			clarifier	N		
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		N		
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
			drying beds	N		
		Thickening	gravity	N		
			dissolved air floatation	N		
		Digestion		N		
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		N		
		Lockable gate		N		
		Electrified		N		
		Yard		N		
		Staff facilities		N		
		Sludge licence		N		
		Contract for sludge disposal		N		
8	REMARKS	This is a self-purification plant consisting of 4 oxidation ponds.The one oxidation pond is full of blood from the nearby Abottor.				

Ventersburg WWTW Condition Assessment Pictures

Oxidationpond, self purification plant, only has 4 oxidation ponds. Pond contains blood from the abbotoirs

Ventersburg WWTW

Ventersburg WWTW Process



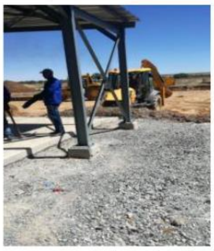
Virginia WWTW Condition Assessment

NAME OF WWTW	**Virginia Sewer Treatment Plant**				
ADDRESS/LOCATION	Virginia Sewer				
COORDINATES	28° 7'13.56"S	26°46'57.97"E			
	Description		YES/NO	Number	
PROCESS CONFIGURATION	Flow diagram of the WWTW		yes	n/a	
	Design Capacity		n/a		
	Staff organogram		yes	n/a	
	Description	Type of Operation	Y/N	Number	Condition
PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Good,working
		mechanical	Y	2	Good,working
	Grit Removal	manually cleaned channels	N		
		mechanically cleaned channels	Y	2	Good,working
		automated de-griters	N		
	Flow measuring devise		Y	1	Good,working
	Flow balance/equalization basin/tank		N		
PRIMARY TREATMENT PROCESS	Primary Settling		Y	2	Good,working
	Oxidation Pond System		Y	1	Good,working
	Flow balancing/equalization basin/tank		N		
SECONDARY TREATMENT PRO	Trickling Filters		N		
	Activated sludge		Y		
	Rotating biological contactors		Y	2	Good,working
	Secondary Settler	humus tank	Y	1	Good,working
		clarifier	Y	2	Good,working
TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Good,working
	Constructed Wetlands		N		
	Maturation pond/s		Y	1	Good,working
SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	N		
		drying beds	N		
	Thickening	gravity	Y	1	Good,working
		dissolved air floatation	N		
	Digestion		Y	3	Good,working
FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Concrete palisade,completely vandalised by Zamazamas
	Lockable gate		N		Bad,no lockable gates
	Electrified		N		
	Yard		Y		In bad condition
	Staff facilities		Y		In bad condition
	Sludge licence		N		
	Contract for sludge disposal		N		
REMARKS	Plant is working well and consists of Part A and Part B.Part B is not working at the moment because it is currently being refurbished by the contractor.				

Virginia WWTW Condition Assessment Pictures


Inlet 1, Sand trap.


Compacter for the grit, still new


Refurbishment taking place


Inlet 1


Vortex degritter, stirrer blade broken

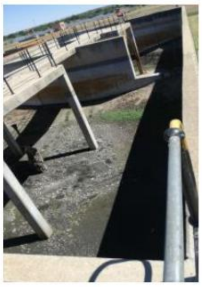

Sluice gate


Two automatic screen and one is manual, fully operational


Flow meter fully operational

Virginia WWTW


Paved road under construction


Aerobic on B side, contractor busy fixing it


Anarobic tank in A side, mixer being fixed


Aerobic tank in A side running properly


Aerobic tank B side under rehabilitation


Construction activities on B side aerobic tanks


No faults found at the Aerobic tank side A

Virginia WWTW (continued)

Flow meter for rest pump

Oxygen metre readings fully operational

Return sludge metre

Flow reactor reading metre

Side tunnel

Turbidity metre reading fully operational

Link between aerobic and sst being constructed

Virginia WWTW (Continued)

Sst A

Sst B, not working due to the refurbishment

Sst 2A

Thickener under refurbishment

Anarobic digester, no faults found, 2 new pumps to be installed.

Sst 2B under refurbishment

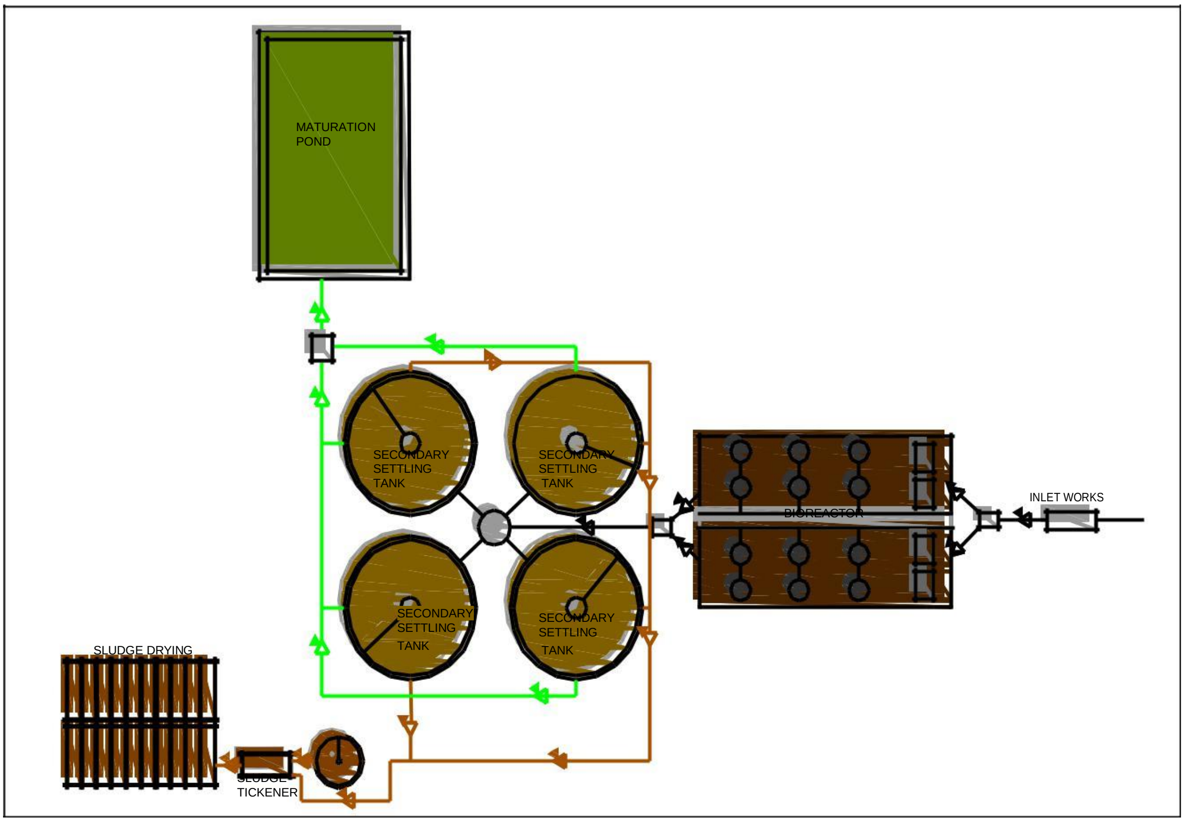
Virginia WWTW (Continued)

22 drying beds, currently under refurbishment

Scarcer system, showing what is happening at the plant

Virginia WWTW

Virginia WWTW Process

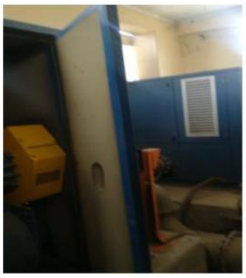


Witpan WWTW Condition Assessment

	NAME OF WWTW	**Witpan WWTW**				
	ADDRESS/LOCATION	Welkom				
	COORDINATES	See spreadshheet with woordintaes				
Item		Description		YES/NO	Number	
1	PROCESS CONFIGURATION	Flow diagram of the WWTW		yes	n/a	
		Design Capacity		n/a		
		Staff organogram		yes	n/a	
Item		Description	Type of Operation	Y/N	Number	Condition
2	PRELIMINARY TREATMENT PROCESS	Screens	manual	Y	1	Good,working
			mechanical	Y	2	Good,working
		Grit Removal	manually cleaned channels	N		
			mechanically cleaned channels	Y	2	Good,working
			automated de-griters	N		
		Flow measuring devise		N		
		Flow balance/equalization basin/tank		N		
3	PRIMARY TREATMENT PROCESS	Primary Settling		N	2	Good,working
		Oxidation Pond System		N		
		Flow balancing/equalization basin/tank		N		
4	SECONDARY TREATMENT PRO	Trickling Filters		N		
		Activated sludge		Y	2	To be checked
		Rotating biological contactors		Y	2	Good,working
		Secondary Settler	humus tank			
			clarifier	Y	2	
5	TERTIARY TREATMENT PROCESS	Disinfection (chemicl/UV)		Y	1	Good,working
		Constructed Wetlands		N		
		Maturation pond/s		N		
6	SLUDGE TREATMENT PROCESS	Dewatering	filter/belt press	Y	1	Good,working
			drying beds	N		
		Thickening	gravity	N		
			dissolved air floatation	N		
		Digestion		N		Good,working
7	FACILITY FACILITIES	Fence (steel pallisade (SP)fence/concrete palisade(CP)/ brick wall (BW)/wire fence		Y		Electrical Fence ,not working
		Lockable gate		N		Bad,no lockable gates
		Electrified		Y		Electrical Fence ,not working
		Yard		Y		In good condition
		Staff facilities		Y		In good condition
		Sludge licence		Y		
		Contract for sludge disposal		Y		
8	REMARKS	Plant working properly. Bronville and Thabong Lines blocked by the Zamazamas and currently not running One blower not working properly				

Witpan WWTW Condition Assessment Pictures

Inlet 1 fully operational.

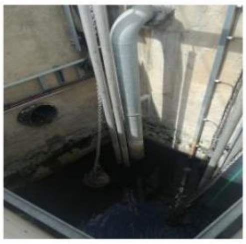


Blower 2, not working properly

Manhole 2, no manhole cover

Damaged pipe at the pressbelt outlet

Mixer 1,fully operational



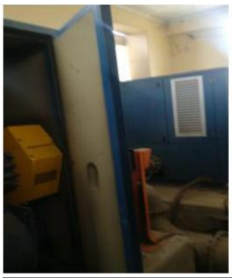
Supernatant, fully operational

Classifier, fully operational

½ recycling pumps working

Witpan WWTW

Inlet 1 fully operational.

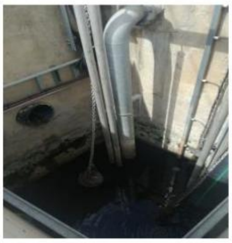


Blower 2, not working properly

Manhole 2, no manhole cover

Damaged pipe at the pressbelt outlet

Mixer 1,fully operational



Supernatant, fully operational

Classifier, fully operational

½ recycling pumps working

Witpan WWTW

Summary of Needs and Gaps for the Waste Water Treatment Plants

NUMBER	NAME OF PLANT	FUNCTIONALITY	Current structure Original posts	Acting structure currently	Requirements DWS	Proposed structure	Comments
1	THABONG WWTW class B works WELKOM	Plant need to be upgraded and portions of old works needs to be refurbished. Plant currently standing due to broken bottom bearings. Chlorination system damaged due to lack of chlorine.	Class 111 Class 1 8 shift workers 3 general workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers 3 general workers	**Class B Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class V Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 1 Tractor driver 10 General workers	Please note that every class B works must have at least Class II process controller per shift according to regulation 2843 Currently 3 general workers on side to do housekeeping Order for repairing the bottom bearings was received contractor busy to repair it. New chlorination method to be installed.
2	Theronia Class B works WELKOM	The whole plant to be upgraded.	6 shift workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 6 Shift workers	**Class B Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class V Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 1 Tractor driver 10 General workers	Please note that every class B works must have at least Class II process controller per shift according to regulation 2843 **Currently no general workers on side to do housekeeping**
3	Witpan Class B works WELKOM	New plant in operation	8 Shift workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers 1 general workers	**Class B Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class V Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 1 Tractor driver 10 General workers	Please note that every class B works must have at least Class II process controller per shift according to regulation 2843 **Currently no general workers on side to do housekeeping**
4	Odendaalsrus Class D works	Plant in operation Inlet works walls busy collapsing and gas damaged the electrical panel. Process been hampered due to no water entering works. Cable theft happened and plant are out of commission	8 Shift workers 1 general worker	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers 1 general workers	**Class D Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 10 General workers	Please note that every class D works must have at least Class II process controller per shift according to regulation 2843 Currently no general workers on side to do housekeeping and remove drying beds. Cables was stolen in the presence of security.
5	Kutlwanong Class D works	Plant needs to be upgraded inlet works under design plant needs to be extended. Also all cables of aerators been stolen.	8 Shift workers 6 General worker	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers 6 general workers	**Class D Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class V Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 1 Tractor driver 10 General workers	Please note that every class D works must have at least Class II process controller per shift according to regulation 2843 Cables was stolen in the presence of security.

NUMBER	NAME OF PLANT	FUNCTIONALITY	Current structure Original posts	Acting structure currently	Requirements DWS	Proposed structure	Comments
6	Allanridge Class D works	Plant under construction Plant in operation but not complying to general standards yet. 50% functionality.	8 Shift workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers	**Class D Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class IV roaming Class III Class II Class I 8 Class 0 (shifts) 6 General workers	Please note that every class D works must have at least Class II process controller per shift according to regulation 2843 Currently no general workers on side to do housekeeping and remove drying beds
7	Virginia Class C works	Plant under construction A works 100% operational. B works 20%	Class III 8 Shift workers 4 General workers	Acting class V roaming Acting Class IV roaming 8 Shift workers	**Class C Works must have:** Class V Class IV roaming Class III per shift Class II Class I (8) Class 0	Class V Roaming Class IV Class III Class II Class I 8 Class 0 (shifts) 10 General workers	Please note that every class C works must have at least Class III process controller per shift according to regulation 2843
8	Hennenman Class C works	Aerators gearboxes old needs to be replaced, Electrical panels old needs to be replaced. Chlorination unit damaged due to standing time, new method to be considered.	Class I 8 General workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers	**Class C Works must have:** Class V Class IV roaming Class III per shift Class II Class I (8) Class 0	Class V Roaming Class III Class II Class I 8 Class 0 (shifts) 6 General workers	Please note that every class C works must have at least Class III process controller per shift according to regulation 2843
9	Phomolong Class D works	Some aerators needs to be refitted, one gearbox to be repaired.	Class I 8 General workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming Acting class 1 8 Shift workers	**Class D Works must have:** Class V roaming Class IV Class III Class II per shift Class I (8) Class 0	Class V Roaming Class III Class II Class I 8 Class 0 (shifts) 6 General workers	Please note that every class D works must have at least Class II process controller per shift according to regulation 2843
10	Ventersburg/ Mmamahabane Class E works	Oxidation pond system. Currently been upgraded	Class 1 roaming 2 General workers	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming	**Class E Works must have:** Class II per shift	Class 1 2 General Worker	Please note that every class E works must have at least Class II process controller per shift according to regulation 2843
11	Whites	Contractor to be appointed to install septic tank system	Class 1 roaming	Acting class V roaming Acting Class IV roaming Acting class 3 Roaming	**Class E Works must have:** Class II per shift	Class 1 2 General Worker	Please note that every class E works must have at least Class II process controller per shift according to regulation 2843

Condition Assessment for Sewer Pump Stations

The following general problems were encountered in all the Pump stations assessed:

Missing/Stolen Components in pump stations e.g Motors ,rotating assemblies, etc.
Vandalised Pump stations
Vandalised Pump houses
Cable theft at the pump stations
No proper fencing and lockable gates at the pump stations
Most pump stations have a fraction of the installed pumps operational

Pumps Stations Per Drainage Area

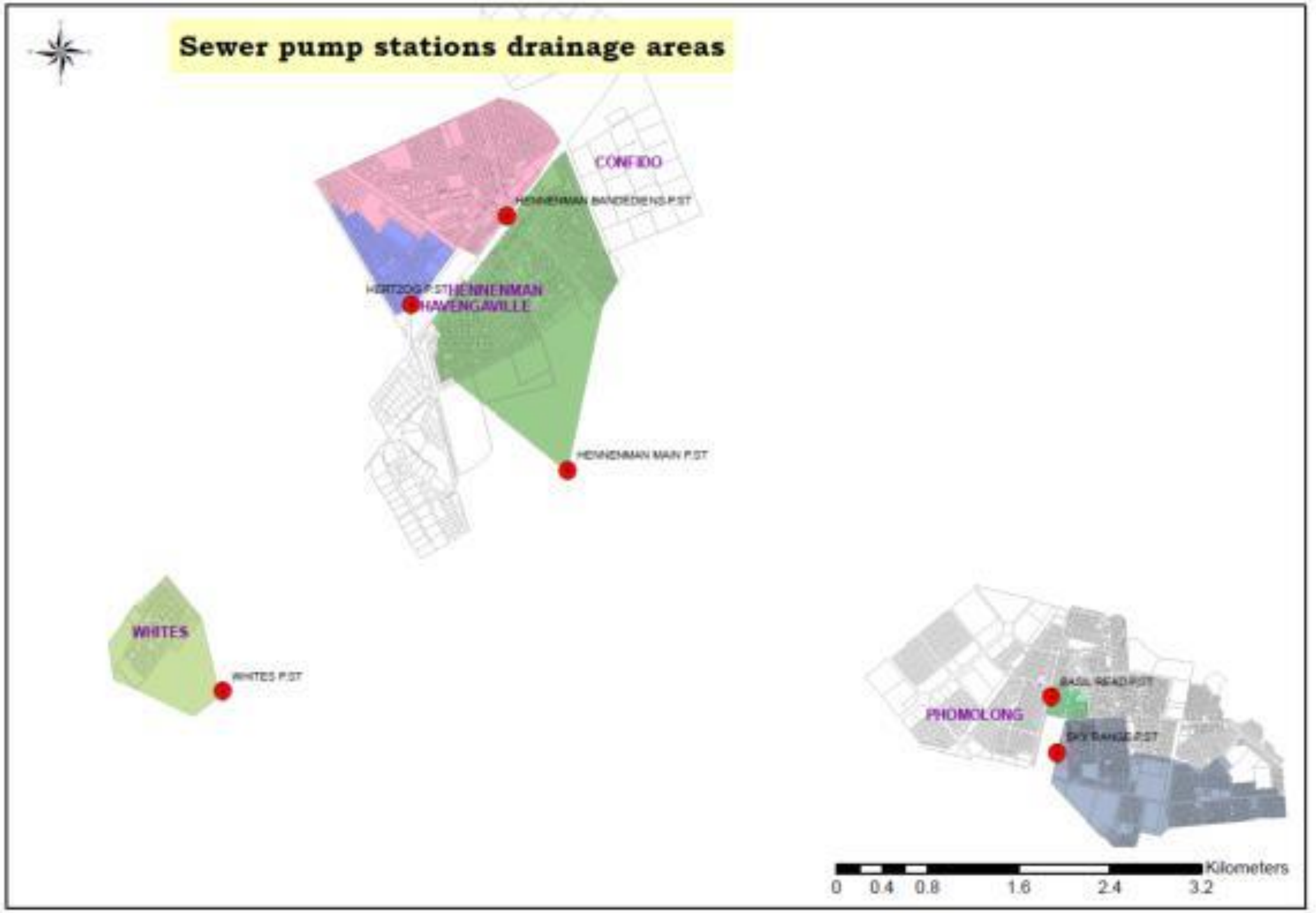
Number	Drainage Area	Stands	Inflow in Ml	Flow direction
	Allanridge and Nyakalong			
1	Extension 3	639	0.124	*Ex 3 to voelpan*
2	Managers	5	0.005	*Allanridge to WWTW*
3	Shopping Center	3	0.002	*Shopping Centre to line*
4	Nyakalong 1	4113	2.302	*Nyakkalong to WWTW*
5	Voëlpan	672	0.752	*Voelpan to WWTW*
	Calculated flow to Allanridge WWTW		**3.186**	
	Welkom			
1	Western Pump station	4058	2.067	*south part of Welkom to Major*
2	Rheederpark	649	0.277	*North part of rheederspark to Major*
3	Phomolong village	945	0.484	
4	Traffic	2178	0.881	*Traffic*
5	Power Road	2247	0.970	*Pump to theronia or can grvitate to witpan*
6	Major	2164	0.949	*Major pump to Theronia WWTW*
	Calculated flow to Theronia WWTW		**5.627**	
1	T8	14716	7.840	*Main out fall - Thabong*
2	Old Thabong	793	0.378	*Main outfall to Thabong WWTW*
3	Vida	70	0.030	*Western Part of R Stad to Network*
4	Bronville South	1343	1.079	*Main outfall to Witpan WWTW*
5	Bronville North	1775	1.013	*Main outfal to Witpan WWTW*
6	Hani Park	5126	2.865	*Hani Park to Thabong WWTW*
	Calculated flow Thabong WWTW		**11.113**	
			0.887	**Bypass to Witpan**
7	Power Road also pump to Witpan		0.970	
	Calculated flow to Witpan WWTW		**3.949**	

Number	Drainage Area	Stands	Inflow in Ml	Flow direction
	Allanridge and Nyakalong			
1	Extension 3	639	0.124	*Ex 3 to voelpan*
2	Managers	5	0.005	*Allanridge to WWTW*
3	Shopping Center	3	0.002	*Shopping Centre to line*
4	Nyakalong 1	4113	2.302	*Nyakkalong to WWTW*
5	Voëlpan	672	0.752	*Voelpan to WWTW*
	Calculated flow to Allanridge WWTW		**3.186**	
	Welkom			
1	Western Pump station	4058	2.067	*south part of Welkom to Major*
2	Rheederpark	649	0.277	*North part of rheederspark to Major*
3	Phomolong village	945	0.484	
4	Traffic	2178	0.881	*Traffic*
5	Power Road	2247	0.970	*Pump to theronia or can grvitate to witpan*
6	Major	2164	0.949	*Major pump to Theronia WWTW*
	Calculated flow to Theronia WWTW		**5.627**	
1	T8	14716	7.840	*Main out fall - Thabong*
2	Old Thabong	793	0.378	*Main outfall to Thabong WWTW*
3	Vida	70	0.030	*Western Part of R Stad to Network*
4	Bronville South	1343	1.079	*Main outfall to Witpan WWTW*
5	Bronville North	1775	1.013	*Main outfal to Witpan WWTW*
6	Hani Park	5126	2.865	*Hani Park to Thabong WWTW*
	Calculated flow Thabong WWTW		**11.113**	
			0.887	**Bypass to Witpan**
7	Power Road alos pump to Witpan		0.970	
	Calculated flow to Witpan WWTW		**3.949**	

	Odendaalsrus			
1	Groot Frank	883	0.761	*Pump sewer from Town and Industial area + Akasie + Atheat Outfall serwer to WWTW*
2	Klein Frank	22	0.014	
3	Althea	266	0.243	*Pump sewer from Alteat to Akasie*
4	Akasia	186	0.196	*Pump sewer to Groot Frank*
5	Hospital Road	165	0.048	*Eldorie to OD WWTW*
6	Goudrif 1	148	0.147	*Hospital Part to OD WWTW*
7	Goudrif 2	149	0.113	*Hospital Part to OD WWTW*
8	Bothaville	82	0.053	*Hospital Part to OD WWTW*
9	Ben Regal	116	0.043	*Eldorie to OD WWTW*
10	Eldorie	2	0.069	
11	Mimosa			*Pool and Mimosa to sewer line*
12	Workshop			*Workshop to sewer line*
	Calculated flow to OD WWTW		**1.686**	
	Calculated Flow to Kutlwanong WWTW			**Gravitation line to Kutlwanong WWTW**
	Hennenman			
1	Hertzog	196	0.127	*South west part of Hennenman to Bandediens*
2	Bandediens	670	0.397	*Pump to other side of Rail road*
3	Hennenman Main	705	0.527	*Hennenman to Hennenman WWTW*
4	Whites PS	117	0.040	*Tansport to Hennenman WWTW*
	Calculated flow to Hennenman WWTW		**1.090**	

	Phomolong			
1	Sky Range	2264	1.102	*Pump tp Phomolong WWTW*
2	Basil Read	178	0.120	*Phomolong Village to Skyrange*
	Calculated flow to Phomolong WWTW		**1.222**	
	Virginia			
1	Gawie Theron	125	0.108	*Pump form Joel Park and Harmony to Gravaitation line to Nothern*
2	Joel Park	124	0.037	*Pump from Joel Park to Gravitation line*
3	Argon	249	0.185	*Saaiplaas to Nothern*
4	Duikboot	3	0.001	*Sedibeng and Tikwe to Gravitation line*
5	Birch way	256	0.225	*Merriespruit to Gravitation line*
6	Grysbok	503	0.462	*East of virginia to Hoof PS*
7	Kitty	615	0.214	*Kitty to Gravitation line in Meerispruit*
8	Hoof Pomp Stasie	17580	11.359	
9	Northern			
10	Meloding	3472	1.953	
	Calculated flow to Virginia WWTW		**14.545**	
	Ventersburg			
1	Mmamahabane	2264	1.217	
	Calculated Flow to Ventersburg and Mmamahabane		**1.217**	

Hennenman/Phomolong Pump Stations



Basil Read Pump Station Condition Assessment

	NAME OF PUMP STATION	Basil Read Pumpstation			
	ADDRESS/LOCATION	Hennenman			
	COORDINATES	28° 0'43.68"S	27° 4'26.31"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Basil Read**			**Only manholes left**	No Pumps.Pumps taken to Sky Range

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate not locked
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	0	None
	Sump pump	0	None
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	0	None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	0	None

To be decominssioned.

