agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

DRAFT STATUS QUO REPORT
FOR
LEJWELEPUTSWA DISTRICT MUNICIPALITY

FOR THE
DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT FRAMEWORKS FOR SIX DISTRICT MUNICIPALITIES IN FOUR PROVINCES

DEVELOPED BY:
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FOR:
Department of Agriculture, Land Reform and Rural Development
and Department of Forestry, Fisheries and Environment

Date: 31 March 2022

EXECUTIVE SUMMARY

- **Introduction and background**

The Department of Agriculture, Land Reform and Rural Development (DALRRD) in collaboration with the Department of Forestry, Fisheries and Environment (DFFE), the Eastern Cape, Free State, Mpumalanga and North West provincial departments responsible for environmental management, and the OR Tambo, Chris Hani, Lejweleputswa, Thabo Mofutsanyane, Nkangala, and Ruth Segomotsi Mompati district municipalities appointed a professional service provider to conduct strategic assessment of the environment by compiling Environmental Management Frameworks (EMFs) and developing listed activities' exclusion standards for these identified District Municipalities over a period of twenty-four (24) months.

The purpose of the EMF is to guide sustainable land development within the above six (6) identified District Municipalities. Additionally, the project intents to conduct pre-assessment of the environmental sensitivities and opportunities within these six (6) districts to streamline environmental authorizations. The EMFs are to be developed through an extensive consultative process which includes all relevant sector departments, provinces and municipalities, as well as any other Interested and Affected Party (I&AP). The EMFs will be developed through the extensive use of spatial tools, positive and negative mapping of environmental attributes, sensitivity mapping and detailed assessment of potential impacts including cumulative impacts and risk assessments.

The Lejweleputswa District Municipality's Environmental Management Framework (EMF) was initiated through a concurrent agreement between the national and provincial ministers responsible for environmental affairs in terms of Chapter 5 of the National Environmental Management Act (1998). It was prepared as a collaboration between the Department of Agriculture, Land Reform and Rural Development (DALRRD) and the Department of Forestry, Fisheries and the Environment (DFFE), and the Free State's Department of Economic, Small Business Development, Tourism & Environmental Affairs (DESTEA).

The need for the EMF was driven by authority concerns in the District regarding the following issues:

- The pressures to deliver services and enhance development, list many potential project, however some might occur in sensitive environments and trigger the need for Environmental Authorisation (EIA Regulations, 2014);
- Currently individual projects require separate EIA processes and authorisation which consume financial resources and time to deliver;
- Conducting a district wide EMF saves time and funds spent on individual projects.
- EMFs maps sensitivities (constraints) and opportunities of the identified study areas.

Muvuledzi Consulting (PTY) Ltd has been appointed to conduct the EMF process on behalf of and in collaboration with the collaborating local, provincial and national authorities together with other key role players in the District.

- **EMF Development Approach**

The environmental obligations of the DALRRD in terms of section 11 of NEMA Schedule 1 include the need to compile Environmental Implementation Plans (EIP) to show how the Department will comply with legislation and according to Schedule 2 the need to compile Environmental Management Plans (EMP) to show what and how the department's programmes contribute towards Environmental Management (SPLUMA, SG office, Deeds, etc).

Furthermore, Sections 12 and 21(j) of SPLUMA respectively determine that special tools should take cognisance of any environmental management instruments and that spatial tool must include a strategic assessment of the environmental pressures and opportunities.

The EMF development approach for this project follows the EMF regulations requirements as put out below:

a) identify by way of a map or otherwise the geographical area to which it applies;

b) specify the attributes of the environment in the area, including the sensitivity, extent, interrelationship and significance of those attributes;
c) identify any parts in the area to which those attributes relate;
d) state the conservation status of the area and in those parts;
e) state the environmental management priorities of the area;
f) indicate the kind of developments or land uses that would have a significant impact on those attributes and those that would not;
g) indicate the kind of developments or land uses that would be undesirable in the area or in specific parts of the area;
h) indicate the parts of the area with specific socio-cultural values and the nature of those values;
i) identify information gaps;
j) indicate a revision schedule for the environmental management framework; and
k) include any other matters that may be specified.

Items a) to d) and item h) are to be addressed in this, the Status Quo phase of this EMF. The purpose of the Status Quo phase is to lay a foundation for sustainable development by generating an understanding of the current situation in the District with respect to environmental attributes and their management.

Leading on from the literature review, the development of the status quo assessment has involved technical work undertaken as specialist studies and has also been informed by input from stakeholders through a consultation process and guidance from the Project Steering Committee (PSC). The specific approach, methods, and timing of the activities for each of these elements are described in this section.

- **Environmental Profile**

Lejweleputswa District Municipality (LDM) is situated in the western region of the Free State province, covering an area of 32 287km². LDM is bordered by three other district municipalities, namely, Thabo Mofutsanyana in the north east, Fezile Dabi in the north and Xhariep in the south west whilst the Mangaung Metro borders it in the south east.