Basil Read Pump Station Pictures

Basil Read Pump station, no pumps

Old pumps were here, taken to Sky Range

Only manholes left at Basil Read

Basil Read Pump station

Sky Range Pump Station Condition Assessment

NAME OF PUMP STATION	Sky Range Pumpstation		
ADDRESS/LOCATION	Hennenman		
COORDINATES	28° 1'3.19"S	27° 4'31.58"E	

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Sky range**	**2264**	**1.102**	**Pumps to Phomolong WWTW**	Two screw pumps,both working very well

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	Good
	Drinking water	Good
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	2	Good
	Sump pump	2	Good
	Extraction Fan	2	Good
	Auto Rake	1	Good
	Screen press	2	Good
	Muffle monster	1	Good
	Motors	2	Good
	Starter	2	Good
	Ultrasoninc	2	Good
	Flow Meter	1	Good
	Generator	2	Good

Sky Range Pump Station Pictures

Sky Range Pumpstation

Screw pumps, both working

Sluice gates okay

Channel pumping to Phomolong WWTW

Outlet from Pumpstation to WWTW

Electric panel fully functional

Sky Range Pumpstation, newly built , fully operational and in good condition

Hennenman Main Pump Station Pictures

Hennenman Pumpstation

Pump 1 fully operational

Pump 2 fully operational

Both pumps fully functional, buildings in poor condition.

Hennenman Pump station

Hennenman Bandendien Pump Station Pictures

One pump does not have motor

External view of the pump station

Hennema Bandediens Pump Station

Hertzorg Pump Station Condition Assessment

NAME OF PUMP STATION	Hertzog Pumpstation	
ADDRESS/LOCATION	Hennenman	
COORDINATES	27°58'47.95"S	27° 1'1.17"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Hertzog**	**196**	**0.127**	**Collects from the south west parts of Hennenman and pumps into Bandediens**	One pump Operational

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Yes

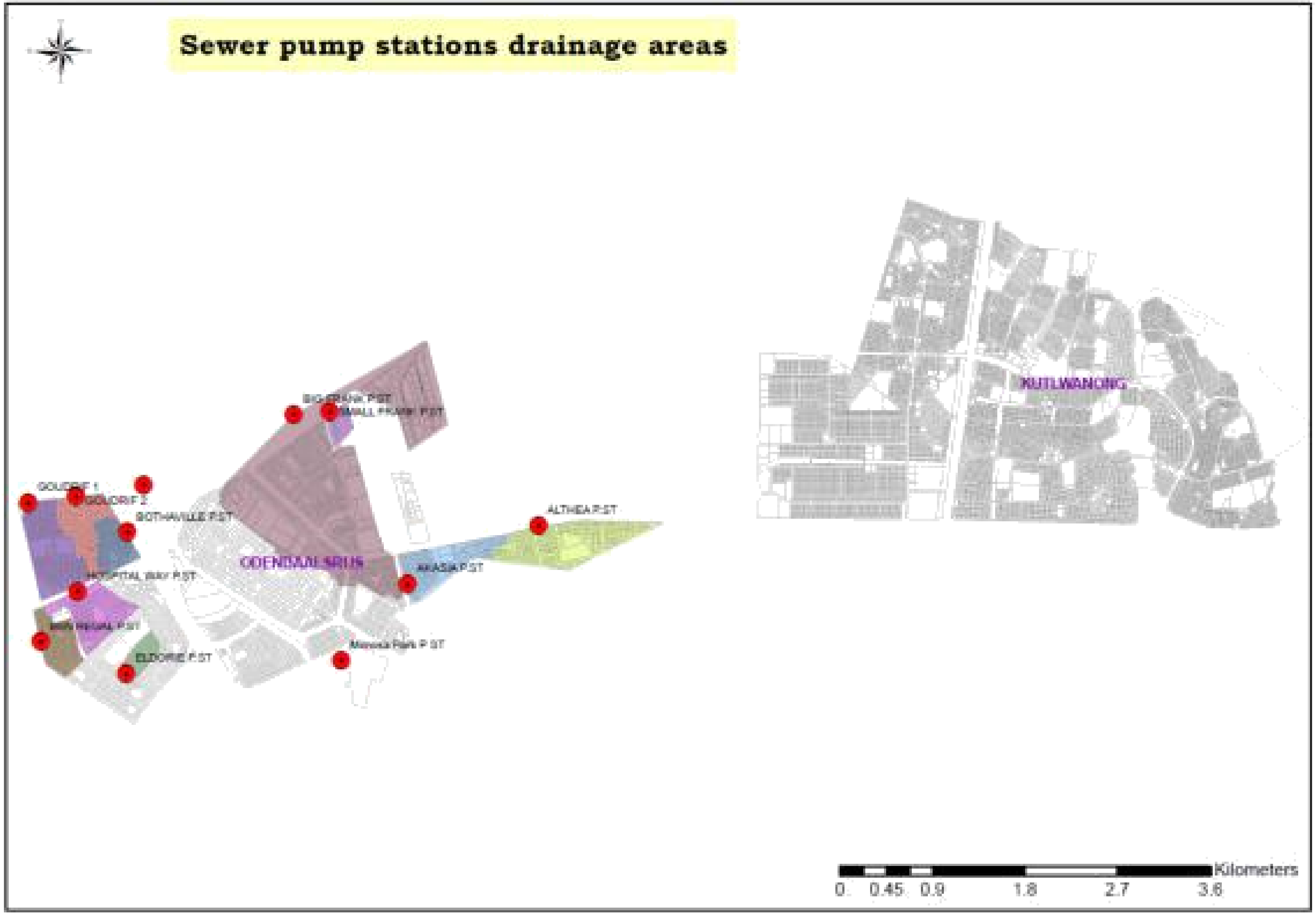
	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	1	Working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	good
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	2	Good

Hertzorg Pump Station Pictures

Hertzog pump station

The pump is working

Hertzog Pump Station


Sewer pump stations drainage areas
BOTHAVILLE P.ST
HOSPITAL WAY P.ST
ODENDAALSRUS
AKASIA P.ST
ALTHEA P.ST
ELDORIE P.ST
KUTLWANONG
Kilometers
0 0.45 0.9 1.8 2.7 3.6

Althea Pump Station Condition Assessment

NAME OF PUMP STATION	Althea Pumpstation
ADDRESS/LOCATION	Odendaalsrus
COORDINATES	27°52'12.90"S 26°42'45.80"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Althea**	**266**	**0.243**	**Power sewer from Althea to Akasia**	One pump working,the other pump does not have motor

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate not locked
	Electrical Supply	Yes

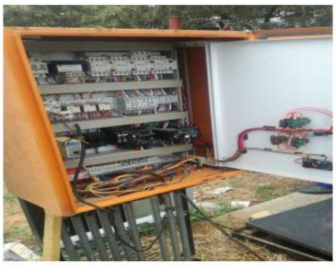
	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	2	One working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	One missing
	Starter		None None
	Ultrasoninc		None
	Flow Meter		
	Generator	2	Good

Althea Pump Station Condition Assessment Pictures

Althea Pumpstation

Two pumps only one pump working, the other one does not have a motor

Sump



Panel Box fully operational

Althea Pump station.

Akasia Pump Station Condition Assessment

NAME OF PUMP STATION	Akasia Pumpstation	
ADDRESS/LOCATION	Odendaalsrus	
COORDINATES	27°52'26.91"S	26°41'54.16"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Akasia**	**186**	**0.196**	**Collects from Althea residential area and pumps into Large Frank Pump station**	One out of two pumps operating

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate not locked
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	2	One working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	One missing
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	2	Good

Akasia Pump Station Condition Assessment Pictures

Akasia Pumpstation

Sumps

Two pumps only one pump working, the other one does not have a motor

Panel Box fully operational

Akasia Pumpstation.

Ben Regal Pump Station Condition Assessment

NAME OF PUMP STATION	Ben Regal Pumpstation
ADDRESS/LOCATION	Odendaalsrus
COORDINATES	27°52'51.86"S 26°39'45.51"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Ben Regal**	**116**	**0.043**	**Receives from a part of Eldorie and pumps into Odendaalsrus WWTW**	Two screw pumps,both operational

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate not locked
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump	1	None
	Number of Pumps		None
	Sump pump		None
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Ben Regal Pump Station Condition Assessment Pictures

Ben Regal Pump station

Sumps

Submersible pump being used for now.

Panel box fully operational

Ben Regal Pump station.

Big Frank Pump Station Condition Assessment

NAME OF PUMP STATION	Big Frank Pumpstation	
ADDRESS/LOCATION	Odendaalsrus	
COORDINATES	27°51'42.48"S	26°41'19.28"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Big Frank**	**883**	**0.761**	**Pumps sewer from Town and Industrial Area +Akasia + Athlea Outflow sewer to WWTW**	Two pumps but only one working

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate lockable
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	2	One working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	One missing
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	2	Good

Big Frank Pump Station Condition Assessment Pictures

Gate and concrete palisade fence

No keys to the gate, there are two pumps but only one working. The other pump does not have motors

Big Frank Pump Station

Bothaville Pump Station Condition Assessment

NAME OF PUMP STATION	Bothaville Pumpstation
ADDRESS/LOCATION	Odendaalsrus
COORDINATES	27°52'20.96"S 26°40'15.41"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Bothaville**	**82**	**0.053**	**Collects from portion of Hospital Park and pumps into Odendaalsrus WWTW**	Two pumps but only one working

	Description	Condition
INFRASTRUCTURE	Structural works	Bad
	AblutionFacilities	None
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Gate not locked
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	2	One working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	One missing
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	2	Good

Bothaville Pump Station Condition Assessment Pictures

Bothaville Pump station

Pump

Two pumps inside only one working.

Panel box fully operational.

Bothaville Pump station.

Eldorie Pump Station Condition Assessment

NAME OF PUMP STATION	Eldorie Pumpstation	
ADDRESS/LOCATION	Odendaalsrus	
COORDINATES	27°53'2.89"S	26°40'20.79"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Eldorie**	**2**	**0.069**	**Pumps into Ben Regal pump station**	Only submissable pump currently working

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump	1	Good
	Number of Pumps		N/A
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Eldorie Pump Station Condition Assessment Pictures

Eldorie Pump station, no gate

Only submersible pump currently not working

Eldorie Pump station.

Goudrief 1 Pump Station Condition Assessment

NAME OF PUMP STATION	Goudrift 1 Pumpstation	
ADDRESS/LOCATION	Odendaalsrus	
COORDINATES	27°52'5.10"S	26°39'43.88"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Goudrift 1**	**148**	**0.147**	**Collects from portion of Hospital Parkand pumps into Odendaalsrus WWTW**	Eldorie to Odendaalsrus

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	2	1 WORKING
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors	1	1 MISSING
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator	2	1 working

Goudrief 2 Pump Station Condition Assessment

NAME OF PUMP STATION	Goudrift 2 Pumpstation
ADDRESS/LOCATION	Odendaalsrus
COORDINATES	27°52'4.62"S 26°39'52.55"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Goudrift 2**	**149**	**0.113**	**Collects from portion of Hospital Park and pumps into Odendaalsrus WWTW**	Only submissable pump currently working

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump	1	Good
	Number of Pumps		N/A
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Goudrief 2 Pump Station Condition Assessment Pictures

Goudrift 2 Pump station

Pump

No pump, submersible used.

Submersible Pump 1

Submersible Pump.

Mimosa using a

Submersible Sump

Pump 2.

Panel fully operational.

Goudrift 2 Pump station.

Hospital Way Pump Station Condition Assessment

	NAME OF PUMP STATION	Powerweg Pumpstation			
	ADDRESS/LOCATION	Welkom			
	COORDINATES	28° 0'9.08"S	26°45'20.81"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Power road	2247	0.970	*Pumps to Theronia or can gravitate to Witpan*	Not operating

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	Lockable gate
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	0	No pumps
	Sump pump	0	No sump pumps
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Hospital Way Pump Station Condition Assessment Pictures

Mimosa Park Pump Station Condition Assessment

NAME OF PUMP STATION	Mimosa Pumpstation	
ADDRESS/LOCATION	Odendaalsrus	
COORDINATES	27°52'49.54"S	26°41'32.90"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Mimosa**	**No residents**		**Receives sewer from swimming pool and Mimosa Park and pumps into the nearby sewer line**	Two submissable pumps operating

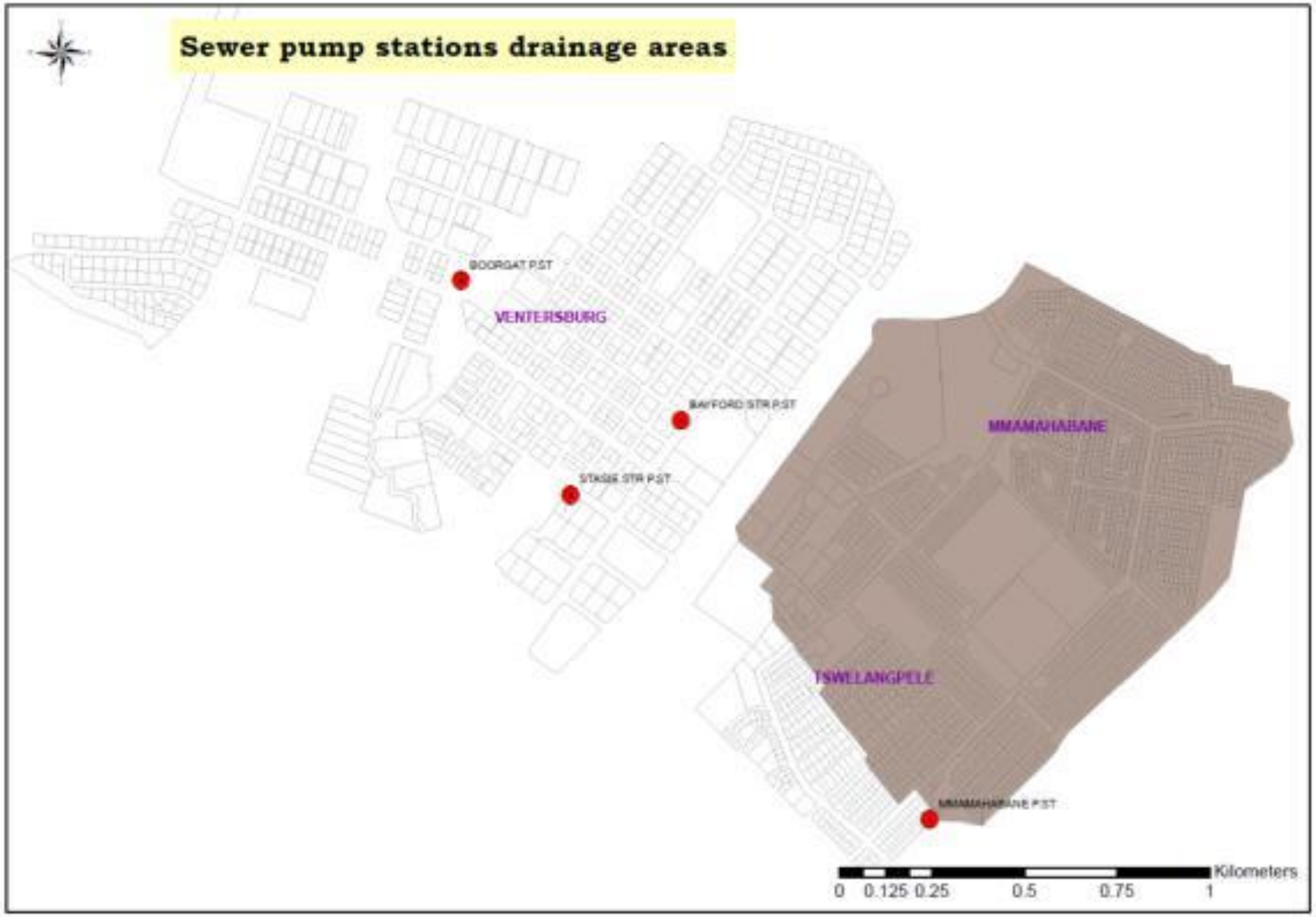
	Description	Condition
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	None
	Lockable Gate	None
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump	2	Good
	Number of Pumps		None
	Sump pump		None
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Ventersdorp Pump Stations Drainage Areas

Summary of pump stations

Ventersdorp Pump Stations Drainage Areas



Mmamahabane Pump Station Condition Assessment

NAME OF PUMP STATION	Mmamahabane Pumpstation	
ADDRESS/LOCATION	Ventersberg	
COORDINATES	28° 5'48.55"S	27° 8'42.25"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Mmamahabane Pumpstation**	**2264**	**1.953**	**Pumps into Mmamahabane WWTW**	Two screw pumps,both operational

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	Good
	Drinking water	Yes
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump	1	Good
	Number of Pumps	2	Good
	Sump pump	2	Good
	Extraction Fan		Good
	Auto Rake		Good
	Screen press		Good
	Muffle monster		Good
	Motors	2	Good
	Starter	2	Good
	Ultrasoninc	2	Good
	Flow Meter	2	Good
	Generator	2	Good

Mmamahabane Pump Station Condition Assessment Pictures

Screw pumps, fully operational

Both screw pumps working well

Mechanical screen fully operational

Manual screen, fully operational

Compactor, fully operational

Classifier, fully operational

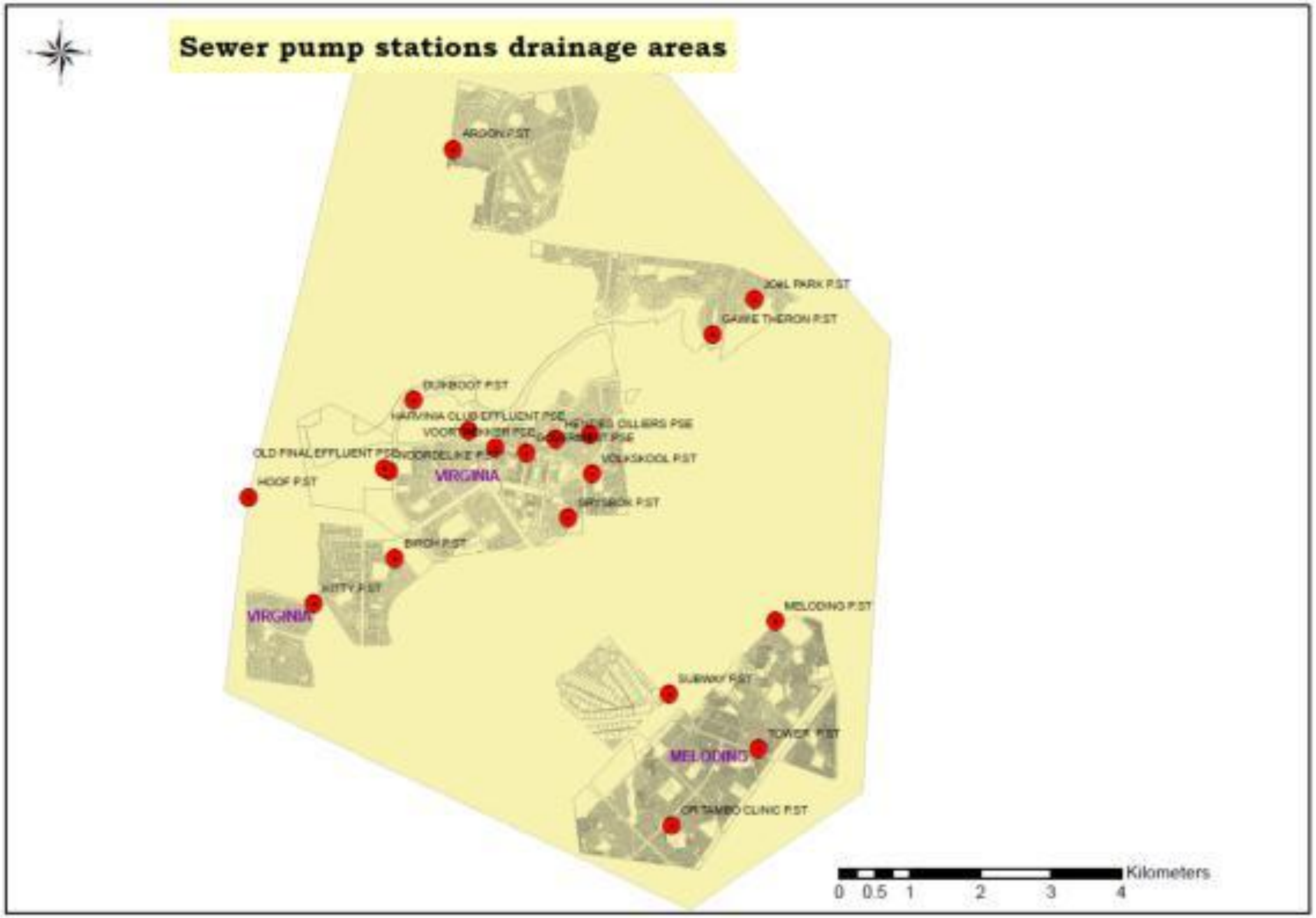
Small leakage at one booster pump

Overall view of mamahabane pump station

Mamahabane Pump Station

Virginia Sewer Pump Stations Drainage Areas

Virginia Sewer Pump Stations Drainage Areas



Argon Pump Station Condition Assessment

	NAME OF PUMP STATION	Argon Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 3'42.25"S	26°51'22.05"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Major**	**2164**	**0.949**	**Collects from the Southern part of Welkom,Verkeer,Power Road,Rhedeers Park,Phomolong Village and Western pump station and pump into the Theronia WWTW**	The pumpstation is currently not working mainly due to cable theft.

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	5	All not working
	Sump pump	0	
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Argon Pump Station Condition Assessment Pictures

Argon Pump station

Concrete palisade fencing not safe from vandalisers.

Rusted board cover

One temporary pump currently being used.

Argon Pump station.

Birch Pump Station Condition Assessment

	NAME OF PUMP STATION	Birch Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 6'58.95"S	26°50'53.41"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Birch**	**246**	**0.225**	**From Merriespruit and pump to Gravitition line**	There are 2 pumps,both pumps are currently operating

	Description	Condition
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	2	Good
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Birch Pump Station Condition Assessment Pictures

Overview of the pump station

Temporary pumps inside the manholes working

Broken concrete palisade fence

Birch Pump Station

Duikboot Pump Station Condition Assessment

NAME OF PUMP STATION	Duikeboot Pumpstation	
ADDRESS/LOCATION	Virginia	
COORDINATES	28° 5'41.78"S	26°51'10.71"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Duikboot**	**3**	**0.001**	**Receives from Sedibeng Water and Tikwe Lodge and pumps into the adjacent gravitition line**	One Pump currently operating,The second Pump is still to be installed

	Description	Condition
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Inside Tikwe
	Lockable Gate	None
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	1	Good
	Sump pump	1	Good
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

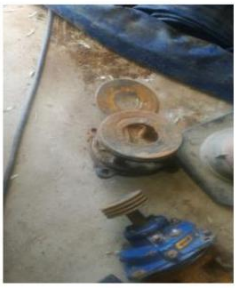
Duikboot Pump Station Condition Assessment Pictures

Pump station inside Tikwe lodge ,one pump functional.

Duikeboot Pump station

Grysbok Pump Station Condition Assessment Pictures

Main Entrance with lockable gate



Ware-plates missing in two pumps

Two assemblies missing in two pumps

Two pumps missing, housing assemblies and liners are not working.

Building entrance is in good condition

Switch board

Grysbok Pump station

Harvina Club Effluent Pump Station Condition Assessment

Harvinia pump station inside harvinia rugby club

Vandalism, motors stolen

Irrigation valves not functional

All electrical cable stolen

Harvinia Pump Station

Henties Cilliars Pump Station Condition Assessment Pictures

Completely vandalised

The building need to be demolished and reconstructed.

Nothing inside the vandalised building

No proper fencing around the vandalised building

Henties Cilliars Sport Gronde Pump station

Hoof Pump Station Condition Assessment

NAME OF PUMP STATION	Hoof Pumpstation		
ADDRESS/LOCATION	Virginia		
COORDINATES	28° 6'30.23"S	26°49'36.40"E	

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Birch**	**246**	**0.225**	**From Merriespruit and pump to Gravitition line**	There are 2 pumps,both pumps are currently operating

	Description	Condition
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	2	Good
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Hoof Pump Station Condition Assessment Pictures

Hoof Pump station

Mechanical screen not working

Concrete Palisade Fencing

Gate has fallen down

Inside the pumpstation, only one of the six pumps working

All the other ones need new motors

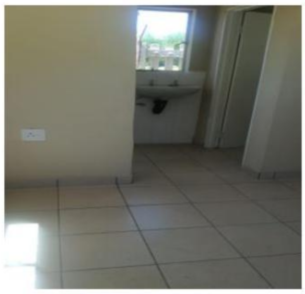
Burnt out motor

Hoof Pumpstation

Old motors stored in the same room, there is no store room

Some cables stolen due to vandalism

Thieves lift the roller door to gain access into the pump station.



Newly built pump guard room. Stolen cables.

Hoof Pump station (continued)

Kitty Pump Station Condition Assessment

	NAME OF PUMP STATION	Kitty Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 7'13.73"S		26°50'12.75"E	
	Drainage Area	**Stands**	**Inflow in Ml**	**Flow direction**	**Condition**
DRAINAGE AREA	**Birch**	**246**	**0.225**	**From Merriespruit and pump to Gravitition line**	There are 2 pumps,both pumps are currently operating

	Description	**Condition**
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	**Number**	**Condition**
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	2	Good
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Kitty Pump Station Condition Assessment Pictures

No power supply

No pump, electrical cable removed by contractor during the nearby road construction and have not replaced it.

Kitty Pump Station

Noordelike Pump Station Condition Assessment

	NAME OF PUMP STATION	Noordelike Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 6'21.68"S		26°50'52.89"E	
	Drainage Area	**Stands**	**Inflow in Ml**	**Flow direction**	**Condition**
DRAINAGE AREA	**Birch**	**246**	**0.225**	**From Merriespruit and pump to Gravitition line**	There are 2 pumps,both pumps are currently operating

	Description	**Condition**
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	**Number**	**Condition**
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	2	Good
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

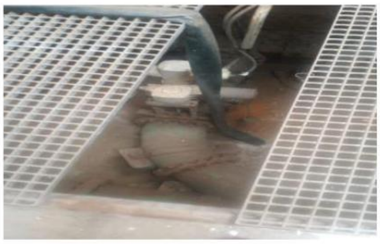
Noordelike Pump Station Condition Assessment Pictures

External view of the pump station

Inside of the pump station

Pumps inside, 1 out of 4 working

The 3 damaged pumps



Pipes damaged

Rusted pies removed

Noordelike Pump Station

Old Final Pump Station Condition Assessment

	NAME OF PUMP STATION	Old Final Effluent Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 6'19.21"S	26°50'52.65"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Birch**	**246**	**0.225**	**From Merriespruit and pump to Gravitition line**	There are 2 pumps,both pumps are currently operating

	Description	Condition
INFRASTRUCTURE	Structural works	None
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Good

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	2	Good
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Old Final Pump Station Condition Assessment


Windows vandalised


No door


Two pumps


One of the two pumps not working


Sump pump, fully operational

Old Final Effluent Pump Station

Voolkskool Pump Station Condition Assessment Pictures

Voolskol inside Virginia high school.

Vandalised switch box for booster pumps

Pump not operating

No motors, pump stolen and vandalised

Voolskol Pump station

Gawie Theron Pump Station Condition Assessment

NAME OF PUMP STATION	Gawie Theron Pumpstation	
ADDRESS/LOCATION	Virginia	
COORDINATES	28° 5'9.11"S	26°53'37.84"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Major**	**2164**	**0.949**	**Collects from the Southern part of Welkom,Verkeer,Power Road,Rhedeers Park,Phomolong Village and Western pump station and pump into the Theronia WWTW**	The pumpstation is currently not working mainly due to cable theft.

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	5	All not working
	Sump pump	0	
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Gawie Theron Pump Station Condition Assessment Pictures

Lockable gate.

Stolen cable from the Distribution board

Cable stolen from arm system

Valve Chamber fully operational

One pump operating, the other pump is missing

pump station currently operating with one pump

Gawie Theron Pump Station

Joel Park Pump Station Condition Assessment

NAME OF PUMP STATION	Joel Park Pumpstation
ADDRESS/LOCATION	Virginia
COORDINATES	28° 5'0.01"S 26°54'18.29"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Major**	**2164**	**0.949**	**Collects from the Southern part of Welkom,Verkeer,Power Road,Rhedeers Park,Phomolong Village and Western pump station and pump into the Theronia WWTW**	The pumpstation is currently not working mainly due to cable theft.

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	5	All not working
	Sump pump	0	
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Joel Park Pump Station Condition Assessment Pictures

Valves, fully operational

Board still new, fully operational

2 pump inside, the other pump not working

Concrete palisade fencing

Lockable gate at Joel Park

Joel Park Pump Station

Meloding Pump Station Condition Assessment

Meloding Pump Station Condition Assessment Pictures

Pump station has not been functional for the past 5 months

No power supply, no clean water and no sewer

Panel missing, currently using the two panel boxes

Guardroom to be fenced with the pump area

Motor and assembling missing in pump 4

Meloding Pump Station WWTW

Subway Pump Station Condition Assessment

	NAME OF PUMP STATION	Subway Pumpstation			
	ADDRESS/LOCATION	Virginia			
	COORDINATES	28° 8'8.25"S	26°53'18.22"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Subway			Pumps stormwater and ground water	No pumps and currently not operating mainly due to vandalism

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	None
	Lockable Gate	None
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	0	No pumps
	Sump pump		N/A
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press		N/A
	Muffle monster		N/A
	Motors		N/A
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator		N/A

Subway Pump Station Condition Assessment Pictures

Subway Pump station

Side view, station vandalised

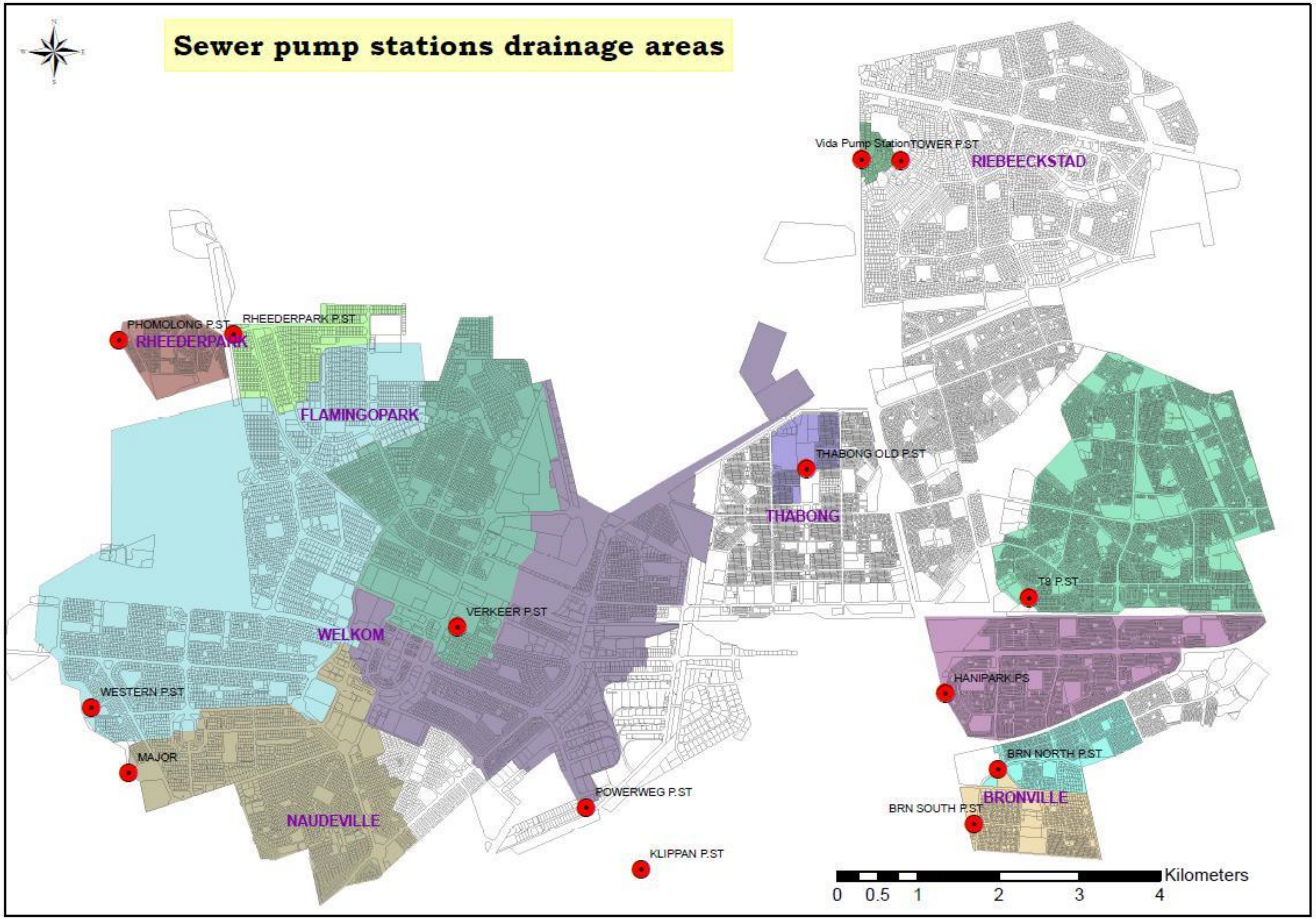
No pumps and DBS.

Vandalised not working

Subway Pump station currently not working.

Welkom Pump Stations Drainage Areas

Welkom Pump Stations Drainage Areas



Vida Pump Station Condition Assessment

	NAME OF PUMP STATION	Vida Pumpstation			
	ADDRESS/LOCATION	Welkom			
	COORDINATES	27°55'31.89"S	26°47'49.33"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Vida**	**945**	**0.03**	**From Western Part of Riebeckstad and pump into Riebecksad sewerage network**	One out of three pumps working

	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	3	1 working
	Sump pump	1	good
	Extraction Fan		N/A
	Auto Rake	1	Good
	Screen press	1	Good
	Muffle monster	1	Good
	Motors	1	Good
	Starter	1	Good
	Ultrasoninc	1	Good
	Flow Meter	1	Good
	Generator	1	Good

Vida Pump Station Condition Assessment Pictures

The pump station does not have a gate

1/3 pump working, the other two pumps are not working, no motors and rotation assemblies

Panel, fully operational

Lockable door

Vida Pump Station

T8 Pump Station Condition Assessment

NAME OF PUMP STATION	Thabong T8 Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	27°58'26.76"S 26°49'3.24"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	T8	14716	7.84	Main out fall - Thabong	All 3 pumps working.Pumpstation currently being expanded

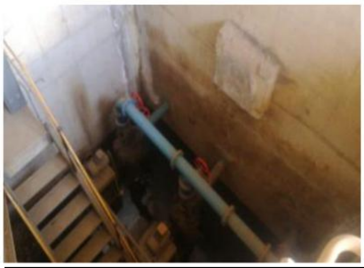
	Description	Condition
INFRASTRUCTURE	Structural works	Good
	AblutionFacilities	Good
	Drinking water	Good
	Fenced	Yes
	Lockable Gate	Yes
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		N/A
	Number of Pumps	3	Good
	Sump pump	3	Good
	Extraction Fan		N/A
	Auto Rake		N/A
	Screen press	3	Good
	Muffle monster		N/A
	Motors	3	Good
	Starter		N/A
	Ultrasoninc		N/A
	Flow Meter		N/A
	Generator	3	Good

T8 Pump Station Condition Assessment Pictures

Thabong T8 pump station gate

Old sumps



Old pumps area

Under construction, plant being expanded increase the capacity

All 3 pumps working

Channel to sumps

Thabong T8Pump Station

Hani Park Pump Station Condition Assessment

NAME OF PUMP STATION	Hanipark Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	27°59'6.99"S 26°48'26.69"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Hani Park	5126	2.865	*Hani Park to Thabong WWTW*	No pumps in this station.Lots of flooding in the facility

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	No gate
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	0	No pumps
	Sump pump	0	No sump pumps
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Hani Park Pump Station Condition Assessment Pictures

Hani Park Pump station

No gate

Sumps

Inside it is full of water and no pumps

Hani Park Pump station

Bronville North Pump Station Condition Assessment

	NAME OF PUMP STATION	Bronville North Pumpstation			
	ADDRESS/LOCATION	Welkom			
	COORDINATES	27°59'43.22"S	26°48'46.39"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Bronville North	2247	1.013	*Pumps to Main outfall to Witpan WWTW*	1 OUT OF 3 PUMPS WORKING

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	No gate
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	3	1 WORKING
	Sump pump	3	Poor
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	Good
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	1	Good

Bronville North Pump Station Condition Assessment Pictures

Bronville North Pump station

Lockable gate

Sumps

Vandalised Guard room

Three pumps but only one working, the other two are still under maintenance.

Bronville North Pump station.

Bronville South Pump Station Condition Assessment Form

NAME OF PUMP STATION	Bronville South Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	27°59'55.01"S / 26°48'39.81"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Broville South	5126	2.865	*Pumps to Main outfall to Witpan WWTW*	1 OUT OF 3 PUMPS WORKING

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	No gate
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	3	1 WORKING
	Sump pump	3	Poor
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	Good
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	1	Good

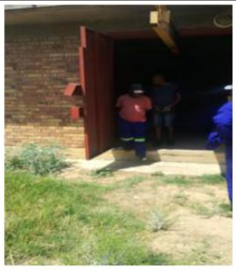
Bronville South Pump Station Condition Assessment Pictures

Bronville South Pump station

Three sumps

Only one pump working, the other two are under construction

Panel fully operational



Lockable door

No gate and door to Guard room

Bronville South Pump station is working with one pump.

Powerweg Pump Station Condition Assessment

NAME OF PUMP STATION	Powerweg Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	28° 0'9.08"S | 26°45'20.81"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Power road	2247	0.970	*Pumps to Theronia or can gravitate to Witpan*	Not operating

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	Lockable gate
	Electrical Supply	None

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	0	No pumps
	Sump pump	0	No sump pumps
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Powerweg Pump Station Condition Assessment Pictures

Power weg pump station

Not operating and no access

Powerweg Pump Station

Klippan Pump Station Condition Assessment

	NAME OF PUMP STATION	Klippan Pumpstation			
	ADDRESS/LOCATION	Welkom			
	COORDINATES	28° 0'4.81"S	26°45'55.30"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Klippan	5126	2.865	*Hani Park to Thabong WWTW*	No pumps in this station.Lots of flooding in the facility

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	God
	Lockable Gate	No gate
	Electrical Supply	None

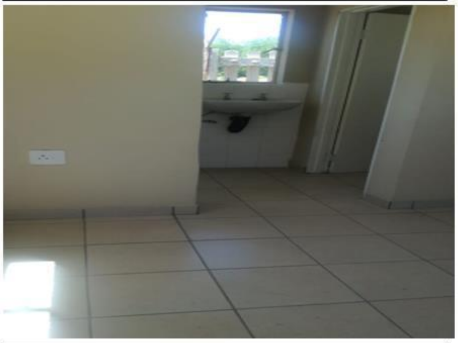
	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	0	No pumps
	Sump pump	0	No sump pumps
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Klippan Station Condition Assessment Pictures

Klippan Pumpstation

No key, no pumps inside. Contractor to do refurbishment on this Pump station

Thieves lift the roller door to gain access into the station



Newly built pump guard room. Stolen cables.

Klippan Pumpstation currently not working

Phomolong Pump Station Condition Assessment

NAME OF PUMP STATION	Phomolong Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	27°56'42.35"S 26°42'16.35"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Phomolong**	**945**	**0.484**	**From Phomolong village and pump into RheedersPark Pump station**	One out of three pumps currently operating.Lots of flooding in the facility

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	3	1 working
	Sump pump	1	good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	2	good
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	1	good

Phomolong Pump Station Condition Assessment Pictures

Phomolong Pump station

Buildings in poor condition.

Pump 1 fully operational

Pump 2 fully operational

Phomolong Pump station

Rheeder Park Pump Station Condition Assessment

NAME OF PUMP STATION	Rheederpark Pumpstation	
ADDRESS/LOCATION	Welkom	
COORDINATES	27°56'39.37"S	26°43'3.70"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Rheederspark**	**649**	**0.277**	**North Part of Rheederspark to Major**	One out of 3 pumps currently operating

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	3	2 not working
	Sump pump	1	Good
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	3	1 working
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator	1	Good

Rheeder Park Pump Station Condition Assessment Pictures

Rheederpark pump station

entrance

Cable theft

2 pumps not working, no rotation assemblies and motors

Rheederpark Pump Station

Major Pump Station Condition Assessment

NAME OF PUMP STATION	Major Pumpstation
ADDRESS/LOCATION	Welkom
COORDINATES	27°59'38.28"S 26°42'16.05"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Major**	**2164**	**0.949**	**Collects from the Southern part of Welkom,Verkeer,Power Road,Rhedeers Park,Phomolong Village and Western pump station and pump into the Theronia WWTW**	The pumpstation is currently not working mainly due to cable theft.

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		
	Number of Pumps	5	All not working
	Sump pump	0	
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Major Pump Station Condition Assessment Pictures

Major pump station not operational due to cable theft

Cable theft at the pump station

Flooded sump

Only 2/5 pumps were operating

Cable theft at the panel

More cable theft

Major Pump Station

Verkeer/Traffic Pump Station Condition Assessment

NAME OF PUMP STATION	Verkeer Pumpstation	
ADDRESS/LOCATION	Welkom	
COORDINATES	27°58'38.07"S	26°44'43.96"E

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	Verkeer /Traffic	2178	0.881	*Pumps to Major pumpstation and then pumped into*	One out of 3 pumps oprating

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Good
	Lockable Gate	Good
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps	3	1 working
	Sump pump		None
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors	1	2 motors missing
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Verkeer/Traffic Pump Station Condition Assessment Pictures

Verkeer Pump Station

Building entrance

3 pumps, only 1 pump working, the other 2 do not have motors

Old motors

Old motors

Sump area

Verkeer/Traffic Pump Station

Western Pump Station Condition Assessment

	NAME OF PUMP STATION	Western Pumpstation			
	ADDRESS/LOCATION	Welkom			
	COORDINATES	27°59'11.50"S	26°41'59.65"E		

	Drainage Area	Stands	Inflow in Ml	Flow direction	Condition
DRAINAGE AREA	**Western**	**4058**	**2.067**	**South part of Welkom to Major**	Pumpstation currently not operating.Lots of flooding in and around the facility

	Description	Condition
INFRASTRUCTURE	Structural works	Poor
	AblutionFacilities	None
	Drinking water	None
	Fenced	Yes
	Lockable Gate	No gate
	Electrical Supply	Yes

	Description	Number	Condition
PUMP STATION COMPONENTS	Submersible pump		None
	Number of Pumps		None
	Sump pump		None
	Extraction Fan		None
	Auto Rake		None
	Screen press		None
	Muffle monster		None
	Motors		None
	Starter		None
	Ultrasoninc		None
	Flow Meter		None
	Generator		None

Western Pump Station Condition Assessment Pictures

Western pump station

Pump station sumps not working

Flooding inside the pump station

Lots of flooding, pump station not working

Lots of cable theft has occurred here

Western Pump Station

Summary of Pump Stations Needs and Gaps

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
1	Phomolong Pump Station	Rheederspark	There are two pumps, both working properly	No toilet	No guard house	No security	• Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
2	Rheederspark Pump Station	Rheederspark	There are 3 pumps and only 1 is currently working	No toilet	No guard house	No security	• Repairs of 2 pumps • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
3	Vida Pump Station	Riebeeckstad	There are 3 pumps and only 1 is currently working	No toilet	No guard house	No security	• Repairs of 2 pumps, with motors, panel to be repaired • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
4	Western Pump Station	Lakeview Pump station Challenges are the pump station are currently inside the water and getting flooded weekly leaving it to out of operation.	Pump station currently not operating. Lots of flooding in and around the facility	No toilet	No guard house	No security	• Repairs electrical panel • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station • Pump station needs to be relocated. •

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
5	Major Pump Station	St. Helena	The pump station is currently not working mainly due to cable theft	No toilet on site	guard completed	Security On side (MBV not on side due to non-payments) Needs armed response	• Repairs of pumps, repair panel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
6	Old Traffic Pump Station	Doorn	There are 3 pumps and only 1 is currently working Pump station Needs to be refurbished. Challenges with sand entering the pump station.	There is toilet on site	No guardhouse To be build	No security	• Repairs of 2 pumps • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
7	Power Road Pump Station	Industrial Area	Pump station not operating	No toilet on site	No guard house	No security	• Repairs of pumps • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
8	Klippan Pump Station	Witpan	No pumps in this station, lots of flooding in the facility	None	None	1 Guard per shift	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights
9	Bronville North Pump Station	Bronville	There are 3 pumps, only one is currently working	No Toilets on side	Construction of guard house with ablution facilities completed	Security On side (MBV no security on side due to non-payments)	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
10	Bronville South Pump Station	Bronville	There are 3 pumps and only one is working	None	Construction of guard house with ablution facilities completed	Security On side (MBV no security on side due to non-payments)	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
11	Hanipark Pump Station	Hani Park	No pumps in this station. Lots of flooding in the facility	None	None	2 guards per shift	• Repairs of pumps with motors • Electrical panel • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
12	T8 Pump Station	Thabong	There are 3 pumps and all are working. Pump station currently being expanded	Yes in guard room	yes	Security on side	• Pumps are old and worn but are operating, needs to be replace. • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
13	Old Thabong Pump Station	Thabong	One out of three pumps working	None	No guard house	No guard	• Repairs on pumps • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
14	Voelpan Pump Station	Allanridge	There are 2 pumps and only 1 is currently working	No toilet	No guard house	No security	• Repairs of 1 pump • Screens not in operation

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
14 a	Managers Pump Station	Allanridge	No pumps – emptied weekly with external pump	No toilet	No guard house	No security	• Install automated pumps
14 b	Shopping complex Pump Station	Allanridge	No pumps – emptied weekly with external pump	No toilet	No guard house	No security	• Install automated pumps
14 c	Ext 3 pump station	Allanridge	Totally vandalized – including electrical supply - emptied weekly with external pump	No toilet	No guard house	No security	• Refurbish pump station • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights
15	Nyakallong Main Pump Station	Nyakallong	There are 3 pumps and only 1 is currently working	No toilet	No guard house	No security	• Repairs of 2 pumps • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station •
16	Mmamahabane Pump Station	Mmamahabane	Two screw pumps, both operational	No toilet	No guard house	No security	• Construction of guard house with ablution facilities

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
							•
17	Big Frank Pump Station	Odendaalsrus	There are 2 pumps and only 1 is currently working	No toilet	No guard house	Security On side	• Repairs of 1 pump • Need cables • Construction of guard house with ablution facilities • Placing of security personnel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
18	Small Frank Pump Station	Odendaalsrus	There is one pump and currently not working	No toilet	No guard house	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station. need grits
19	Goudrif 2 Pump Station	Odendaalsrus	There is 1 pump and is working New pump was installed in march 2018	No toilet	No guard house	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
20	Goudrif 1 Pump Station	Odendaalsrus	There are 2 pumps and only 1 working Pump station is old, need structural repairs	No toilet but not needed	No guard house but not needed	No security	• Pump standing. • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
21	Bothaville Pump Station	Odendaalsrus	There are 2 pumps and only one is working	No toilet	No guard house	No security	• Cables was stolen • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
22	Hospital Pump Station	Odendaalsrus	There are 2 pumps, 1 is working	No toilet	No guard	No security	• pump Need motor • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
AA	Althea Pump Station	Odendaalsrus	One pump working, the other pump doesn't have motor	No toilet but not needed	No guard house but not needed	No security	• pump Need motor • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights
23	Akasia Pump Station	Odendaalsrus	Two pumps, only one operating	No toilet	No guard house	No security	• Need electrical motor • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
24	Aldorie Pump Station	Odendaalsrus	Structure damaged. New pump station to be build	No toilet but not needed	No guard house but not needed	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
25	Ben Regal	Odendaalsrus	Two screw pumps, both operational	No toilet	No guard house	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
26	Whites Pump Station	Whites	Pump station out of operation due to non-functioning of Whites WWTW Septic tank system to be installed.	None	None	No security	• Refurbishment of WWTW • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
27	Henneman Main Pump Station	Henneman	There are 2 pumps and only 1 is working. Building needs to be repaired, panel to be replaced Sump to be cleaned	No toilet but not needed	No guard house but not needed	No security	• Repairs of 1 pump • Panel to be replaced • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
28	Hertzog Pump Station	Henneman	One pump fully operational	No toilet	No guard house	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
29	Henneman Tyre Services Pump Station	Henneman	There are 2 pumps and only 1 is working	No toilet but not needed	No guard house but not needed	No security	• Repairs of 1 pump • Repair of panel • Installation of security fence with sensors •

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
30	Basil Read Pump Station	Phomolong construction	No pumps. Pumps taken to sky range	No toilet	No guard house	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
31	Sky Range Pump Station	Phomolong	Two screw pumps, both working very well	There are toilets on side	Yes	No security	• Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
32	Gawie Theron Pump Station	Virginia	There are 2 pumps and only 1 is working	No toilet but not needed	No guard house but not needed	No security	• Repairs of 1 pump • Need new submersible pump • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
33	Argon Pump Station	Virginia	There are 2 pumps and only 1 is working	No toilet but not needed	No guard house but not needed	No security	• Repairs of 1 pump • Installation of security fence with sensors connected to alarm system • Armed response

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
							•
34	Duikboot Pump Station	Virginia	One pump currently operating, the second pump still to be installed	No toilet	No guard house	Pump Station inside Tikwe Lodge premises, security provided by the Lodge.	• Repairs of 1 pump • Need electrical panel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station •
35	Kitty Pump Station	Virginia	There are 2 pumps and only 1 is working No electrical supply to the pump station	No toilet but not needed	No guard house but not needed	No security	• Repairs of 1 ting at pump station • Replace ever • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
36	Meloding Pump Station	Meloding	There are 6 pumps and only 3 is working	There is toilet on site	New guard house	No security	• Repairs of 3 pumps • Need new complete panel • Construction of guard house • Placing of security guard • Installation of security fence with sensors connected to alarm system

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
37	Subway Pump Station	Meloding	No pumps and currently not operating mainly due to vandalism	No toilet	No guard house	No security	• Need pipework • Need panel • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
38	Hoof Pump Station	Virginia	There are 6 pumps and only 2 is working	No toilet	No guard	2 guards per day shift 4 guards per night shift	• Repairs of 4 pumps • Fans to be repaired • Repairs on electrical panel • Need sump pumps • Construction of guard house with ablution facilities • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
39	Birch Pump Station	Virginia	There are 2 pumps, both pumps are currently operating	No toilet	No guard house	No security	• Repair electrical panel • Installation of security fence with sensors connected to alarm system • Armed response •

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
40	Old Final Pump Station	Virginia	There are 3 pumps and only 1 is working	No toilet	No guard house	No security	• Repairs of 2 pumps • Repair electrical panel • Construction of guard house with ablution facilities • Placing of security guard • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • 3 pumps to be replaced • Panel to be repaired • Grass cutting around the pump station
	Northern Pump Station	Virginia	There are 4 pumps and only 1 is working				
41	Grysbok Pump Station	Virginia	There are 3 pumps and only 2 is working	There is toilet on site	Construction of guard house to be completed by end March	No security	• Repairs of 1 pumps • Placing of security guard • Installation of security fence with sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
42	Harvinia Effluent Pump Station	Harvinia Club, Virginia	The Pump Station is operated and maintained by the club for use of purified effluent	No toilet but not needed	No guard house but not needed	No security guard but not needed	• Installation of sensors connected to alarm system

NUMBER	NAME OF PUMP STATION	LOCATION	FUNCTIONALITY	ABLUTION FACILITIES	GUARD HOUSE	SECURITY	RECOMMENDATION
43	Hentie Cilliers Effluent Pump Station	Hentie Cilliers School Grounds, Virginia	The Pump Station is operated and maintained by the school for use of purified effluent	No toilet but not needed	No guard house but not needed	No security guard but not needed	• Installation of sensors connected to alarm system
44	Hentie Cilliers Effluent Pump Station	Hentie Cilliers Sports Grounds, Virginia	The Pump Station is operated and maintained by the school for use of purified effluent Totally vandalized	No toilet but not needed	No guard house but not needed	No security guard but not needed	• Installation of sensors connected to alarm system • Totally vandalized
45	Volskool Effluent Pump Station	Volkskool School Grounds, Virginia	The Pump Station is operated and maintained by the school for use of purified effluent	No toilet but not needed	No guard house but not needed	No security guard but not needed	• Installation of sensors connected to alarm system
46	Voortrekker Effluent Pump Station	Virginia	There is 1 pump at purification works	No toilet but not needed	No guard house but not needed	No security needed	• Installation of sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station
47	Government Effluent Pump Station	Virginia	No water supply due to no pump at purification works	No toilet but not needed	No guard house but not needed	No security needed	• Installation of sensors connected to alarm system • Armed response • Installation of security lights • Grass cutting around the pump station

5.2 Future demand, needs and challenges

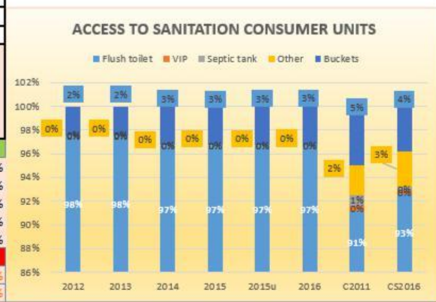
5.2.1 Levels of service

Sanitation Level of Service and Backlog

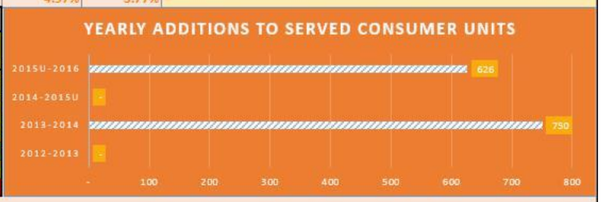
The **Table 5.2.1** below shows the statistics for access to sanitation for the Matjhabeng Municipality for various years

Table 5.2.1: Access to Sanitation for Matjhabeng Local Municipality

NON-FINANCIAL CENSUS OF MUNICIPALITIES - CONSUMER UNITS							HOUSEHOLDS	
ACCESS TO SANITATION CONSUMER UNITS							CENSUS	CS2016
	Select year							
Sanitation servi	2012	2013	2014	2015	2015u	2016	C2011	CS2016
Flush toilet	80 101	80 101	80 734	80 734	80 734	81 360	99 912	126 135
VIP	-	-	-	-	-	-	537	413
Septic tank	32	32	32	32	32	32	1 002	383
Other	-	-	-	-	-	-	2 726	4 141
Buckets	2 000	2 000	2 750	2 750	2 750	2 750	5 448	5 141
Total Served	80 133	80 133	80 766	80 766	80 766	81 392	104 177	131 072
Flush toilet	98%	98%	97%	97%	97%	97%	91%	93%
VIP	0%	0%	0%	0%	0%	0%	0%	0%
Septic tank	0%	0%	0%	0%	0%	0%	1%	0%
Other	0%	0%	0%	0%	0%	0%	2%	3%
Buckets	2%	2%	3%	3%	3%	3%	5%	4%
Total Backlog	2 000	2 000	2 750	2 750	2 750	2 750	5 448	5 141
% Served	97.56%	97.56%	96.71%	96.71%	96.71%	96.73%	95.03%	96.23%
% backlog	2.44%	2.44%	3.29%	3.29%	3.29%	3.27%	4.97%	3.77%



Yearly additions to consumer units						Households
Level of Service	2012-2013	2013-2014	2014-2015u	2015u-2016	Sparkline	(2016-2011)/a
Flush toilet	-	750	-	626		5 245
VIP	-	750	-	-		-25
Septic tank	-	750	-	-		-124
Other	-	750	-	-		283
Served	-	750	-	626		5 379
Buckets	-	750	-	-		-61
Backlog	-	750	-	-		5 318



The **Table 5.2.1** shows that the number of household units with flush toilets was 80 101 in 2012 and 2013. This figure increased to 80 734 in 2014 and stayed the same in 2015. In 2016 there was an increase to 81 360.

No households with VIP toilets recorded for 2012 to 2016. The number of septic tanks has remained the same at 32 between 2012 and 2016.

Two thousands households used the bucket system in 2012 and 2013. The number increased to 2750 in 2014 and stayed the same even in 2016.

The increase in the number of households that use the bucket system increases the backlog. Furthermore, it means a reduction in the percentage number of households with flush toilets.

5.2.2 Load Reduction

Flow varies during the 24 hour day. There is a diurnal variation over 24 hours and variation during wet and dry conditions. Also, infiltration of groundwater and ingress of surface stormwater into the sewerage system will affect the rate of flow significantly. Hence flow recording during both wet and dry weather conditions is necessary to establish peak factors. The influent to a WWTW has wide diurnal cyclic variation, both in flow rate and concentration (COD, TKN) also known as the strength. As a result, the load rate, which is the product of flow rate and concentration invariably varies over 24hrs as well.
Wastewaters can have a wide range of strengths and varying characteristics depending on their origin. These include factors such as population size and income levels; sewer layout, lengths and gradients; climatic and seasonal effects. Furthermore, wastewater characteristics can be divided into three main categories, namely, the concentration of oxidisable organic material, or substrate; the concentration of nutrients present and the solids concentration.

However, despite the many influencing factors, generally it is found that the combined effect gives rise to influent flow and load rate patterns that are similar for most plants.
Typically, the flow rate reaches a maximum, at some time during the day, of about two times the average daily rate, and a minimum sometime during the night of about half the average rate. The influent COD and TKN concentrations show a similar pattern of behaviour, virtually in phase with the flow variations. As a result, the diurnal cyclic load rate variation can range from four to six times to less than a quarter of the average daily value.

Daily cyclic variations in flow and load rates impact on the design, performance and operation of WWTW. For example:

- The effect of variable input patterns on plant design generally is one of increased capital costs; for example, since the settling tanks and hydraulic connections must be designed to cope with the peak flow rate. Furthermore, the aeration capacity must be designed to cope with the peak oxygenation rate requirement set by the peak load rate.
- Peak loads and flows may cause "overloading" of the reactive capacity of the organism mass or the physical design provisions thereby affecting WWTW performance.
- The inadequate oxygenation during peak load period may lead to deterioration in nitrification efficiency thereby affecting the properties of the settling liquor.
- Diurnal cyclic variations in load rate necessitate that the aeration rate be adjusted accordingly, to limit over aeration ·and to prevent under-aeration.

There are generally two approaches in practice for load reduction. Namely, in-plant control and equalization control.

In-plant control, each treatment unit is controlled separately in such a way that the effects of the cyclic inputs are adequately accommodated. As a result, no attempt is made to attenuate variations in influent flow and load rate prior to each reaching the various plant units.
The In-plant control approach relies heavily on the operators and consequently the availability of skilled personnel.

On the other hand, equalization control involves the regulating influent flow and load rates to relatively constant values upstream of the biological process and in turn simplifying reducing the control requirements within the plant.
The advantages of this approach is that the measure of control still necessary in the process can be performed by manual means at infrequent intervals or by using simple equipment.

The equalization involves the installation of a balancing or equalization tank at the treatment plant upstream of the biological process. This will allow for the cyclic input of flow and load to enter the tank thereby attenuating fluctuations in both flow and load.

Based on the ongoing discussion, it is recommended that balancing or equalization tanks be installed as means of load reduction.

5.2.3 Bulk Collection and Processing

This section focusses on the projected sewer demands for each WWTW vs the Design Capacity for each plant. It also shows which year the Design capacity is expected to be exceeded and upgrades will be required.

Future Projected Volumes

Table 5.2.2 below summarises the Projected Capacity Volumes required for Allanridge Wastewater Treatment Plant as per the estimated increase in population.

Table 5.2.2: **Projected Capacity Volumes required for Allanridge WWTW**

Allanridge			
Design Capacity = 4ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	Remarks
2018	3,3	0,8	Design Capacity not Exceeded
2019	3,5	0,9	Design Capacity not Exceeded
2020	3,8	1,0	Design Capacity not Exceeded
2021	4,1	1,0	Design Capacity Exceeded
2022	4,3	1,1	Design Capacity Exceeded
2023	4,4	1,1	Design Capacity Exceeded
2024	4,6	1,2	Design Capacity Exceeded
2025	4,9	1,2	Design Capacity Exceeded
2026	5,2	1,3	Design Capacity Exceeded
2027	5,4	1,4	Design Capacity Exceeded
2028	6,0	1,5	Design Capacity Exceeded
2029	6,0	1,5	Design Capacity Exceeded

Allanridge WWTW will operate at full capacity by 2021.Therefore upgrades need to happen now in to expand the facility to 6 ML/day and this will be sufficient until the year 2029.

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Ondendaalsrus Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Ondendaalsrus WWTW will not be exceeded by 2029.

Table 5.2.3: Projected Capacity Volumes required for Ondendaalsrus WWTW

Odendaalsrus			
Design Capacity =6 ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	2,4	0,4	Design Capacity not Exceeded
2019	2,6	0,7	Design Capacity not Exceeded
2020	2,8	0,5	Design Capacity not Exceeded
2021	3,0	0,5	Design Capacity not Exceeded
2022	3,2	0,5	Design Capacity not Exceeded
2023	3,4	0,6	Design Capacity not Exceeded
2024	3,6	0,6	Design Capacity not Exceeded
2025	3,8	0,6	Design Capacity not Exceeded
2026	4,0	0,7	Design Capacity not Exceeded
2027	4,1	0,7	Design Capacity not Exceeded
2028	4,3	0,7	Design Capacity not Exceeded
2029	4,5	0,8	Design Capacity not Exceeded

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Kutlwanong Wastewater Treatment Plant as per the estimated increase in population.

Table 5.2.4: Projected Capacity Volumes required for Kutlwanong WWTW

Kutlwanong			
Design Capacity = 6ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	7,8	1,3	Design Capacity Exceeded
2019	8,4	1,4	Design Capacity Exceeded
2020	9,0	1,5	Design Capacity Exceeded
2021	9,6	1,6	Design Capacity Exceeded
2022	10,3	1,7	Design Capacity Exceeded
2023	10,9	1,8	Design Capacity Exceeded
2024	11,5	1,9	Design Capacity Exceeded
2025	12,1	2,0	Design Capacity Exceeded
2026	12,7	2,1	Design Capacity Exceeded
2027	13,3	2,2	Design Capacity Exceeded
2028	14,0	2,3	Design Capacity Exceeded
2029	14,6	2,4	Design Capacity Exceeded

This facility will require immediate upgrade. It will need to cater for 14,6 ML/day by 2029.This can be achieved by providing additional 5,5 ML/day that can be sufficient until 2024.A further 3,1 ML/day will be required in 2024 to cater for the demand up to 2029.

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Theronia Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Theronia WWTW will not be exceeded by 2029.

Table 5.2.5: Projected Capacity Volumes required for Theronia WWTW

Theronia			
Design Capacity = 27ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	10,5	0,4	Design Capacity not Exceeded
2019	11,4	0,4	Design Capacity not Exceeded
2020	12,2	0,5	Design Capacity not Exceeded
2021	13,0	0,5	Design Capacity not Exceeded
2022	13,9	0,5	Design Capacity not Exceeded
2023	14,7	0,5	Design Capacity not Exceeded
2024	15,5	0,6	Design Capacity not Exceeded
2025	16,4	0,6	Design Capacity not Exceeded
2026	17,2	0,6	Design Capacity not Exceeded
2027	18,0	0,7	Design Capacity not Exceeded
2028	18,9	0,7	Design Capacity not Exceeded
2029	19,7	0,7	Design Capacity not Exceeded

Theronia WWTW is currently being upgraded, but to only 9ML/d and not to 27 ML/d as per its original design capacity. Based on the figures above, 9ML/d will not be sufficient for current demand.

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Witpan Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Witpan WWTW has already been exceeded. Upgrades are required.

Table 5.2.6: Projected Capacity Volumes required for Witpan WWTW

Witpan			
Design Capacity = 12ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	25,7	2,1	Design Capacity Exceeded
2019	15,9	1,3	Design Capacity Exceeded
2020	18,0	1,5	Design Capacity Exceeded
2021	20,2	1,7	Design Capacity Exceeded
2022	22,4	1,9	Design Capacity Exceeded
2023	24,5	2,0	Design Capacity Exceeded
2024	26,7	2,2	Design Capacity Exceeded
2025	28,8	2,4	Design Capacity Exceeded
2026	31,0	2,6	Design Capacity Exceeded
2027	33,1	2,8	Design Capacity Exceeded
2028	35,3	2,9	Design Capacity Exceeded
2029	37,5	3,1	Design Capacity Exceeded

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Thabong Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Thabong WWTW has already been exceeded. Upgrades are required.

Table 5.2.7: Projected Capacity Volumes required for Thabong WWTW

Thabong			
Design Capacity = 12ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	21,1	1,8	Design Capacity Exceeded
2019	34,8	2,9	Design Capacity Exceeded
2020	36,6	3,1	Design Capacity Exceeded
2021	38,4	3,2	Design Capacity Exceeded
2022	40,2	3,4	Design Capacity Exceeded
2023	42,0	3,5	Design Capacity Exceeded
2024	43,8	3,6	Design Capacity Exceeded
2025	45,6	3,8	Design Capacity Exceeded
2026	47,4	3,9	Design Capacity Exceeded
2027	49,1	4,1	Design Capacity Exceeded
2028	50,9	4,2	Design Capacity Exceeded
2029	52,7	4,4	Design Capacity Exceeded

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Virginia Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Virginia WWTW will not be exceeded by 2029.

Table 5.2.8: Projected Capacity Volumes required for Virginia WWTW

Virginia			
Design Capacity = 26ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	11,0	0,4	Design Capacity not Exceeded
2019	11,9	0,5	Design Capacity not Exceeded
2020	12,8	0,5	Design Capacity not Exceeded
2021	13,6	0,5	Design Capacity not Exceeded
2022	14,5	0,6	Design Capacity not Exceeded
2023	15,4	0,6	Design Capacity not Exceeded
2024	16,3	0,6	Design Capacity not Exceeded
2025	17,1	0,7	Design Capacity not Exceeded
2026	18,0	0,7	Design Capacity not Exceeded
2027	18,9	0,7	Design Capacity not Exceeded
2028	19,7	0,8	Design Capacity not Exceeded
2029	20,6	0,8	Design Capacity not Exceeded

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Hennenman Wastewater Treatment Plant as per the estimated increase in population.

The design capacity for Hennenman WWTW will not be exceeded by 2029.

Table 5.2.9: Projected Capacity Volumes required for Hennenman WWTW

Hennenman			
Design Capacity = 4ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	1,1	0,3	Design Capacity not Exceeded
2019	1,2	0,3	Design Capacity not Exceeded
2020	1,3	0,3	Design Capacity not Exceeded
2021	1,3	0,3	Design Capacity not Exceeded
2022	1,4	0,4	Design Capacity not Exceeded
2023	1,5	0,4	Design Capacity not Exceeded
2024	1,6	0,4	Design Capacity not Exceeded
2025	1,7	0,4	Design Capacity not Exceeded
2026	1,8	0,4	Design Capacity not Exceeded
2027	1,9	0,5	Design Capacity not Exceeded
2028	1,9	0,5	Design Capacity not Exceeded
2029	2,0	0,5	Design Capacity not Exceeded

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Phomolong Wastewater Treatment Plant as per the estimated increase in population.

Table 5.2.10: Projected Capacity Volumes required for Phomolong WWTW

Phomolong			
Design Capacity = 4ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	3,3	0,8	Design Capacity not Exceeded
2019	3,4	0,9	Design Capacity not Exceeded
2020	3,7	0,9	Design Capacity not Exceeded
2021	3,9	1,0	Design Capacity not Exceeded
2022	4,2	1,0	Design Capacity Exceeded
2023	4,4	1,1	Design Capacity Exceeded
2024	4,7	1,2	Design Capacity Exceeded
2025	4,9	1,2	Design Capacity Exceeded
2026	5,2	1,3	Design Capacity Exceeded
2027	5,4	1,4	Design Capacity Exceeded
2028	5,7	1,4	Design Capacity Exceeded
2029	5,9	1,5	Design Capacity Exceeded

Phomolong WWTW will need to be upgraded by 2022 from 4 ML/day to 6 ML/day, this will be sufficient until 2029.

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Ventersburg Wastewater Treatment Plant as per the estimated increase in population.

Table 5.2.11: Projected Capacity Volumes required for Ventersburg WWTW

Ventersburg			
Design Capacity = 0,5ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	0,4	0,8	Design Capacity not Exceeded
2019	0,4	0,8	Design Capacity not Exceeded
2020	0,5	0,9	Design Capacity not Exceeded
2021	0,5	1,0	Design Capacity not Exceeded
2022	0,5	1,0	Design Capacity Exceeded
2023	0,5	1,1	Design Capacity Exceeded
2024	0,6	1,2	Design Capacity Exceeded
2025	0,6	1,2	Design Capacity Exceeded
2026	0,6	1,3	Design Capacity Exceeded
2027	0,7	1,3	Design Capacity Exceeded
2028	0,7	1,4	Design Capacity Exceeded
2029	0,7	1,5	Design Capacity Exceeded

Ventersburg WWTW will need to be upgraded by 2022 from 0,5 to 0,7 ML/day to cater for demand up to 2029.

Future Projected Volumes

The table below summarises the Projected Capacity Volumes required for Mmamahabane Wastewater Treatment Plant as per the estimated increase in population.

Table 5.2.12: Projected Capacity Volumes required for Mmamahabane WWTW

Mmamahabane			
Design Capacity = 0,6ML/day			
Year	**Calculated Demand Volumes**	**% Percentage**	
2018	1,4	2,3	Design Capacity Exceeded
2019	1,4	2,3	Design Capacity Exceeded
2020	1,5	2,5	Design Capacity Exceeded
2021	1,8	3,0	Design Capacity Exceeded
2022	1,9	3,2	Design Capacity Exceeded
2023	2,0	3,4	Design Capacity Exceeded
2024	2,1	3,6	Design Capacity Exceeded
2025	2,3	3,8	Design Capacity Exceeded
2026	2,4	4,0	Design Capacity Exceeded
2027	2,5	4,2	Design Capacity Exceeded
2028	2,6	4,4	Design Capacity Exceeded
2029	2,7	4,6	Design Capacity Exceeded

Mmamahabane will need immediate upgrade from 0, 6 ML/day to 2, 7 ML/day. This will be sufficient until 2029.

5.2.4 Expansion of Reticulation Network

The following are required reticulation network expansions as a result of new developments and bucket eradication:

Welkom (Thabong) T16: Construction of Waterborne Sanitation for 1300 Stands. This will need require the expansion of waterborne sanitation and water network to cater for 1300 stands and a sewer pump station.
Expand the water and sewer reticulation network as a result of servicing 54 stands in Mmamahabane.
Upgrading of current T8 pump station to accommodate new developments and new serviced stands that are approximately 14 500.
The eradication of bucket system to 173 stands in Thabong extension 15 Bronville will need the network to be expanded to include those stands..

The eradication of bucket system to 391 stands in Thabong extension 26 will need the network to be expanded to include those stands.
The eradication of bucket system to Kutlwanong K10 will need the network to be expanded to include those stands.

5.2.5 Alternative Technologies

The most commonly used wastewater treatment technologies in South Africa activated sludge, bio/trickling filters, rotating biological reactors, wastewater ponds, membrane bio-reactors, wetlands and aerobic granular activated sludge (WRC Report No. TT 675/16, August 2016).

The preferred technology is often linked to the size of the plant . Table below shows the categorisation of plants based on size/flow rate and population.

Table 5.2.13: categorisation of plants based on size/flow rate and population

Wastewater Treatment Plant Categories	Flow rate	Population Equivalent
Micro size plant	< 0.5 Ml/day	5 000
Small size plant	0.5-2 Ml/day	5 000-20 000
Medium size plant	2-10 Ml/day	20 000-100 000
Large size plant	10-25 Ml/day	100 000-250 000
Macro size plant	>25 Ml/day	>250 000

Source: WRC Report No. TT 675/16, August 2016

The main objective of any wastewater treatment is the removal of suspended solids and reduction of COD also known as BOD, and ammonia. Process selection the relevant technology is dependent of various factors. However, the main principle is that the technology process selection should be relevant to the context within which it is selected.

The designers need to strike a balance amongst the various constraints associated with each technology such as:

- Size of the population and the sewage flows
- Load/sewage strength arriving at the plant
- Capital costs (construction costs)
- Operational costs (day to day running costs and maintenance costs)
- Available skilled operators for day to day operation and maintenance
- Categorisation of the receiving body of water (i.e wether sensitive or not), this will influence the Water Licence Use requirement (WULA).
- Linked to the above is the desired effluent quality and sludge management
- Environmental impact assessments
- Availability of land for current and future growth

The tables below show the interaction amongst the various factors to be considered for the various technologies.

Table 5.2.14: Interaction amongst the various factors to be considered for the various technologies.

Aspect / Criterion	Pond system	Wetlands	Trickling filters/ Biological filters system	Rotational Biological Contactors	Activated sludge system	AGAS system	Membrane bio-reactors
Plant size	Typically applicable in micro to small plant size	Typically applicable in micro to small plant size	Small and medium size plant	Small and medium size plant	Focused on a medium sized plant	Focused on a medium sized plant	Suitable for where plant capacity is needed
Flow rate	Suitable in small/low flow volumes (0.5-2 Ml/day)	Suitable in small/low flow volumes (0.5-5 Ml/day)	0.5-10Ml/day	0.5-10Ml/day	Suitable for large volumes of wastewater (>2 Ml/day)	Suitable for large volumes of wastewater (10Ml/day)	Suitable for large volumes of wastewater
Land availability	Requires adequate land Requires a buffer strip between human settlement and residential areas	Requires adequate land	Requires minimal land area	Requires minimal land area	Requires little land area	Requires little land area especially where there are land restrictions	Requires little land area
Type of influent	Domestic, industrial, agricultural	Treated	Domestic	Domestic	Domestic, industrial	Domestic, industrial	Domestic, industrial
Size of contributing community	<5000 persons	<5000 persons	5000-50 000 persons	5000-50 000 persons	Ranges from 20 000 to 100 000 persons	Ranges from 20 000 to 100 000 persons	Ranges from 20 000 to 100 000 persons

Source: WRC Report No. TT 675/16, August 2016

Aspect / Criterion	Pond system	Wetlands	Trickling filters/ Biological filters system	Rotational Biological Contactors	Activated sludge system	AGAS system	Membrane bio-reactors
Treated wastewater quality	Removal of pathogens is high. Removes high concentrations of COD	Removal of Phosphates and Nitrates is high	No strict Nitrogen and Phosphorus standards	No strict Nitrogen and Phosphorus standards	Highly efficient treatment method where discharge standards are strict with respect to phosphate	Highly efficient treatment method where strict Nitrogen and Phosphorus discharge standards are required	Highly efficient treatment method where high quality treated wastewater is required, especially for reclamation and reuse
Receiving environment	Evaporation, Specified irrigation	Local stream or river, specified irrigation	Local stream or river, specified irrigation	Local stream or river, specified irrigation	Local stream or river, specified re-use according to the authorisation	Local stream or river, specified re-use according to the authorisation	Local stream or river, specified re-use according to the authorisation
Sludge treatment/handling	Sludge drying beds, sludge lagoons	No sludge expected	Sludge drying beds	Sludge drying beds	Anaerobic digestion, sludge lagoons, drying beds or mechanical de-watering	Sludge lagoons, drying beds or belt presses for de-watering	Sludge lagoons, drying beds or belt presses for de-watering
Costs (in terms of municipal affordability) Based on the current (2015/2016 industry norms)	Low capital cost (Approximately R2-4 Million/Ml)	Low capital cost (Approximately R2-4 Million/Ml)	Medium cost (Approximately R7-9Million/Ml)	Medium cost (Approximately R7-9Million/Ml)	High cost (Approximately R13-15 Million/Ml)	High cost (Approximately R13-15 Million/Ml)	High cost (Approximately R13-15 Million/Ml)

Source: WRC Report No. TT 675/16, August 2016

Aspect / Criterion	Pond system	Wetlands	Trickling filters/ Biological filters system	Rotational Biological Contactors	Activated sludge system	AGAS system	Membrane bio-reactors
Operation Number of skilled operating staff	Requires low skilled operating staff	Requires low skilled operating staff	Requires moderately skilled operating staff	Requires moderately skilled operating staff	Operational requirements are demanding Competent and highly skilled staff is required	Competent and highly skilled staff is required	Competent and highly skilled staff is required
Reliable and available electrical power	Suitable in areas where there is minimal electricity supply	Suitable in areas where there is minimal electricity supply	Requires electrical power supply though the trickling filter unit does not necessarily require electricity.	Requires reliable electrical power	Requires reliable electrical power	Requires reliable electrical power	Requires reliable electrical power
Maintenance	No mechanical/ electrical equipment and instrumentation to maintain	No mechanical/ electrical equipment and instrumentation to maintain	Low maintenance	Low maintenance	Requires high level of reliability with respect to mechanical equipment. Requires a formal planned and preventative maintenance programme	Low maintenance due to removal of mixers, recirculation pumps and settling tanks	Incorporate more instrumentation and automated process control Requires high level of reliability with respect to mechanical equipment

Source: WRC Report No. TT 675/16, August 2016

5.2.6 Risk Assessment

The Green Drop (GD) Certification Programme was developed in 2008. It is a form of regulation that is aligned to a risk based regulatory approach to present best management practice. Green Drop is implemented by the Department of Water and Sanitation bi-annually.

Risk is defined and calculated as Cumulative Risk Rating (CRR). This risk is measured against the Design Capacity of plant. This Risk-based regulation allows the municipality to identify critical risk areas within its wastewater treatment process.

A wastewater treatment works with a higher Cumulative Risk Rating (CRR) value means that plant has reached or is approaching its critical state of operation and therefore requires intervention. A lower CRR value means the plant holds a low and manageable risk position.

Figure shows the risk profile of the various provinces in South Africa. Free State is one of the four provinces that have a %CRR/CRRmax greater than 80%.

Current Status of WWTW after the 2017 WRAP update:

Table 5.2.15. shows the historic data including the current status of WWTWs after the 2017 WRAP Update.

Table 5.2.16: historic data including the current status of WWTWs after the 2017 WRAP Update.

System Name	Green Drop Score 2011 (%)	Green Drop Score 2012 (%)	WWTW Risk Rating 2013 DWS	CRR 2013-2014	CRR 2014-2015	CRR 2015-2016	CRR 2016-2017	Progress
Avg Score	14.2 %	**58.06 %**	**57.3%**					
Allanridge	15.5	**47.04**	**76.4**	12(43%)	**13(47%)**	**12 (43%)**	**10(36%)**	
Odendaalsrus	*Not assessed*	**65.57**	**50.0**	13(46%)	**13(46%)**	**17(61%)**	**12(43%)**	
Kutlwanong	15.0	**58.18**	**63.64**	17(61%)	**14(50%)**	**17(61%)**	**12(43%)**	
Theronia	16.0	**49.75**	**55.6**	22(79%)	**24(86%)**	**23(82%)**	**11(39%)**	
Witpan	*Not assessed*	*Not assessed*	**100**	100%	**100%**	**100%**	**100%**	
Thabong	24.6	**77.26**	**45.45**	11(39%)	**9(32%)**	**10(36%)**	**15(54%)**	
Virginia	26.9	**57.02**	**40.74**	18(64%)	**19(68%)**	**20(71%)**	**10(36%)**	
Hennenman	9.2	**59.22**	**52.92**	7(25%)	**7(25%)**	**10(36%)**	**7(25%)**	

Phomolong	15.5	**64.08**	**52.94**	11(39%)	**8(29%)**	**12(43%)**	**7(25%)**	
Ventersburg	15.5	**55.19**	**58.2**	13(72%)	**13(72%)**	**13(72%)**	**10(58%)**	
Mmamahabane	*Were assessed with Ventersburg*	**55.38**	**76.47**	12(67%)	**11(61%)**	**13(72%)**	**10(58%)**	

Source:MLM GREEN DROP IMPROVEMENT PLAN 2017 -2018 (Version 6: 2016-2017 W²RAP)

In general, all WWTWs have seen an improvement in the %CRR/CRR(max). Furthermore, except for the Kutlwanong WWTW , all WWTWs have improved their categories from previous categorisation. This is positive for the municipality.

The Allanridge WWTW is categorised as medium risk at 70.6 %CRR/CRR(max). This shows an improvement from the previous categorisation of high risk at 58 %CRR/CRR(max) . The following were identified as challenges in the Allanridge WWTW:

no sludge management,

no disinfection and

bad effluent water quality do not comply.

The Odendaalsrus WWTW was previously categorised as a high risk, at 72.7%CRR/CRR(max), however with the 2017 ratings, it is now categorised as medium risk at 54,5 %CRR/CRR (max).

The following were identified as challenges in the Odendaalsrus WWTW:

no flow measurement

no sludge management,

no disinfection and

poor effluent water quality

The Kutlwanong WWTW has improved its % CRR/CRR (max) from 68.2 to 54.5. Despite the improvement, it remains in the medium risk category.

The following were identified as challenges in the Odendaalsrus WWTW:

no sludge management,

no disinfection and

poor effluent water quality

The Theronia WWTW has significantly improved from a %CRR/CRR(max) of 96.3 to 47. This means an improvement from being categorised as critical risk, therefore requiring intervention to low risk.

The following were identified as challenges in the Theronia WWTW:

poor effluent water quality

no sludge management no

disinfection

The Thabong WWTW has improved from a %CRR/CRR(max) of 72.7 to 47. This means an improvement from being categorised as high risk to low risk.

The following were identified as challenges in the Thabong WWTW:

- no disinfection
- no proper sludge management
- de watering system not operational

The Witpan WWTW has improved from a %CRR/CRR(max) of 100 to 68.2. This means an improvement from being categorised as high risk to medium risk.

The Virginia WWTW has improved from a %CRR/CRR(max) of 63 to 37. This means an improvement from being categorised as medium risk to low risk.

Hennenman and Phomolong WWTWs both improved from a %CRR/CRR(max) of 58.8 to 41.2. This means an improvement from being categorised as medium risk to low risk.

The Ventersburg WWTW has improved from a %CRR/CRR(max) of 70.6 to 58.5. It improved its categorisation from high risk to medium risk.
Lastly, the Mmamahabane WWTW has improved from a %CRR/CRR(max) of 76.5 to 58.8. It improved its categorisation from high risk to medium risk.

Summary of Risks and Associated Recommendations

The risk identified are categorised into five. Namely, WWTW operating above design capacity of 100%faulty or no flow meters leading to incorrect meter reading, deterioration in final effluent due to operating above 100% design capacity, Effluent water quality do not complying with the General authorization limits and do not comply with regulation and WWTW technical skills.
Table 5.2.17 below shows the summary of risk and associated recommendations.

Table 5.2.17: Summary of Risks and Associated Recommendations

Risk Identified		Existing control measures / Recommendations
1	WWTW Operating above design Capacity of 100 % Allanridge Odendaalsrus Theronia Witpan Virginia Ventersburg Mmamahabane	No flow measurement present on these WWTW , Flow are calculated with the STAT SA population figures to determine the loading of WWTW Flow meters need to be installed.
2.	Faulty/No flow meters leading to incorrect flow readings	All flow meters at WWTW need to be calibrated annually. Management to ensure that calibration programme is maintained.

	Risk Identified	Existing control measures / Recommendations
3	Deterioration in final effluent due operating above 100% of design capacity. Allanridge Theronia Ventersburg Mmamahabane	Due to no flow measurement the organic loading cannot be monitored and can be a possible cause to deterioration of the final Effluent. These WWTW need to be refurbished.
4	Effluent water quality do not complying with the General authorization limits and do not comply with regulation Allanridge Odendaalsrus Kutlwanong Theronia Witpan Ventersburg Mmamahabane	These WWTW need to be refurbished.
5	**WWTW Technical Skill** MLM do not comply with the regulation and do not have sufficient and skilled Process Controllers on site Insufficient number of terrain and plant personnel to execute the daylily operations and plant maintenance Skilled /Maintenance team, insufficient number of maintenance personnel to execute the daily mechanical and electrical maintenance	Interim measures are that process controller's work on more than one WWTW and Supervisors are roaming over the East. West and Central Units New trainee Class II Process Controllers on each WWTW Class B works do have shift workers on site with a Process Controller on stand by ,

	Risk Identified	Existing control measures / Recommendations
	Financial Constrains in the Municipality is affecting the daily operations on the WWTW Capital Projects	Interim measure is to prioritize the treatment process to ensure that Plants and Pump stations is running

5.3 Effluent Water Quality

Effluent is treated water, wastewater or other liquid flowing out of a waste water treatment facility.
Municipalities need to have a copy of Authorisation (License, GA or permit) stating the details of the effluent quality, limits and discharging standards(in case of oxidation ponds), copy of applicable Authorisation, containing the specified effluent quality limits or standards for discharge to a water body or for irrigation or for other applications.

The effluent quality is characterised by measuring three compliance categories. Namely:

- 90% microbiological compliance (Escherichia coli and Faecal Coliforms);
- 90% chemical compliance (COD ,Ammonia and Nitrate Nitrogen Ortho-phosphate ; and
- 90% physical compliance (pH ,Suspended Solids and Electrical Conductivity)

The compliance is calculated as the number of compliant samples divided by the number of total samples tested.

This section discusses the monitoring compliance results of the various wastewater treatment plants in the MLM over the past four years. Each plant is discussed in terms of the three compliance categories as described above. **Figure 5.2.1**shows the effluent water quality trends for the municipality.

The GDS compliance is expressed in the following colour codes.

GDS Compliance :	> 95.0	90 - 95	80 - 90	< 80

MLM Overall Effluent Water Quality Trends

	2015	2016	2017	2018
E. coli	11.7%	5.2%	4.3%	4.3%
pH	99.7%	100.0%	100.0%	100.0%
Electrical Conductivity	80.5%	92.0%	99.2%	82.4%
Suspended Solids	76.1%	83.7%	82.3%	85.4%
Ammonia as N	47.7%	56.7%	66.9%	20.9%
COD	63.6%	79.9%	10.0%	26.5%
Nitrate as N	95.1%	97.7%	99.7%	100.0%
Ortho-Phosphate as P	82.9%	80.2%	83.1%	91.7%
Monitoring Compliance	63.8%	67.1%	50.0%	33.6%

Effluent Water Quality Trends/Area

EFFLUENT WATER QUALITY TRENDS

GDS Compliance :	> 95.0	90 - 95	80 - 90	< 80

WWTW	Monotoring Compliance Year			
	2015	2016	2017	2018
Allanridge	68.3%	58.3%	39.1%	27.1%
Hennenman	88.4%	85.9%	59.9%	49.3%
Kutlwanong	55.8%	45.8%	28.2%	11.0%
Odendaalsrus	47.8%	39.9%	31.5%	20.5%
Phomolong	89.4%	91.7%	74.1%	96.0%
Thabong	70.5%	81.0%	42.8%	25.4%
Theronia	62.3%	63.7%	63.9%	27.3%
Mmamahabane	53.9%	89.2%	44.3%	0.0%
Ventersburg	69.9%	76.1%	44.3%	0.0%
Virginia	88.5%	90.6%	65.5%	59.8%

Figure 5.2.1 shows the effluent water quality trends for the municipality.

The trends show that the monitoring compliance has been deteriorating over the past four years in the MLM waste water treatment plans. The main problem areas include failures in E.coli, COD, Ammonia as N ,Ortho-Phosphate as P and suspended solids.

To note about the effluent quality as per the three compliance categories

Microbiological Compliance: E coli compliance consistently low due to no Chlorination

Physical Compliance: pH complied consistently 100 %

Chemical Compliance: Only Nitrate has a compliance consistently higher than 90 %

Allanridge WWTW Effluent Water Quality

Table 5.2.18 shows the historic trends for effluent water quality generated at the Allanridge WWTW.

Table 5.2.18: Historic trends for effluent water quality generated at the Allanridge WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	0.0%	0.0%	0.0%	0.0%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	86.8%	100.0%	95.5%	100.0%
Suspended Solids	10.5%	20.0%	40.9%	47.0%
Ammonia as N	0.0%	0.0%	4.6%	13.0%
COD	0.0%	0.0%	0.0%	0.0%
Nitrate as N	100.0%	100.0%	100.0%	100.0%
Ortho-Phosphate as P	0.0%	0.0%	13.6%	27.0%
Monitoring Compliance				

The trends as shown in **Table 5.2.18** above show that the monitoring compliance has been deteriorating over the past four years. The monitoring compliance was 68.3% in 2015 and declined over the years to 27.1% in 2018. The main problem areas include failures in E.coli, COD, Ammonia as N ,Ortho-Phosphate as P and suspended solids.

It needs to be noted that there although certain parameters have been identified as challenge areas, there is improvement in such areas such as the suspended solids which increased from 10.5% in 2015 to 47% in 2018. Ammonia as N increased from 0% in 2015 to 13% in 2018. Lastly, Ortho-Phosphate as P increased from 0% in 2015 to 27.1 % in 2018.

Hennenman WWTW Effluent Water Quality

Table 5.2.19 shows the historic trends for effluent water quality generated at the Hennenman WWTW.

Table 5.2.19: Historic trends for effluent water quality generated at the Hennenman WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	24.1%	14.3%	11.4%	15.8%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	100.0%	100.0%	100.0%	92.0%
Suspended Solids	98.0%	93.8%	94.7%	92.0%
Ammonia as N	51.0%	67.3%	56.4%	8.0%
COD	73.7%	55.6%	12.5%	19.0%
Nitrate as N	100.0%	92.9%	100.0%	100.0%
Ortho-Phosphate as P	100.0%	87.8%	97.4%	97.0%
Monitoring Compliance	**88.4%**	**85.9%**	**59.9%**	**49.3%**

The trends as shown in **Table 5.2.17** above show that the monitoring compliance has been deteriorating over the past four years. The monitoring compliance was 88.4% in 2015 and declined over the years to 49.3% in 2018.
The main substance/parameters that have shown decline include E.coli, Ammonia as N and COD.

Kutlwanong WWTW Effluent Water Quality

Table 5.2.20 shows the historic trends for effluent water quality generated at the Kutlwanong WWTW.

Table 5.2.20: Historic trends for effluent water quality generated at the Kutlwanong WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	14.3%	7.4%	0.0%	0.0%
pH	96.7%	100.0%	100.0%	100.0%
Electrical Conductivity	100.0%	100.0%	100.0%	100.0%
Suspended Solids	93.3%	96.2%	72.2%	76.5%
Ammonia as N	53.3%	51.4%	0.0%	0.0%
COD	71.4%	50.0%	0.0%	0.0%
Nitrate as N	100.0%	96.9%	100.0%	100.0%
Ortho-Phosphate as P	100.0%	100.0%	55.6%	76.5%
Monitoring Compliance				

There is a decline in monitoring compliance over the past four years. The monitoring compliance was at 55.8% in 2015 and is now at 11.% in 2018. Problem substance/parameters include E.coli, Ammonia as N and COD. The following substance/parameters have in general also shown decline over the years, suspended solids, and Ortho-Phosphate as P.

Odendaalsrus WWTW Effluent Water Quality

Table 5.2.21 shows the historic trends for effluent water quality generated at the Odendaalsrus WWTW.

Table 5.2.21: Historic trends for effluent water quality generated at the Odendaalsrus WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	15.4%	3.2%	0.0%	0.0%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	100.0%	100.0%	100.0%	80.0%
Suspended Solids	100.0%	30.3%	82.6%	93.3%
Ammonia as N	53.3%	48.1%	13.0%	0.0%
COD	80.1%	46.4%	0.0%	20.0%
Nitrate as N	46.7%	72.2%	93.3%	100.0%
Ortho-Phosphate as P	100.0%	30.3%	73.9%	93.3%
Monitoring Compliance				

The monitoring compliance trends have declined over the past for years. The monitoring compliance was at a low 47.8% in 2015 and declined further to 20.5.% in 2018. Problem substance/parameters include E.coli, Ammonia as N and COD.

Thabong WWTW Effluent Water Quality

Table 5.2.22 shows the historic trends for effluent water quality generated at the Thabong WWTW.

Table 5.2.22: Historic trends for effluent water quality generated at the Thabong WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	12.0%	2.3%	0.0%	0.0%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	100.0%	100.0%	100.0%	100.0%
Suspended Solids	100.0%	97.6%	100.0%	100.0%
Ammonia as N	89.7%	100.0%	88.5%	64.7%
COD	100.0%	66.7%	4.4%	50.0%
Nitrate as N	100.0%	100.0%	100.0%	100.0%
Ortho-Phosphate as P	100.0%	97.7%	100.0%	100.0%
Monitoring compliance	**70.5%**	**81.0%**	**42.8%**	**25.4%**

There has been a decline in monitoring compliance over the past four years. The Monitoring compliance was at 70.5% in 2015 and 25.4% in 2018. There are certain areas that consistently complied over the years. These include pH, Electrical conductivity, suspended solids and Nitrate as N. Problem substance/parameter include E.coli, Ammonia as N and COD.

Theronia WWTW Effluent Water Quality

Table 5.2.23 shows the historic trends for effluent water quality generated at the Theronia WWTW.

Table 5.2.23: Historic trends for effluent water quality generated at the Theronia WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	16.7%	0.0%	10.3%	7.7%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	76.5%	100.0%	100.0%	100.0%
Suspended Solids	25.7%	53.3%	51.6%	15.4%
Ammonia as N	11.4%	11.8%	0.0%	0.0%
COD	0.0%	0.0%	0.0%	0.0%
Nitrate as N	100.0%	100.0%	100.0%	100.0%
Ortho-Phosphate as P	80.7%	50.0%	90.3%	100.0%
Monitoring Compliance				

There has been a decline in monitoring compliance over the past four years. The Monitoring compliance was at 62.3% in 2015 and 27.3% in 2018. Problematic substance/parameters include E.coli, suspended solids, ammonia as N and COD.

Substance/ parameters that have consistently complied include pH, Electrical conductivity, suspended solids and Nitrate as N.

Mmamahabane WWTW Effluent Water Quality

Table 5.2.25 shows the historic trends for effluent water quality generated at the Mmamahabane WWTW.

Table 5.2.25: Historic trends for effluent water quality generated at the Mmamahabane WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	33.3%	9.1%	0.0%	0.1%
pH	100.0%	100.0%	100.0%	0.0%
Electrical Conductivity	100.0%	100.0%	100.0%	0.0%
Suspended Solids	45.5%	72.7%	71.4%	0.0%
Ammonia as N	0.0%	25.0%	0.0%	0.0%
COD	0.0%	0.0%	16.7%	0.0%
Nitrate as N	100.0%	75.0%	100.0%	0.0%
Ortho-Phosphate as P	100.0%	81.8%	57.1%	0.0%
Monitoring Compliance		**89.2%**		

There has been a decline in monitoring compliance over the past four years. The Monitoring compliance was at 62.3% in 2015 and 0% in 2018. None of the compliance parameters where achieved in 2018. Problematic substance/parameters over the years include E.coli, suspended solids, ammonia as N and COD.

Ventersburg WWTW Effluent Water Quality

Table 5.2.26 shows the historic trends for effluent water quality generated at the Ventersburg WWTW.

Table 5.2.26: Historic trends for effluent water quality generated at the Ventersburg WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	0.0%	12.5%	16.7%	0.1%
pH	100.0%	100.0%	100.0%	0.0%
Electrical Conductivity	54.5%	100.0%	100.0%	0.0%
Suspended Solids	18.2%	37.5%	57.1%	0.0%
Ammonia as N	9.1%	0.0%	0.0%	0.0%
COD	0.0%	0.0%	16.7%	0.0%
Nitrate as N	90.1%	100.0%	100.0%	0.0%
Ortho-Phosphate as P	20.0%	25.0%	57.1%	0.0%
Monitoring compliance				

There has been a decline in monitoring compliance over the past four years. The Monitoring compliance was at 69.9% in 2015 and 0% in 2018. None of the compliance parameters where achieved in 2018. Problematic substance/parameters over the years include E.coli, suspended solids, ammonia as N , COD and Ortho-Phospate as P.

Virginia WWTW Effluent Water Quality

Table 5.2.27 shows the historic trends for effluent water quality generated at the Virginia WWTW.

Table 5.2.27: Historic trends for effluent water quality generated at the Virginia WWTW

Substance/Parameter	2015	2016	2017	2018
E. coli	0.0%	2.0%	5.1%	0.0%
pH	100.0%	100.0%	100.0%	100.0%
Electrical Conductivity	100.0%	100.0%	100.0%	100.0%
Suspended Solids	91.8%	98.0%	100.0%	100.0%
Ammonia as N	77.5%	88.8%	76.2%	58.0%
COD	97.4%	83.0%	29.4%	59.5%
Nitrate as N	100.0%	100.0%	100.0%	100.0%
Ortho-Phosphate as P	97.7%	100.0%	100.0%	100.0%
Monitoring Compliance	**88.5%**	**90.6%**		

There has been a decline in monitoring compliance over the past four years. The Monitoring compliance was at 69.9% in 2015 and 0% in 2018. None of the compliance parameters where achieved in 2018. Problematic substance/parameters over the years include E.coli, suspended solids, ammonia as N , COD and Ortho-Phospate as P.

5.4 Sludge Management

According to the National Department of Water and Forestry; and National Water Research Commission, 2006 document " Guidelines for the Utilisation and Disposal of Water Sludge Volume 1" sludge in waste water treatment refers to the material removed from wastewater treatment plants designed to treat predominately domestic wastewater and includes the following products :

- Raw or primary sludge from a primary clarifier
- Primary sludge from an elutriation process
- Anaerobically digested sludge, both heated and cold
- digestion Oxidation pond sludge
- Septic tank sludge and other sludge from on-site sanitation units
- Surplus or waste activated sludge
- Humus sludge
- Pasteurised sludge
- Heat-treated sludge
- Lime-stabilised sludge
- Composted sludge

The use pollutants in a sludge have an impact in the use and disposal of the sludge. Also, the management and operation of the wastewater treatment plant should be such that it generates a stable sludge which does not generate any odours or attract disease vectors. Constant monitoring and feedback to WWTW operation management is important to for the sludge generation, handling, use and disposal in a sustainable way.

Failure to do the above will negatively affect the community and the relationship between the municipality and the community. Furthermore, this will negatively affect the municipality's ability to meet the legal requirements for sludge management. In turn, this will affect the relevant licences that are issued to municipalities for managing sludge.

The sludge quality is also characterised by measuring three compliance categories. Namely:

- microbiological parameters (Faecal Coliforms and Helminth
- ova); physical and stability indicators (pH ,TS,VS,VFA) ; and
- chemical characteristics (nutrients, metals and organic pollutants)

Figure 5.4.1 shows the overview of the characterisation process.

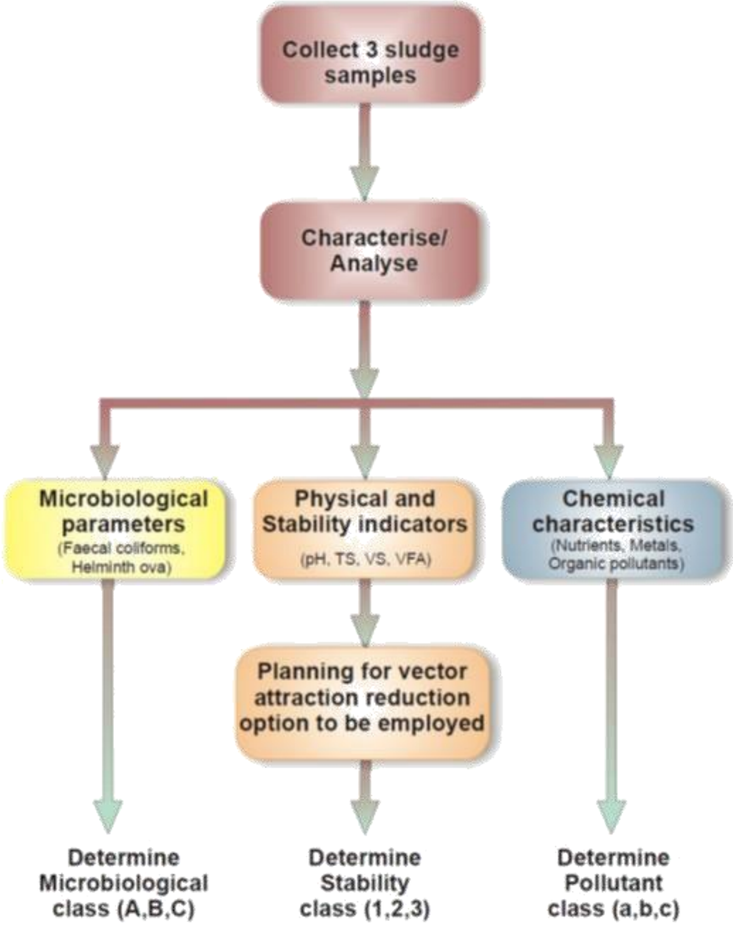


Figure 5.4.1 : Overview of the Sludge Characterisation Process

Table 5.4.1: Sludge Management

WWTW	DesignCapacity	g/tone Sludge Wasted per month	Sludge Licence
Allanridge	4 Ml	No sludge were wasted during 2016-2017 WWTW is in process to be refurbished	Allanridge Land Disposal GSB 16/2/7/C251/D2/P289
Thabong	12 Ml	Digester and Waste Activated Sludge was not treated with the Dewatering system due to vandalism. Thabong has the option to re cycle wasted sludge or to discharge into the main sewer line to the Witpan WWTW.	Welkom Land Disposal Site Class 2 B33/2/340/32/P85
Theronia	27 Ml	Theronia WWTW is not in operation and no sludge were treated .	Welkom Land Disposal Site
Witpan	12Ml	Functional	Welkom Land Disposal Site
Odendaalsrus	6 Ml	No sludge could be pumped out of Sludge lagoon due to broken pumps	Odendaalsrus Land Disposal Class 2 B33/2/325/6/P108
Kutlwanong	6 Ml	Sludge flow meter not operational,no sludge measurement	Odendaalsrus Land Disposal Class 2 B33/2/325/6/P108
Hennenman	4 Ml	0.02. Sludge is used by the Parks Department in Hennenman.	Phomolong Land Disposal. Class 2 B33/2/350/122/P30
Phomolong		0.06. Sludge is used by the Parks Department in Hennenman.	Phomolong Land Disposal Class 2 B33/2/350/122/P30
Virginia	26Ml. 13Ml Operational	Sludge from open digester is discharged into drying beds.	Virginia Land Disposal G S B 16/2/7/C404/D2/1/P338
Ventersburg	0.5Ml	Aerated Oxidation Pond	
Mmamahabane	0.6Ml	Aerated Oxidation Pond	

The following can be noted from **Table 5.4.1** above:

- In general, the WWTW do have sludge licences
- Some of the plants do not treat their sludge
- Some of the plants do not dispose of their sludge in line with sludge management principles
- Hennenman and Phomolong WWTW sludge are used by the Hennenman Parks Department

Allanridge WWTW Sludge Management

Table 5.4.2 shows the management of sludge at the Allanridge WWTW.

Table 5.4.2: Sludge Management at Allanridge Waste Water Treatment Works

Allanridge WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Activated sludge (Pasveer Ditch) with Solar/Thermal drying beds		4ML		Allanridge Land Disposal GSB 16/2/7/C251/D2/P289
Type of waste	**Method of removal**	**Method of waste**		
Screenings	Hand removal	Wheel borrow	Land Disposal	
Sand and Detritus	Hand removal	Wheel borrow	Land Disposal	
Return Activated Sludge	Re Cycle to reactor			
Waste activated sludge	Pumps	Drying beds	Land Disposal	
Cleaning Programs				
Drying beds	When needed			

The sludge at from the screenings , sand detritus is removed by hand and disposed using wheel borrow at the on-site land disposal.

The return activated sludge is removed by pumps, deposited into the drying beds, and disposed at the on-site land disposal.

Hennenman WWTW Sludge Management

Table 5.4.3 shows the management of sludge at the Hennenman WWTW

Table 5.4.3: Sludge Management at Hennenman Waste Water Treatment Works

Hennenman WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per month**	**Sludge License**
Activated Sludge (Oval Ditch) with Solar/thermal drying beds		4 ML	0.02	Phomolong Land Disposal Class 2 B33/2/350/122/P30
Type of waste	**Method of removal**	**Method of waste**		
Screenings	Hand removal	Wheel barrow	Land Disposal	
Sand and Detritus	Hand removal	Wheel barrow	Land Disposal	
Return Activated Sludge	Re cycle to Reactor or Anoxic dam			
Waste activated sludge	Pumps	Drying beds	Land Disposal	
Cleaning Programs				
Final Effluent Storage dams	On request			
Drying Beds	On request			

The sludge at from the screenings , sand detritus is removed by hand and disposed using wheel borrow at the on-site land disposal.

The return activated sludge is recycled to the reactor or anoxic dam. The waste activated sludge is then pumped into the drying beds to be disposed at the Phomolong Land disposal site.

Kutlwanong WWTW Sludge Management

Table 5.4.4 shows the management of sludge at the Kutlwanong WWTW

Table 5.4.4: Sludge Management at Kutlwanong Waste Water Treatment Works

Kutlwanong WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per month**	**Sludge License**
Activated Sludge BNR (Anaerobic, Anoxic, Aerobic) with Aerobic Digestion (Lagoon)		6ML	0.66	Odendaalsrus Land Disposal Class 2 B33/2/325/6/P108
Type of waste	**Method of removal**			
Screenings	Mechanical Rake	Containers	Land Disposal	
Sand and Detritus	Mechanical Rake	Containers	Land Disposal	
Return Activated Sludge	Re cycle to inlet works			
Waste activated sludge	Pumps	Sludge Lagoon	Removal with cleaning	
Sludge Lagoon	Pumps	Removal when needed	Land Disposal	
Cleaning Programs				
Lagoon	When needed			

The sludge from the screenings and sand and detritus is removed by mechanical rake and put in containers to be disposed at the Odendaalsrus land disposal site.

The return activated sludge is recycled to inlet works. The waste activated sludge is pumped into the lagoon.

Odendaalsrus WWTW Sludge Management

Table 5.4.5 shows the sludge generated at the Odendaalsrus WWTW.

Table 5.4.5: Sludge Management at Odendaalsrus WWTW

Odendaalsrus WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Biological Trickling Filter , Aerobic Lagoon and Anaerobic Digestion		6ML		Odendaalsrus Land Disposal Class 2 B33/2/325/6/P108
Type of waste	**Method of removal**			
Screenings	Mechanical rake	Containers	Land Disposal	
Sand and Detritus	De gritting system	Containers	Land Disposal	
Sludge Lagoon	Pumps	Drying beds	Land Disposal	
Humis sludge	Recycle to inlet works			
Cleaning Programs				
Lagoon	When needed	Every 2-4 Years		
Drying beds	When needed			

Phomolong WWTW Sludge Management

Table 5.4.6 shows the sludge generated at the Phomolong WWTW.

Table 5.4.6: Sludge Management at Phomolong WWTW

Phomolong WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Activated Sludge BNR, Solar/thermal Drying beds (Sludge Lagoon)		4 Ml	0.06	Phomolong Land Disposal Class 2 B33/2/350/122/P30
Type of waste	**Method of removal**		**Method of waste**	
Screenings	Hand removal	Wheel barrow	Land Disposal	
Sand and Detritus	Hand removal	Wheel barrow	Land Disposal	
Return Activated Sludge	Re cycle to Reactor			
Sludge lagoon	Pumps	Supernatant inlet works	Sludge to Drying beds	
Waste activated sludge	Pumps	Drying beds	Land Disposal	
Cleaning Programs				
Night Soil lagoon	On request			
Final Effluent Storage dams	Every 5 years	Done in 2013 - 2014		

Thabong WWTW Sludge Management

Table 5.4.7 shows the sludge generated at the Thabong WWTW.

Table 5.4.7: Sludge Management at Thabong WWTW

Thabong WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per month**	**Sludge License**
Activated Sludge BNR (Anaerobic, Anoxic, Aerobic), Anaerobic Digestion, Screw press de watering		12 ML	0.49	Welkom Land Disposal Site Class 2 B33/2/340/32/P85
Type of waste	**Method of removal**			
Screenings	Mechanical rake	Containers	Land Disposal	
Sand and Detritus	De gritting system	Containers	Land Disposal	
Primary Sludge	Prim sedimentation	Re cycle to inlet works and Digesters	De watering	Land Disposal
Digester sludge	Pumps	De watering	Land Disposal	Option to pump into Network to Witpan
Return Activated Sludge	Sec Sedimentation	Re cycle from Sec Sedimentation		
Waste Activated Sludge	Pump	De watering	Land Disposal	Option to pump into Network to Witpan
Cleaning Programs				
Inlet works channel	Annually			
Digester	When needed	Every 2 – 4 years		

Theronia WWTW Sludge Management

Table 5.4.8 shows the sludge generated at the Theronia WWTW.

Table 5.4.8: Sludge Management at Theronia WWTW

Theronia WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Biological Trickling Filter , Anaerobic Digestion		27 ML		Welkom Land Disposal Site
Type of waste	**Method of removal**			
Screenings	Hand rake	Grab Removal	Land Disposal	
Sand and Detritus	De gritting system	Grab Removal	Land Disposal	
Primary Sludge	Primary sedimentation	Digesters	Drying beds	Land Disposal
Digester sludge	Pumps	Drying Beds	Land Disposal	
Humis	Re Cycle Inlet works			
Cleaning Programs				
Digesters	When needed	Every 2 – 4 years		
Drying beds	When needed			

Mmamahabane WWTW

Table 5.4.9 shows sludge generated at the Mmamahabane WWTW.

Table 5.4.9: Sludge Management at Phomolong WWTW

Mmamahabane WWTW	Type of Works	Design Capacity	g/ton sludge wasted per day	Sludge License
Aerated Oxidation Pond		**0.6 ML**		Ventersburg Land Disposal
Type of waste	**Method of removal**			
Screenings	Hand removal	Wheel barrow	Land Disposal	
Cleaning Programs				
Oxidation Ponds	On request – Plant is in process for upgrade			

Ventersburg WWTW Sludge Management

Table 5.4.10 shows sludge generated at the Ventersburg WWTW.

Table 5.4.10: Sludge Management at Ventersburg WWTW

Ventersburg WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Aerated Oxidation Pond		**0.5 ML**		Ventersburg Land Disposal
Type of waste	**Method of removal**	**Method of waste**		
Screenings	Hand removal	Wheel Barrow	Land Disposal	
Cleaning Programs				
Oxidation Ponds	On request – Plant is in process for upgrade			

Virginia WWTW Sludge Management

Table 5.4.11 shows the sludge generated at the Virginia WWTW.

Table 5.4.11: Sludge Management at Virginia WWTW

Virginia WWTW	**Type of Works**	**Design Capacity**	**g/ton sludge wasted per day**	**Sludge License**
Activated Sludge BNR , Aerobic(Open) Digestion and Solar/Thermal drying beds		26ML only 13ML in operation	No data	Virginia Land Disposal G S B 16/2/7/C404/D2/1/P338
Type of waste	**Method of removal**	**Method of waste**		
Screenings	Mechanical Rake	Wheel barrow	Land Disposal	
Sand and Detritus	Vortex de gritting system	Wheel barrow	Land Disposal	
Return Activated Sludge	Re cycle to reactor			
Waste activated sludge	Sludge Thicker	Open Digester	Drying beds	Land Disposal
Aerobic (open) Digester	Pumps	Drying beds	Land Disposal	
Cleaning Programs				
Digester	When needed	Every 5 years		
Drying beds	On request			

Witpan Sludge Management

Table 5.4.12 shows sludge generated at Witpan WWTW

Table 5.4.12: Sludge Management at Witpan WWTW

Witpan WWTW	Type of Works	Design Capacity	g/ton sludge wasted per day	Sludge License
Activated Sludge BNR with Belt press de watering		12Ml		Welkom Land Disposal
Type of waste	**Method of removal**			
Screenings	Mechanical Rake	Containers	Land Disposal	
Sand and Detritus	De gritting system	Containers	Land Disposal	
Re activated Sludge	Re cycle to reactor			
Waste Activated sludge	Pumps	Belt press	Land Disposal	
Cleaning Programs				
Inlet channel	Annually			

5.5 The Master Plan 2019-2029

SEWER INFRASTRUCTURE

Several factors need to be taken into account when developing solutions to address the needs identified during the condition assessment of the WWTW.

These include:

- Utilise the existing infrastructure as far as possible.
- Availability of space for the proposed upgrade works
- Prioritise technologies that less complex and do not require highly skilled personnel for maintenance
- The quality of the treated effluent
- The receiving environment of the treated effluent (e.g water stream or ponds)
- Minimal length of the sewer outfall so that water is treated as close as possible to the source.
- Operational costs.
- Safety and security.

The following Refurbishment and Upgrades Options for all the Treatment plants were considered.

OPTION 1

This option aims at refurbishing and upgrading each Water Treatment Plants without decommissioning any of them to standards that will cater for Sewer Demands in Matjhabeng up to the year 2029.This option also seeks to use the existing infrastructure in all the WWTW as much as possible.

Table 5.5.1: Option 1

ITEM NO.	WWTW	Short term solution	Medium term solution	Long term solution
1	**Allanridge WWTW**	Completion of the current refurbishment project which is taking place.	Upgrade the facility and expand the capacity to at least 6 ML/day by the year 2021	Proper maintenance
2	**Odendaalsrus WWTW**	Refurbishment of the plant	Proper maintenance	Proper maintenance
3	**Kutlwanong WWTW**	Reconstruction of the outfall which has been poorly constructed and expand the capacity to at least 12,5 ML/day by this year(2019)	Upgrade the plant and expand the capacity to 14,5 ML/day by the year 2025.	Proper maintenance
4	**Theronia WWTW**	Refurbishment of the plant to operate with a capacity of 16 ML/day	Proper maintenance and expand the plant to operate with a capacity of 20 ML/day	Proper maintenance

5	**Witpan WWTW**	Reconstruction of the inlet works which has been poorly constructed and expanding the capacity to 29 ML/day by this year(2019)	Upgrade the plant and expand the capacity to 38 ML/day by the year 2025.	Proper maintenance
6	**Thabong WWTW**	Upgrading plant to operate with a capacity of 35 ML/day by the current year.	Upgrading plant to operate with a capacity of 52,8 ML/day by the current year.	Proper maintenance
7	**Virginia WWTW**	Completion of the current refurbishment project which is taking place.	Proper maintenance	Proper maintenance
8	**Hennenman WWTW**	Refurbishment of the plant	Proper maintenance	Proper maintenance
9	**Phomolong WWTW**	Refurbishment of the Plant	Proper maintenance	Proper maintenance
10	**Ventererersburg WWTW**	Refurbishment of the plant and expand the capacity to 10,5 ML/day by the current year (2019)	Upgrading of the plant to 0,8 ML/day by the current year(2025))	Proper Maintenance
11	**Mmamahabane WWTW**	Refurbishment of the plant and expand the capacity to 1,5 ML/day by the current year (2019)	Upgrading of the plant to 2,8 ML/day by the current year(2025))	Proper Maintenance

In this option , upgrades can be done as follows :

Theronia WWTW:

Refurbish existing infrastructure. Biofilter works need to be refurbished to cater for the capacity of 21,5 Ml/day which is the projected demand for the year 2029.

Thabong WWTW :

Thabong WWTW is a newer works and with few mechanical/electrical problems and it will be feasible to refurbish it. The Thabong WWTW, has to be upgraded to 60 Ml/d to meet the demand by 2029.

Witpan WWTW :

Witpan WWTW is already being refurbished (now in the commissioning stage) Effluent from Witpan will be pumped to Mosert canal to avoid filling up of the pan (Witpan/Klippan)

This plant will need to be upgraded by at least 2025 to a capacity of 38,7 ML/d to meet the demands for 2029.

The Mosert canal that leads to the Sand River will have to be upgraded to accommodate the flows it will be required to convey.
Refurbishment of these WWTWs will increase their life span under proper maintenance; it is then recommended that regular inspections must be carried out to -investigate the condition of the WWTW to avoid permanent failure of the technologies

Allanridge WWTW :

Allanridge WWTW which is currently undergoing refurbishment will need to be upgraded to 6,5 ML/day in phase 2 by 2025 in order to meet the demand estimated for 2029.

Odendaalsrus WWTW :

Odendaalsrus WWTW will need to undergo major refurbishment and all malfunctioning mechanical equipment will need to be replaced.

Kutlwanong WWTW :

The outfall in the Kutlwanong WWTW which has been poorly constructed will need to be reconstructed. This plant will have to be upgraded to 16 ML/day by the year 2025 to meet the demands estimated for the year 2029.

Virginia WWTW :

Virginia WWTW is currently undergoing refurbishment in one section (Section B) and currently has one section (Section A) only operating.

Hennenman WWTW :

Hennenman WWTW will need to undergo major refurbishment and all malfunctioning mechanical equipment will need to be replaced.

Phomolong WWTW :

Phomolong WWTW will need to undergo major refurbishment and all malfunctioning mechanical equipment will need to be replaced.

Ventersburg WWTW :

Ventersburg WWTW needs to be upgraded and the capacity to be increased to 0,8 ML/day by the year 2025 to meet the demands estimated for 2029.
Mmamahabane WWTW:

Mmamahabane WWTW needs to be upgraded and the capacity to be increased to 2,8 ML/day by the year 2025 to meet the demands estimated for 2029

As indicated in above, this option will face the following challenges:

There is serious safety and security in almost all the Treatment Plants caused mainly by the Illegal Miners and Illegal dwellers who are responsible for theft and Vandalism in most of the Treatment Plants.

All personnel working at the plants should be properly trained and a proper organisational structure should be put in place to ensure that all the Treatment plants are maintained regularly.

The required space for activated sludge systems might not be enough to build some plants with the required capacity at 2029; however additional land may be acquired.
Refurbishing the biofilter system at Theronia will come with a limited lifespan compared to the capital outlays for the refurbishment since the structures (civil works) are also reaching their design life.

OPTION 2

This option aims at upgrading and refurbishing of the plants , combining some plants together, as a result some will be decommissioned or converted to pump stations.

Table 5.5.2: Option 2

ITEM NO.	WWTW	Short term solution	Medium term solution	Long term solution
1	**Allanridge WWTW**	Completion of the current refurbishment project which is taking place.	Upgrade the facility and expand the capacity to at least 5,2 ML/day by the year 2021	Proper maintenance and expand the plant to operate at 6,5 ML/day by 2025
2	**Odendaalsrus WWTW**	De-commission Odendaalsrus WWT and pump all the wastewater that reaches it to Kutlwanong WWT.	Converted to Pump station to Pump wastewater to Kutlwanong WWT	Proper maintenance of the Pump station
3	**Kutlwanong WWTW**	Reconstruction of the outfall which has been poorly constructed and expand the capacity to at least 16 ML/day by this year(2019) in order for it to cater for the Waste coming from Odendaalsrus WWTW.	Upgrade the plant and expand the capacity to 20 ML/day by the year 2025. This plant will cater for both Kutlwanong and Odendaalsrus wastewater until 2029.	Proper maintenance
4	**Theronia WWTW**	Refurbishment of the plant and convert the biofilters into the activated sludge system to operate with a capacity of 16 ML/day	Proper maintenance and expand the plant to operate with a capacity of 20 ML/day	Proper maintenance
5	**Witpan WWTW**	Reconstruction of the inlet works which has been poorly constructed by 2019.	Converted to Pump station to Pump wastewater to Thabong WWT	Proper maintenance
6	**Thabong WWTW**	Upgrading the Plant to operate with a capacity of 45,6 ML/d	Upgrade the plant and expand the capacity to 90,2 ML/day by the year 2025. This plant	Proper maintenance

			will cater for both Thabong and Witpan wastewater until 2029	
7	**Virginia WWTW**	Completion of the current refurbishment project which is taking place.	Proper maintenance	Proper maintenance
8	**Hennenman WWTW**	Refurbishment of the plant	Proper maintenance	Proper maintenance
9	**Phomolong WWTW**	Refurbishment of the Plant	Proper maintenance	Proper maintenance
10	**Ventersburg WWTW**	Refurbishment of the plant and expand the capacity to 1 ML/day by the current year (2019)	Converted to Pump station to Pump wastewater to Mmamahabane WWT	Proper Maintenance
11	**Mmamahabane WWTW**	Refurbishment of the plant and expand the capacity to 1,5 ML/day by the current year (2019)	Upgrading of the plant to 3,4 ML/day by the current year(2025) and for it to cater for the wastewater that will be pumped from Ventersburg.	Proper Maintenance

Theronia WWTW :

The Theronia WWTW can be upgraded by converting some of the biofilters into activated sludge systems, similar to what is was done at the Witpan WWTW. However, this will be more expensive than establishing a new activated sludge system. Some of the effluent from Theronia can be handled by evaporation and irrigation of parks whilst the rest of the wastewater can be treated at Thabong with Witpan converted to a pump station

Witpan WWTW :

Witpan WWTW has to be converted to a pump station to pump the wastewater to be treated at Thabong WWTW.

Thabong WWTW :

The existing 12 Mℓ/d plant in Thabong WWTW should be refurbished while additional modules have to be added to cater for the additional wastewater that will be generated from Witpan.

Due to space limitations the activated sludge treatment facility is proposed to be constructed next to the existing plant to accommodate this additional effluent.

The Witpan WWTWs will be converted to a pump station to pump all the wastewater that reaches the plant to Thabong WWTWs.

The Mostert canal that leads to Sand River needs to be upgraded to accommodate increased effluent flows from Thabong WWTWs.

Kutlwanong WWTW :

Kutlwanong WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Odendaalsrus WWTW which will be decommissioned and to converted to a pump station to pump water into Kutlwanong WWTW. The upgrade will have to be able to cater for 21 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Odendaalsrus.

Odendaalsrus WWTW :

To be decommissioned and converted to a pump station to pump all the wastewater generated to Kutlwanong WWTW.

Allanridge WWTW :

This plant will be treated as in Option 1.

Virginia WWTW :

This plant will be treated as in Option 1.

Hennenman WWTW :

Hennenman WWTW should be upgraded with additional modules which will cater for the wastewater generated from the old Whites WWTW is currently not operating and will be converted into a pump station to pump water into Hennenman WWTW. The upgrade will have to be able to cater for 2,4 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Whites WWTW which is currently using the septic tank system.

Phomolong WWTW :

This plant will be treated as in Option 1.

Mmamahabane WWTW :

Mmamahabane WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Ventersburg WWTW which will be decommissioned. A pump station has to be built to pump the waste water from Ventersburg to Mmamahabane WWTW. The upgrade will have to be able to cater for 4 ML/day by 2025 which is the projected demand for the combination of Ventersburg WWTW and Mmamahabane WWTW .

OPTION 3

This option aims at refurbishing some plants and converting others to the Oxidation pond systems. .For this option, the following need to be done.

Table 5.5.3: Option 3

ITEM NO.	WWTW	Short term solution	Medium term solution	Long term solution
1	**Allanridge WWTW**	Completion of the current refurbishment project which is taking place.	Upgrade the facility and expand the capacity to at least 5,2 ML/day by the year 2021	Proper maintenance and expand the plant to operate at 6,5 ML/day by 2025
2	**Odendaalsrus WWTW**	Refurbishment of the plant to operate using Oxidation Pond system	Proper maintenance	Proper maintenance
3	**Kutlwanong WWTW**	Reconstruction of the outfall which has been poorly constructed and expand the capacity to at least 12,5 ML/day by this year(2019)	Upgrade the plant and expand the capacity to 16 ML/day by the year 2025.	Proper maintenance
4	**Theronia WWTW**	Refurbish the plant to operate using Oxidation Pond system	Proper maintenance a	Proper maintenance
5	**Witpan WWTW**	Reconstruction of the inlet works which has been poorly constructed and expanding the capacity to 25 ML/day by this year(2019)	Upgrade the plant and expand the capacity to 35 ML/day by the year 2025.	Proper maintenance
6	**Thabong WWTW**	Upgrading the Plant	Proper maintenance	Proper maintenance
7	**Virginia WWTW**	Completion of the current refurbishment project which is taking place.	Proper maintenance	Proper maintenance
8	**Hennenman WWTW**	Refurbishment of the plant	Proper maintenance	Proper maintenance
9	**Phomolong WWTW**	Refurbishment of the Plant	Proper maintenance	Proper maintenance
10	**Ventersburg WWTW**	Refurbishment of the plant and expand the capacity to 1 ML/day by the current year (2019)	Proper Maintenance	Proper Maintenance
11	**Mmamahabane WWTW**	Refurbishment of the plant and expand the capacity to 1,5 ML/day by the current year (2019)	Upgrading of the plant to 3 ML/day by the current year(2025))	Proper Maintenance

Theronia WWTW :

Theronia WWTWs presents itself as a suitable site due to the vast amount of land around the current site and it is at the outskirts of the town. The existing biofilter plant at Theronia WWTW should be decommissioned except for the inlet works and sludge drying beds and/or all the redundant structures will have to be demolished to create additional space for ponds.

The operational 20 Ml/day pond system at Theronia WWTW shall be retained and be incorporated into the new design. In this option, the Witpan WWTWs will have to be decommissioned; additional land space then needs to be acquired, preferably to the south of the existing works as this is located at a slightly lower altitude than the existing works and ponds. Initial calculations indicate a land area of about 60 hectares.

This upgrade will comprise the addition of another set of ponds (aerobic/, facultative ponds) with the alternative of providing an engineered (constructed) wetland.
The inlet works at Theronia WWTW needs to be upgraded to handle the full 30.8 Ml/day and sludge removal and drying beds need to be established.

Witpan and Thabong WWTW :

Witpan WWTW and Thabong WWTW will be decommissioned at some point and some of the wastewater will be allowed to gravitate to Witpan WWTW. At Witpan a pump station should be established to pump the wastewater either to Catchment A or directly to Theronia. There is a possibility that gravity systems may be used to convey waste water to Theronia since the site is slightly lower than both Witpan and Thabong.

This option will replace the use of mechanical technology by the use of ponds system only. The existing pumps for irrigation using the treated effluent will have to be revived and a new pump station will have to be established to pump excess treated effluent to the nearest river system. In this arrangement the effluent may have to be pumped to a point where it flows by gravity to the river system. The Mosert canal feeding effluent to the Sand River will be upgraded.

Hennenman and Whites :

Treated as in Option 2.

Mmamahabane WWTW and Ventersburg WWTW

Treated as in Option 2

Phomolong WWTW :

Treated as in Option 2

Kutlwanong WWTW :

Treated as in Option 1

Allanridge WWTW :

Treated as in Option 1

Odendaalsrus WWTW :

Upgrade the Odendaalsrus WWTW and convert it into the Oxidation Pond system

After looking at all the upgrades options, Option 1 chosen as the most viable option to implement. The upgrades as described for Option 2 above can be carried out as follows in the Long, Medium and Short term from 2019 to 2029.

5.5.1 Long Term Plan

The long term objective of refurbishing and upgrading all the treatment plants will be mainly based on operation and maintenance issues to ensure that all the upgrades that are done by three to five years from now are in good operating conditions.

The table 5.5.4 summarises the Operation and Maintenance costs associated with the Wastewater Treatment Plants.

Table 5.5.4: Operation and Maintenance costs associated with the Wastewater Treatment Plants.

	Unit	Activated Sludge	Combined Works	Biofilter	Ponds
1	Class C works Personnel	R 104 500,00	R 100 100,00	R 126 500,00	R 117 700,00
	Wastewater Technician Supervisor Class V-1 of	R 33 000,00	R 33 000,00	R 33 000,00	R 33 000,00
	Plant operator Class 111-3 of	R 49 500,00	R 49 500,00	R 49 500,00	R 49 500,00
	Labourers (***varies*)	R 22 000,00	R 17 600,00	R 44 000,00	R 35 200,00
2	Maintenance	R 28 958,60	R 17 375,60	R 24 200,00	R 6 600,00
3	Energy	R 288 722,24	R 159 582,50	R 144 361,12	R 5 500,00
4	Chemicals & Materials	R 11 000,00	R 3 300,00	R 11 000,00	R 11 000,00
5	Miscellaneous	R 11 000,00	R 11 000,00	R 11 000,00	R 6 600,00
	Total Operation Costs per month	**R 444 180,84**	**R 291 358,10**	**R 317 061,12**	**R 147 400,00**
	Annual Cost	**R 5 330 170,03**	**R 3 496 297,20**	**R 3 804 733,42**	**R 1 768 800,00**

5.5.2 Three to Five year Capital and Operational Plan (Medium Term Plan)

The medium term solution focusses at upgrading and refurbishing of the plants , combining some plants with being decommissioned and converted to pump stations. The upgrades should be done in such a way that the plants are able to cater for demands of up to 2029.

Theronia WWTW :

The Theronia WWTW can be upgraded by converting some of the biofilters into activated sludge systems, similar to what is was done at the Witpan WWTW. However, this will be more expensive than establishing a new activated sludge system. Some of the effluent from Theronia can be handled by evaporation and irrigation of parks whilst the rest of the wastewater can be treated at Thabong with Witpan converted to a pump station

Witpan WWTW :

Witpan WWTW has to be converted to a pump station to pump the wastewater to be treated at Thabong WWTW.

Thabong WWTW :

The existing 12 Mℓ/d plant in Thabong WWTW should be refurbished while additional modules have to be added to cater for the additional wastewater that will be generated from Witpan.

Due to space limitations the activated sludge treatment facility is proposed to be constructed next to the existing plant to accommodate this additional effluent.

The Witpan WWTWs will be converted to a pump station to pump all the wastewater that reaches the plant to Thabong WWTWs.

The Mosert canal that leads to Sand River needs to be upgraded to accommodate increased effluent flows from Thabong WWTWs.

Kutlwanong WWTW :

Kutlwanong WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Odendaalsrus WWTW which will be decommissioned and to converted to a pump station to pump water into Kutlwanong WWTW. The upgrade will have to be able to cater for 21 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Odendaalsrus.

Odendaalsrus WWTW :

To be decommissioned and converted to a pump station to pump all the wastewater generated to Kutlwanong WWTW.

Allanridge WWTW :

Allanridge WWTW which is currently undergoing refurbishment will need to be upgraded to 6,5 ML/day in phase 2 by 2025 in order to meet the demand estimated for 2029.

Virginia WWTW :

Virginia WWTW is currently undergoing refurbishment in one section (Section B) and currently has one section (Section A) only operating.

Hennenman WWTW :

Hennenman WWTW should be upgraded with additional modules which will cater for the wastewater generated from the old Whites WWTW is currently not operating and will be converted into a pump station to pump water into Hennenman WWTW. The upgrade will have to be able to cater for 2,4 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Whites WWTW which is currently using the septic tank system.

Phomolong WWTW :

Phomolong WWTW will need to undergo major refurbishment and all malfunctioning mechanical equipment will need to be replaced.

Mmamahabane WWTW :

Mmamahabane WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Ventersburg WWTW which will be decommissioned. A pump station has to be built to pump the waste water from Ventersburg to Mmamahabane WWTW. The upgrade will have to be able to cater for 4 ML/day by 2025 which is the projected demand for the combination of Ventersburg WWTW and Mmamahabane WWTW .

5.5.3 One Year Project and Budget Plan (Short Term Plan)

The one year projects can be classified under short-term solutions which are upgrades or refurbishments which should be implemented immediately to meet the current sewer demand for the current year of 2019 up until at least 2025.

Theronia WWTW :

The Theronia WWTW can be upgraded by converting some of the biofilters into activated sludge systems, similar to what is was done at the Witpan WWTW. However, this will be more expensive than establishing a new activated sludge system. Some of the effluent from Theronia can be handled by evaporation and irrigation of parks whilst the rest of the wastewater can be treated at Thabong with Witpan converted to a pump station

Witpan WWTW :

Witpan WWTW has to be converted to a pump station to pump the wastewater to be treated at Thabong WWTW.

Thabong WWTW :

The existing 12 Mℓ/d plant in Thabong WWTW should be refurbished while additional modules have to be added to cater for the additional wastewater that will be generated from Witpan.

Due to space limitations the activated sludge treatment facility is proposed to be constructed next to the existing plant to accommodate this additional effluent.

The Witpan WWTWs will be converted to a pump station to pump all the wastewater that reaches the plant to Thabong WWTWs.

The Mosert canal that leads to Sand River needs to be upgraded to accommodate increased effluent flows from Thabong WWTWs.

Kutlwanong WWTW :

Kutlwanong WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Odendaalsrus WWTW which will be decommissioned and to converted to a pump station to pump water into Kutlwanong WWTW. The upgrade will have to be able to cater for 21 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Odendaalsrus.

Odendaalsrus WWTW :

To be decommissioned and converted to a pump station to pump all the wastewater generated to Kutlwanong WWTW.

Allanridge WWTW :

Allanridge WWTW which is currently undergoing refurbishment will need to be upgraded to 6,5 ML/day in phase 2 by 2025 in order to meet the demand estimated for 2029.

Virginia WWTW :

Virginia WWTW is currently undergoing refurbishment in one section (Section B) and currently has one section (Section A) only operating.

Hennenman WWTW :

Hennenman WWTW should be upgraded with additional modules which will cater for the wastewater generated from the old Whites WWTW is currently not operating and will be converted into a pump station to pump water into Hennenman WWTW. The upgrade will have to be able to cater for 2,4 ML/day by 2025 which is the projected demand for the combination of Kutlwanong and Whites WWTW which is currently using the septic tank system.

Phomolong WWTW :

Phomolong WWTW will need to undergo major refurbishment and all malfunctioning mechanical equipment will need to be replaced.

Mmamahabane WWTW :

Mmamahabane WWTW should be upgraded with additional modules which will cater for the wastewater generated from the Ventersburg WWTW which will be decommissioned. A pump station has to be built to pump the waste water from Ventersburg to Mmamahabane WWTW. The upgrade will have to be able to cater for 4 ML/day by 2025 which is the projected demand for the combination of Ventersburg WWTW and Mmamahabane WWTW .

5.5.4 High Order Cost Estimates

For the purpose of comparing the options, the following assumptions have been made on the basis of the industry available information:

Construction of a new activated sludge works will require about R 10,5 to R11 million per 1 Ml/day flow

Construction of a pond system will require about 2 hectares per 1 Ml/day flow; therefore about 60 ha.

Cost of land is R100 000/hectare

Construction of a pond system will require about R 6 million per 1 Ml/day flow.

To minimise the Costs for that will be sourced for refurbishments and Upgrades of the Treatment Plants, the activities can be carried out in two phases, i.e .Phase 1 and Phase 2. Short term and medium term solutions will make up Phase 1 and long term solutions will make up Phase 2.

<u>SEWER PUMP STATIONS</u>

This section provides Costs associated with refurbishment and Upgrading Costs of the Sewer Pump Stations in Matjhabeng

<u>Pump Stations Linked to Allanridge WWTW</u>

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The Pump stations are responsible for pumping the wastewater to the Treatment Plants and play a major role in ensuring that all the Sewer treatment plants are operating efficiently.

This means that all the Pump Stations will need to be refurbished /upgraded to bring them back into full operation for the Treatment Plants to operate.

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.5: Estimated Refurbishment Costs for Pump Station in Allanridge (Nyakallong)

Estimated Refurbishment Costs for Pump Station in Allanridge (Nyakallong)									
Item	**Names of pump stations**	**Mechanical Works**		**Electrical Works**		**Civil Works**		**TOTAL**	
1	Extension 3	R	1 115 828,05	R	1 280 400,00	R	213 666,75	R	2 609 894,80
2	Managers	R	788 740,31	R	819 280,00	R	153 000,54	R	1 761 020,85
3	Shopping Centre	R	821 780,99	R	853 600,00	R	182 883,80	R	1 858 264,79
4	Nyakallong	R	804 837,06	R	836 000,00	R	156 123,00	R	1 796 960,06
5	Voelpan	R	847 196,90	R	880 000,00	R	188 540,00	R	1 915 736,90
	Subtotal	**R**	**4 378 383,32**	**R**	**4 669 280,00**	**R**	**894 214,09**	**R**	**9 941 877,41**
	Add Contingencies (10%)	R	437 838,33	R	466 928,00	R	89 421,41	R	994 187,74
	Add P & G's (15 %)	R	722 433,25	R	770 431,20	R	147 545,32	R	1 640 409,77
	Add VAT (15%)	R	775 411,69	R	826 929,49	R	158 365,32	R	1 760 706,49
	Total	R	6 314 066,58	R	6 733 568,69	R	1 289 546,14	R	14 337 181,41
	Professional Fees							R	1 792 147,68
	Grand Total							R	16 129 329,08

Pump Stations Linked to Odendaalsrus WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.6: Estimated Refurbishment Costs for Pump Station Linked to Ondendaalsrus

Estimated Refurbishment Costs for Pump Station in Odendaalsrus					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Groot Frank	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
2	Klein Frank	R 763 435,20	R 1 100 000,00	R 220 000,00	R 2 083 435,20
3	Althea	R 1 081 317,91	R 1 240 800,00	R 207 058,50	R 2 529 176,41
4	Akasia	R 1 104 324,67	R 1 267 200,00	R 211 464,00	R 2 582 988,67
5	Hospital Road	R 847 196,90	R 880 000,00	R 164 340,00	R 1 891 536,90
6	Goudrif 2	R 804 837,06	R 836 000,00	R 156 123,00	R 1 796 960,06
7	Goudrif 1	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
8	Bothaville	R 847 196,90	R 880 000,00	R 164 340,00	R 1 891 536,90
9	Ben Regal	R 847 196,90	R 880 000,00	R 188 540,00	R 1 915 736,90
10	Eldorie	R 662 594,80	R 760 320,00	R 126 878,40	R 1 549 793,20
11	Mimosa	R 169 439,38	R 176 000,00	R 37 708,00	R 383 147,38
	Subtotal	**R 3 251 691,42**	**R 3 741 320,00**	**R 726 466,40**	**R 7 719 477,82**
	Add Contingencies (10%)	R 325 169,14	R 374 132,00	R 72 646,64	R 771 947,78
	Add P & G's (15 %)	R 536 529,08	R 617 317,80	R 119 866,96	R 1 273 713,84
	Add VAT (15%)	R 575 874,55	R 662 587,77	R 128 657,20	R 1 367 119,52
	Total	R 4 689 264,20	R 5 395 357,57	R 1 047 637,20	R11 132 258,97
	Professional Fees				R 1 391 532,37
	Grand Total				R12 523 791,34

Pump Stations Linked to Theronia WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.7: Estimated Refurbishment Costs for Pump Station Linked to Theronia

Estimated Refurbishment Costs for Pump Station in Theronia					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Western Pump station	R 1 127 331,44	R 1 293 600,00	R 215 869,50	R 2 636 800,94
2	Rheederpark	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
3	Phomolong Village	R 460 135,28	R 528 000,00	R 88 110,00	R 1 076 245,28
4	Traffic	R 1 092 821,29	R 1 254 000,00	R 209 261,25	R 2 556 082,54
5	Power Road	R 1 150 338,20	R 1 320 000,00	R 220 275,00	R 2 690 613,20
6	Major	R 2 336 928,00	R 1 210 000,00	R 356 950,00	R 3 903 878,00
	Subtotal	**R 5 765 486,21**	**R 5 357 000,00**	**R 1 083 596,25**	**R 12 206 082,46**
	Add Contingencies (10%)	R 576 548,62	R 535 700,00	R 108 359,63	R 1 220 608,25
	Add P & G's (15 %)	R 951 305,22	R 883 905,00	R 178 793,38	R 2 014 003,61
	Add VAT (15%)	R 1 021 067,61	R 948 724,70	R 191 904,90	R 2 161 697,20
	Total	R 8 314 407,66	R 7 725 329,70	R 1 562 654,15	R 17 602 391,52
	Professional Fees				R 2 200 298,94
	Grand Total				R 19 802 690,46

Pump Stations Linked to Virginia WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.8: Estimated Refurbishment Costs for Pump Station linked to Virginia WWTW

Estimated Refurbishment Costs for Pump Station in Virginia					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Gawie Theron	R 1 150 338,20	R 1 320 000,00	R 220 275,00	R 2 690 613,20
2	Joel Park	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
3	Agon	R 763 435,20	R 1 100 000,00	R 220 000,00	R 2 083 435,20
4	Duikboot	R 1 081 317,91	R 1 240 800,00	R 207 058,50	R 2 529 176,41
5	Birch Way	R 1 104 324,67	R 1 267 200,00	R 211 464,00	R 2 582 988,67
6	Grysbok	R 847 196,90	R 880 000,00	R 164 340,00	R 1 891 536,90
7	Kitty	R 804 837,06	R 836 000,00	R 156 123,00	R 1 796 960,06
8	Hoof Pomp Stasie	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
9	Nothern	R 847 196,90	R 880 000,00	R 164 340,00	R 1 891 536,90
10	Meloding	R 847 196,90	R 880 000,00	R 188 540,00	R 1 915 736,90
	Subtotal	**R 4 071 691,20**	**R 4 521 000,00**	**R 882 343,00**	**R 9 475 034,20**
	Add Contingencies (10%)	R 407 169,12	R 452 100,00	R 88 234,30	R 947 503,42
	Add P & G's (15 %)	R 671 829,05	R 745 965,00	R 145 586,60	R 1 563 380,64
	Add VAT (15%)	R 721 096,51	R 800 669,10	R 156 262,95	R 1 678 028,56
	Total	R 5 871 785,87	R 6 519 734,10	R 1 272 426,84	R 13 663 946,81
	Professional Fees				R 1 707 993,35
	Grand Total				R 15 371 940,16

Pump Stations Linked to Hennenman WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.9: Estimated Refurbishment Costs for Pump Station Linked to Hennenman

Estimated Refurbishment Costs for Pump Station in Hennenman					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Bandediens	R 763 435,20	R 1 100 000,00	R 220 000,00	R 2 083 435,20
2	Hennenman Main	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
3	Whites PS	R -	R -	R -	R -
	Subtotal	**R 1 488 698,64**	**R 2 145 000,00**	**R 429 000,00**	**R 4 062 698,64**
	Add Contingencies (10%)	R 148 869,86	R 214 500,00	R 42 900,00	R 406 269,86
	Add P & G's (15 %)	R 245 635,28	R 353 925,00	R 70 785,00	R 670 345,28
	Add VAT (15%)	R 263 648,53	R 379 879,50	R 75 975,90	R 719 503,93
	Total	R 2 146 852,31	R 3 093 304,50	R 618 660,90	R 5 858 817,71
	Professional Fees				R 732 352,21
	Grand Total				R 6 591 169,92

Pump Stations Linked to Witpan WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.10: Estimated Refurbishment Costs for Pump Station linked to Witpan

Estimated Refurbishment Costs for Pump Station in Witpan					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Klippan PS	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
	Subtotal	**R 725 263,44**	**R 1 045 000,00**	**R 209 000,00**	**R 1 979 263,44**
	Add Contingencies (10%)	R 72 526,34	R 104 500,00	R 20 900,00	R 197 926,34
	Add P & G's (15 %)	R 119 668,47	R 172 425,00	R 34 485,00	R 326 578,47
	Add VAT (15%)	R 128 444,16	R 185 069,50	R 37 013,90	R 350 527,56
	Total	R 1 045 902,41	R 1 506 994,50	R 301 398,90	R 2 854 295,81
	Professional Fees				R 356 786,98
	Grand Total				R 3 211 082,78

Pump Stations Linked to Thabong WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.11: Estimated Refurbishment Costs for Pump Station Linked to Thabong

Estimated Refurbishment Costs for Pump Station in Thabong					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Old Thabong	R 804 837,06	R 836 000,00	R 156 123,00	R 1 796 960,06
2	Vida	R 725 263,44	R 1 045 000,00	R 209 000,00	R 1 979 263,44
3	Bronville South	R 847 196,90	R 880 000,00	R 164 340,00	R 1 891 536,90
4	Bronville North	R 847 196,90	R 880 000,00	R 188 540,00	R 1 915 736,90
5	Hani Park	R 763 435,20	R 1 100 000,00	R 220 000,00	R 2 083 435,20
	Subtotal	**R 3 987 929,50**	**R 4 741 000,00**	**R 938 003,00**	**R 9 666 932,50**
	Add Contingencies (10%)	R 398 792,95	R 474 100,00	R 93 800,30	R 966 693,25
	Add P & G's (15 %)	R 658 008,37	R 782 265,00	R 154 770,50	R 1 595 043,86
	Add VAT (15%)	R 706 262,31	R 839 631,10	R 166 120,33	R 1 712 013,74
	Total	R 5 750 993,12	R 6 836 996,10	R1 352 694,13	R13 940 683,35
	Professional Fees				R 1 742 585,42
	Grand Total				R15 683 268,77

Pump Stations Linked to Phomolong WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.12: Estimated Refurbishment Costs for Pump Station Linked to Phomolong

Estimated Refurbishment Costs for Pump Station in Phomolong					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Sky Range	R -			R -
2	Basil Read	R 460 135,28	R 528 000,00	R 88 110,00	R 1 076 245,28
	Subtotal	**R 460 135,28**	**R 528 000,00**	**R 88 110,00**	**R 1 076 245,28**
	Add Contingencies (10%)	R 46 013,53	R 52 800,00	R 8 811,00	R 107 624,53
	Add P & G's (15 %)	R 75 922,32	R 87 120,00	R 14 538,15	R 177 580,47
	Add VAT (15%)	R 81 489,96	R 93 508,80	R 15 604,28	R 190 603,04
	Total	R 663 561,09	R 761 428,80	R 127 063,43	R 1 552 053,32
	Professional Fees				R 194 006,66
	Grand Total				R 1 746 059,98

Pump Stations Linked to Ventersburg WWTW

Estimated Costs Associated with the Refurbishment and Upgrades of the Pump stations

The table below shows a summary of the anticipated costs for refurbishing the pump stations to bring them back into full operation.

Table 5.5.13: Estimated Refurbishment Costs for Pump Station Linked to Ventersburg

Estimated Refurbishment Costs for Pump Station in Ventersburg					
Item	**Names of pump stations**	**Mechanical Works**	**Electrical Works**	**Civil Works**	**TOTAL**
1	Mmamahabane	R 847 196,90	R 880 000,00	R 188 540,00	R 1 915 736,90
	Subtotal	**R 847 196,90**	**R 880 000,00**	**R 188 540,00**	**R 1 915 736,90**
	Add Contingencies (10%)	R 84 719,69	R 88 000,00	R 18 854,00	R 191 573,69
	Add P & G's (15 %)	R 139 787,49	R 145 200,00	R 31 109,10	R 316 096,59
	Add VAT (15%)	R 150 038,57	R 155 848,00	R 33 390,43	R 339 277,00
	Total	R 1 221 742,65	R 1 269 048,00	R 271 893,53	R 2 762 684,18
	Professional Fees				R 345 335,52
	Grand Total				R 3 108 019,71

WASTEWATER TREATMENT PLANTS

The following Tables compare the estimated construction costs for the three Options

Table 5.5.14: Estimated construction costs for Option 1

	OPTION 1: REFURBISH, UPGRADE ALL WASTE WATER TREATMENT PLANTS		
No	**Activity**	**Rates**	**Amount**
	Refurbish biofilter plant at Theronia to 25Ml/day	25Ml/d @ R39,47mil/Ml	R 986 750 000,00
	Refurbish Allanridge to 5,2 Ml/day	5,2Ml/d @ R2,75mil/Ml	R 14 300 000,00
	Refurbish Odendaalsrus to 6Ml/day	6Ml/day @ R3,19mil/Ml	R 191 400 000,00
	Refurbish Kutlwanong to 12.5 Ml/day	12,5Ml//day @ R6,6mil/Ml	R 82 500 000,00
	Refurbish Virginia to 26Ml/day	26Ml/day @ R13.72mi/Ml	R 35 672 000,00
	Refurbish Hennenman 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Phomolong 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Mmamahabane 1,5Ml/day	1,5Ml/day @ R0,79mil/Ml	R 1 185 000,00
	Refurbish existing 12Ml/day Thabong WWTW	Lump sum allowance	R 8 000 000,00
	Additional 25Ml/d activated sludge plant at Thabong	25Ml @ R13,2 mil/Ml	R 330 000 000,00
	Refurbish Witpan 25Ml/day	25Ml @ R13,2mil/Ml/day	R 330 000 000,00
	Upgrade Ventersburg WWTW to Oxidation Pond	1ML @R6 mil per 1 ML/day	R 6 000 000,00
	Purchase of land	60ha @ R100 000ha	R 6 000 000,00
	Demolition of structures	Lump sum allowance	R 5 000 000,00
	Operation and maintenance		
	Thabong	10 years	R 5 330 170,03

	Theronia	10 years	R 3 804 733,42
	Witpan	10 years	R 5 330 170,03
	Allanridge	10 years	R 5 330 170,03
	Odendaalsrus	10 years	R 5 330 170,03
	Kutlwanong	10 years	R 5 330 170,03
	Virginia	10 years	R 5 330 170,03
	Henneman	10 years	R 5 330 170,03
	Phomolong	10 years	R 5 330 170,03
	Ventersburg	10 years	R 1 768 800,00
	Mmamahabane	10 years	R 5 330 170,03
Total			**R 2 067 232 063,69**

Table 5.5.15: Estimated construction costs for Option 2

OPTION 2: REFURBISH, UPGRADE & DECOMMISSION VARIOUS WWTW			
No	**Activity**	**Rates**	**Amount**
	Refurbish Theronia to 16Ml/day	16Ml//day @ R8,44mil/Ml	R 135 040 000,00
	Refurbish Allanridge to 5,2 Ml/day	5,2Ml/day @ R2,75mil/Ml	R 14 300 000,00
	Pump station with pipeline from Witpan to Thabong	25Ml/day @ R2,63mil/Ml	R 65 750 000,00
	Refurbish Kutlwanong to 16 Ml/day	16Ml//day @ R8,44mil/Ml	R 135 040 000,00
	Refurbish Virginia to 26Ml/day	26Ml/day @ R13.72mi/Ml	R 356 720 000,00
	Refurbish Hennenman 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Phomolong 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Mmamahabane 3Ml/day	3Ml/day @ R1,58mil/Ml	R 4 740 000,00
	Refurbish existing 12Ml/day Thabong WWTW	Lump sum allowance	R 8 000 000,00
	Additional 30Ml/day activated sludge plant at Thabong	30Ml/day @ R15,83 mil/Ml	R 474 900 000,00
	Pump station with pipeline from Odendaalsrus to Kutlwanong	6Ml/day @ R3,19mil/Ml	R 3 780 000,00
	Pump statin with Pipe from Ventersburg to Mmamahabane	1Ml/ day @ R0,11mil/Ml	R 110 000,00
	Upgrade channels	Lump sum allowance	R 6 000 000,00
	Demolition of structures	Lump sum allowance	R 5 000 000,00
	Operation and maintenance		
	Thabong	10 years	R 5 330 170,03
	Theronia	10 years	R 5 330 170,03
	Witpan	10 years	R 5 330 170,03
	Allanridge	10years	R 5 330 170,03
	Odendaalsrus	10years	R 5 330 170,03
	Kutlwanong	10 years	R 5 330 170,03
	Virginia	10years	R 5 330 170,03
	Henneman	10 years	R 5 330 170,03
	Phomolong	10 years	R 5 330 170,03
	Ventersburg	10 years	R 5 330 170,03
	Mmamahabane	10 years	R 5 330 170,03
Total			**R 1 284 891 870,33**

Table 5.5.16: Estimated construction costs for Option 3

No	Activity	Rates	Amount
	OPTION 3: REFURBISH, UPGRADE & CONVERT CERTAIN WWTW TO OXIDATION POND SYSTEM		
No	**Activity**	**Rates**	**Amount**
	Upgrade Theronia WWTW to Oxidation Pond	25ML @R6 mil per 1 ML/day	R 150 000 000,00
	Refurbish Allanridge to 5,2 Ml/day	5,2Ml/day @ R2,75mil/Ml	R 14 300 000,00
	Pump station with pipeline from Witpan to Thabong	25Ml/day @ R2,63mil/Ml	R 65 750 000,00
	Refurbish Kutlwanong to 16 Ml/day	16Ml//day @ R8,44mil/Ml	R 135 040 000,00
	Refurbish Virginia to 26Ml/day	26Ml/day @ R13.72mi/Ml	R 356 720 000,00
	Refurbish Hennenman 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Phomolong 4Ml/day	4Ml/day @ R2,11mi/Ml	R 8 440 000,00
	Refurbish Mmamahabane 3Ml/day	3Ml/day @ R1,58mil/Ml	R 4 740 000,00
	Refurbish existing 12Ml/day Thabong WWTW	Lump sum allowance	R 8 000 000,00
	Additional 30Ml/day activated sludge plant at Thabong	30Ml/day @ R15,83 mil/Ml	R 474 900 000,00
	Upgrade Odendaalsrus WWTW to Oxidation Pond	6ML @R6 mil per 1 ML/day	R 36 000 000,00
	Pump statin with Pipe from Ventersburg to Mmamahabane	1Ml/ day @ R0,11mil/Ml	R 110 000,00
	Upgrade channels	Lump sum allowance	R 4 000 000,00
	Purchase of land	60ha @ R100 000ha	R 12 000 000,00
	Demolition of structures	Lump sum allowance	R 5 000 000,00
	Operation and maintenance		
	Thabong	10 years	R 5 330 170,03
	Theronia	10 years	R 1 768 800,00
	Witpan	10 years	R 5 330 170,03
	Allanridge	10years	R 5 330 170,03
	Odendaalsrus	10years	R 1 768 800,00
	Kutlwanong	10 years	R 5 330 170,03
	Virginia	10years	R 5 330 170,03
	Henneman	10 years	R 5 330 170,03
	Phomolong	10 years	R 5 330 170,03
	Ventersburg	10 years	R 5 330 170,03
	Mmamahabane	10 years	R 5 330 170,03
Total			**R 1 334 949 130,27**

5.5.5 Evaluating the three wastewater disposal options

Option 1

This option requires the existing biofilters to be retained.As mentioned in the condition assessment report,the accuracy of the cost estimate for this activity present a risk and an appropriate contractor should be engaged in order for the plants to be refurbished satisfactory.

Biofilter processes have are not very common and not been used for nitrification and denitrification.A current industry practice is the incorporation of an anoxic reactor between the primary settling tanks and the biofilters where nitrate rich post biofilter effluent can be recirculated to promote denitrification.

Option 2

From a view of total project costs (capital, operations and maintenance cost), Option 2 presents the most viable long term solution.

Cost of installation for Activated Sludge Systems is usually low.

Sludge Activated Sludge options are usually easy to operate and are more common in the Municipality

Extended aeration system requires a higher energy input and occupies relatively small area and hence fairly easy to secure from vandalism and theft.

Most of the existing plants are using the Activated Sludge System and still have newer works with a few mechanical/electrical problems and will be feasible to refurbish them.

Option 3

Pond system, is less expensive but is has the further problem that the quality of the final effluent will not be to the required General Limits for release into a waterway. This option will also require some pumping of the wastewater further pumping of the treated effluent to a river which is very far away from the plant.

There is uncertainty on the hydraulic gradient or slope of the ground on the existing plant location.

The available land to construct the pond system is limited, and the cost of demolishing and disposal of the existing plant infrastructure on where the ponds are to be built may prove to be expensive.

Operation and maintenance (O&M) costs of a normal 40.0Ml activated sludge plant will be in the order of R500 000 to R550 000/month compared to probably less than R150 000/month for a pond system being properly maintained, which includes the O&M on the two required pump stations, but that still leaves a substandard final effluent being deposited into the waterway, which cannot be allowed.

5.5.6 CONCLUSION AND RECOMMENDATION ON THE OPTIONS

SEWER INFRASTRUCTURE

It can be concluded that Option 2 presents the best and most viable solution for the management and treatment of wastewater in the Matjhabeng Central area. It is therefore recommended that Option 2 be applied for the medium to long term solution.

DWS has been known to be concerned over the capability of the local municipalities to operate and maintain mechanically orientated plants. This is due to often lack of funds and lack of ability to attract and keep experienced operators. Our view is that although the ponds appear cheaper , the effluent from such technology cannot meet the required general limits standards

In order to meet the required effluent standards, activated sludge needs to form part of the implemented process choice as in Option 2. The system nevertheless has the following drawbacks:

- It takes up huge space.
- Its energy requirements are high, as is normal for most activated sludge plants.
- It uses many variations of mechanical equipment which make it difficult to keep spares of and the great number of equipment applied make it also difficult to operate and maintain.

The mechanical and electrical equipment are also exposed and spread over a wide area, which make it prone to theft and vandalism.

It is clear the Option 2 offers compactness, security from theft and lower operation and maintenance costs than option 1 and 3.

In implementing Option 2,the following issues will also need to be addressed in order for the plants to operate efficiently :

All the sewer pump stations in Matjhabeng need to be refurbished to be in going working conditions

Safety and security challenges caused by the Illegal Miners and Illegal dwellers in Matjhabeng will need to be addressed to ensure that there is no more theft and vandalism in the sewer infrastructure

Community members need to be properly educated on how they use the infrastructure and avoid damaging any components.

All WWTW and Pump stations should have proper security and Organisational structure to ensure that all infrastructure is well taken care of.

WATER INFRASTRUCTURE

Reducing the demand for water is a critical tool of managing the water demand.
The aims of the Strategy are:

To build on current demand management activities;

To achieve significant and sustained water savings by consumers;

To minimize losses and non-revenue water in the distribution network;

To continue to build a water conservation culture in the community;

To improve water billing via metering, data management and reporting; and

To ensure the municipality positively contribute to the National Water Conservation targets set by the National and Provincial Department of Water and Sanitation

6 CHALLENGES FACED BY THE VARIOUS DEPARTMENTS LINKED DELIVERY OF WATER AND SANITATION

Challenges Facing the Infrastructure Directorate

- High vacancy rate;
  - Difficulty to find suitably qualified people during recruitment efforts – both internally and externally;
  - Insufficient training opportunities of current staff in critical occupational categories;
  - Lack of immediate availability of working tools and/or equipment;
- Lack of sufficient equipment, fleet and machinery;
  - People working beyond legal overtime requirements – linked to the high vacancy rate;
  - People who are above the legislated threshold, working overtime – linked to the high vacancy rate;
  - Deliberate damage to water infrastructure by small scale farmers to water their live-stock and Illegal miners to use water for their illegal activities;
- Non-replacement of employees who terminated their services.

Challenges Facing The Finance Department : Clearance Section / Billing / Credit Control

- Due to the increased population without the parallel increase in staff, resulted in a backlog, especially in the Clearance Section;
- All personnel currently in these Sections are acting, leaving a vacuum to their appointed positions;
- Due to the increased population without the parallel increase in staff, resulted in a work overload;
- Improper transfer of properties impacts negatively on the ability of the Finance Department to Bill consumers optimally, due to consumptions that must be written-off because properties registered under the municipal name – consumption on it must be written off;
- The tariff structure is not cost-based; This is a very serious defect on the municipality's side.

The MLM has a tariff policy that is more consistent with some of the tariff principles in the Water Services Act regulations or the requirements of the MSA. However, the implementation of such a policy and principles is not performed by the municipality. The 2014/15 water services structure was based on historical costs which have been escalated by a certain percentage over the years. The tariff structure bares no direct relationship to the actual costs of rendering water services and the level of cross subsidization between the poor and customers who can afford.

It can be argued however, that even if the MLM was to develop and implement an appropriate cost recovery tariff structure, most consumers would still not be able to pay for the service considering the high unemployment rate and slow economic development in the area caused by the closing down of mine shafts and the migration of skilled individuals and the "culture of non-payment" embodied by most residents. Therefore, sustainability of the service in the foreseeable future is high questionable without substantial subsidizations as well as a focus on limiting expenditures on service provision. To improve the payment levels (as a long term strategy), the MLM will have to ensure that various economic development initiatives are implemented by LED to turn the unemployment rate around. The strategy of installing pre-paid meters should not be overlooked, but it will however have little impact with regards to theft, vandalism and illegal connections, if not implemented, monitored and controlled properly.

Challenge Facing Customer Care

According to the Generic Batho Pele Service Standards and Implementation Framework for Local Government of June 2010, there has to be a system for registering affected services and or complaints with the emphasis on the Batho Pele Principles of 1998 which is similar to The White Paper on the Transformation of the Public Service of 1995 (WPTPS).

Other legislature also provides guidelines on keeping services on standard for our communities, such as the Public Service Commission Act, No 46 1997; the Promotion of Administration of Justice Act, No 3 of 2000, the Promotion of Access to Information Act of 2000; the Public Service Regulations; The White on Human Resources Management in the Public Service, 1997, The White Paper on Transforming Public Service Delivery of 1997; the Public Finance Management Act of 1999, the Open Democracy Act of 2000; including, but not limited to the Electronic Communications and Transactions Bill of 2002.

Since 1994, the South African Government has produced a substantial body of enabling legislation as indicated above to promote the transformation of the public service from the old, bureaucratic, rules bound organisation into a dynamic, results driven entity, focused on service delivery. It is the objective of Customer Care as set by the Batho Pele Principles of 1998 that puts forth the not only eight (8), but an increased amount of eleven (11) principles on transforming public service for increased accountability of municipalities. These activities include; Consultation, Service Standards, Access, Courtesy, Information, Openness and Transparency, Redress and Value for Money, Ensuring Innovation and Rewarding Excellence, Service Delivery Impact and Leadership and Strategic Direction.

However, a Draft Customer Care Policy has been developed in January 2015 for Matjhabeng Local Municipality to apply and is still pending recommendation at Exco, in order to see its way through Mayco for final approval at Council. No Customer Care Policy currently exists for MLM. The process of instituting such a developed document would set the driving force for customer services with the prominence of responsive services from the municipality to the greater public.

Simple, clear and understandable mechanisms for registering complaints through a variety of appropriate media, follow-up procedures and a policy on redress will need to be captured as part of a citizens' charter.

In this regard, it should further be noted that a Service Charter in relation to the Customer Care Policy is waiting in tandem for recommendation at Exco. In this case, there is no existence of a Service Charter for MLM. The importance of having such a document would ensure that our municipality perform their basic responsibilities and functions without compromise, because this charter is focused on the five pillars of the Back to Basics Approach, namely; Putting people first, demonstrating good governance and administration, delivering municipal services, sound financial management and accounting and sound institutional and administrative capabilities.

Lastly, we managed to revive the CoGTA administered CRM System (Customer Relationship Management). This web-based system is tailor made for local municipalities to capture and oversee all registered complaints and compliments. Training was provided for on two separate occasions by CoGTA staff and employees of MLM are assisting the public on relieving their complaints amicably through escalation and feedback via sms to the relevant departments. However, there are still some modifications that need to be sorted on this system and this can only happen once CoGTA has sole mandatory power over this system from its initial developers. Therefore, no effort is currently spared in improving services to be more responsive and accountable and primarily to increase the turnaround time of complaints and queries. This lays the basis to build on Customer Relationship Management (CRM) with intend of MLM to be the leading municipality in service delivery excellence in the Free State.

Challenges Faced by the By-Law Section

- Insufficient Fleet (2X SUV Vehicles and 2 Sedans)
- No Equipment (Shotguns, Two-way Radios, Cameras)
- No Skills Development Programmes
- No Infrastructure Numbers;
- No Quick Response Unit

7 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are based on the findings discussed in this report. They are further outlined below in line with the sections of the report.

Municipal Demographics

The average household size in Matjhabeng is 3 people per household. The highest number of population in Matjhabeng is in Welkom followed by Virginia.

The municipality has a high youth unemployment rates. The highest recorded rate is 62, 4 % in Ventersburg.

The municipality has challenges in collecting service delivery revenue due to high unemployment rates in the municipality.

Economic Growth

Although the mining sector is the highest contributor in the GDP of the municipality, the sector has been on a decline in recent years.

The economy is less diversified and will need to be more diversified to cope during tough economic times.

The declining economy can lead to the municipality losing skilled labour, citizens finding it had to afford the cost of living and the citizens battling to pay for their municipality rates and services.

Spatial Development and Land Use

There are areas that have been identified for low income housing development and other for medium to high income earners. Some are in Welkom, Thabong, Ondendaalsrus, Kutlwanong, Hennenman, Phomolong , Ventersburg and Mammahabane Meloding and Virginia.

Water

Status Quo

Sedibeng Water Water board is the main supplier of bulk water and internal reticulation.

The infrastructure is generally in good working condition and maintained regularly by Sedibeng Water Board.

It is estimated that over a third of the reticulation system is over 40 years old and 36% of water reticulation consists of old AC pipe which is prone to damage.

Efficiency levels and losses

The trends show an increase since 2006 to 2018 in NRW. High NRW figures means loss of revenue to the municipality due to poor water management.

The highest component of water loss is physical losses followed by non-metered consumption.

The main contributors to physical losses are leakages and illegal miners.

Apparent losses are mainly due to unmetered water use for the irrigation of parks, unmetered connections, non-metering of communal standpipes and non-metering of some stands in Phomolong, Meloding, Thabong, Bronville, Kutlwanong and Allanridge.

Future Demands Needs and Challenges

The Balkfontein water purification has a design capacity of 360 Ml/d, this will be able to cater for 2029 water demand of approximately 209 Ml/d.

The Municipality has developed water management strategies to manage water demand.

Upgrades and Refurbishments

The following upgrades have been identified, replacement of old worn out water pipes, replacement of old worn-out dilapidated galvanized steel pipes ,refurbishment of hydrants and valves once and replacement of water meters that are dysfunctional.

Expansion of networks

The network will need to be expanded as a result of the bucket system eradication resulting into new stands added on the network ,new developments but also in future as a result of recently approved and ongoing township establishments.

Drinking Water Risk Assessment

Sedibeng Water implements a weekly compliance monitoring, monthly catchment monitoring and biannual full SANS 241 monitoring programmes.

Regular testing shows that the water quality is highly complicate with SANS 241 requirements.

Sanitation

Current Loading and Bulk Capacity

It is estimated that Kutlwanong, Witpan Thabong and Mmamahabane wastewater treatment works are operating above design capacity.

Sanitation Network Issues

Some residents illegally building houses on top of sewer lines,

Illegal Miners who are constantly blocking and damaging the sewer pipes

some retail stores are also alleged to contribute to blockages to fat deposited in the network

Vandalised and stolen infrastructure and lack of resources to attend to these issues.

Waste Water Treatment Works Issues

Most wastewater treatment works do not comply with effluent management principles and sludge management requirements due to stolen or vandalised component of the treatment works.

Waste Water Pumps Stations Issues

Mots pumps stations operate partially due to vandalised or stolen pump station equipment.

Future Demands Needs and Challenges

Bulk Collection and Processing

There is a need to refurbish all the existing pump station, refurbish most of the wastewater treatment works and upgrade some in the short term and other in the long term.

Expansion of the Reticulation network

Expansion will be required as a result of adding more stands in the network and also as a result of new township establishments that will be developed in the future.

Risk Assessment

In general, all WWTWs have seen an improvement in the %CRR/CRR(max). Furthermore, except for the Kutlwanong WWTW , all WWTWs have improved their categories from previous categorisation.

Master Plan 2019- 2029

Sewer Infrastructure

For the purpose of minimising the costs required for refurbishments and Upgrades of the Water and Sewer Infrastructure In Matjhabeng Municipality,the projects will have to be implemented in the following three phases:

Long term

3-5 year Capital and Operational Plan

One year project and budget plan

After looking at different options for refurbishments and upgrades ,there was one Option recommended. This option involves combining some of the WWTW and converting others into pump stations. This is the most economical viable solution and is easy to implement in Matjhabeng as it uses the Activated sludge system which is more common in this municipality.

Water Infrastructure

Under water supply for Matjhabeng it has been established that the main supplier, Sedibeng Water Board is currently facing a very serious challenge due to the amount of money that they owed by the Matjhabeng Municipality. This will possibly become a major problem in the near future as they will be unable to carry out the necessary Upgrades to deal with the growing projected population for up to 2029.

The existing reticulation networks for the whole municipality also needs to be upgraded to cater for the projected demand volumes for up to 2029.

Reducing the demand for water is a critical tool of managing the water demand.
The aims of the Strategy are:

- To build on current demand management activities;
- To achieve significant and sustained water savings by consumers;
  - To minimize losses and non-revenue water in the distribution network;
  - To continue to build a water conservation culture in the community;
- To improve water billing via metering, data management and reporting; and

To ensure the municipality positively contribute to the National Water Conservation targets set by the National and Provincial Department of Water and Sanitation