LDM enjoys almost about a third of the provincial landscape and is home to about 22% of the Free State population (LDM DDM, 2021). As in the name, “Lejweleputswa” meaning grey rock, LDM is rich in gold deposits and lies at the heart of the province’s goldfields. Further to these natural riches, LDM is also a major maize and sunflower producer. The District Municipality is divided into five (5) local municipal areas. These are: Nala Local Municipality which is situated North of the LDM, Matjhabeng Local Municipality in north-eastern region of the district, Masilonyana Local Municipality south-east of the district, Tokologo Local Municipality in the south western section and lastly, Tswelopele Local Municipality in the western section.

According to the LDM District Development Model Draft Report (2021), the total population of Lejweleputswa DM is 649 964. It can be noted that Matjhabeng LM is home to majority of Lejweleputswa’s population in the district with 66% (429 113) population count. Nala LM accounts for 12% (78 515), while 10% (62 770) of the district’s population is found in Masilonyana LM. Lastly, only 7% (47 373) and 5% (29 149) of the district’s population is in Tswelopele LM and Tokologo LM respectively.

In terms of population growth, the overall district population increased by 0.8% for the period 2011–2016 with Matjhabeng LM having the highest population growth of 1.2%. Nala LM had a negative population growth of -0.8% and Tswelopele LM also experience a 0.1% decrease. The local municipality population profile showed that Masilonyana LM grew by 1.1%, followed by Tokologo LM at 0.1% growth rate. However, within the District Municipality, the dominant population age group is of 15 – 64 years, making up 65.2% of the population. Matjhabeng LM has the highest figure of 287 809 in this population group, followed by Nala with 47 272 and Masilonyana at 39 674. The group is economically active compared to other groups, therefore, creation of employment opportunities is critical for this group. The district has a median age of 27 years which is a slightly higher than the median age in Free State at 26 years and a total number of females at 50.31% (319 172) and males at 49.69% (315 291).

Economically, the District Municipality is is largely a mining region, a sector accounting for 31.8% of the district's Gross Value Add (GVA). Other sectors contributing to the districts GVA include community services - 17%, finance - 3%, trade - 14%, transport - 8%, manufacturing - 4%, electricity - 2%, agriculture - 8% and construction - 2%. Trade contributes 20% of employment, followed by community services- 19%, mining - 16%, households - 11%, finance - 9%, agriculture - 9%, manufacturing - 6%, construction - 5%, transport - 4% and electricity - 1%. The economy of the district has been in recession since 2015 to 2018, thus signalling economic difficulties experienced by the district.

The land cover is vastly vegetated, providing an ideal investment opportunity for agro-processing. Out of the five district municipalities in the Free State province, LDM has the third highest proportion of grazing land (11 269.58km^2 or 21.8% of total grazing land) and the highest proportion of arable land (8 137km^2 or 35.6% of total arable land). Lejweleputswa has the second highest number of farms in the province, equating to 2069 farm units, signalling a very good potential for agricultural activity in the district.

According to the LDM District Development Model (2021), as of 2017, the total income for the commercial agriculture industry in the province was R46,9 billion. The key contributors to the total income were mixed farming (accounting for R25,4 billion or 54,2%), followed by livestock farming (R11,2 billion or 23,9%) and growing of cereals and other crops (R8,3 billion or 17,7%). Again, Lejweleputswa was the second highest contributing district in the province with R11,7 billion (24.9% of provincial total).

In terms of mining activities, Lejweleputswa DM has 15 gold mines operating from the towns of Welkom, Virginia and Odendalsrus. Gold mining is dominant in Matjhabeng with two considerable gold reserves with an estimated 20- years life span that still exist in some parts of Matjhabeng and Nala Local Municipalities. Lejweleputswa has significant mining potential for the following: Low-grade coal in Matjhabeng and Nala, Salt in the municipalities of Matjhabeng, Masilonyana, Tswelopele, and Tokologo, Gypsum fields in Tokologo, and Diamond Kimberlite outcrops in Boshof and Theunissen.

- **Environmental Management Priorities**

Environmental governance refers to the processes of decision-making involved in the management and control of the environment and natural resources. South African district municipalities perform environmental management functions, allocated to them in terms of the Constitution, the suite of National Environmental Management Acts as well as other sector specific legislations on powers and functions. National Environmental Management Act promotes the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities.

Climate change and other related events are already causing and will continue to cause a number of challenges for Lejweleputswa District Municipality, linked to impacts such as increased temperatures, extreme weather events (e.g. flooding and drought). To respond to these changes, the District Municipality through its District Environmental Co-ordination Committee has initiated discussions on having its own Climate Change Strategy and Action Plan. This is a phased programme, which has focused on climate change adaptation and enhancing the Municipality's ability to cope with climate change impacts. The likely climate change impacts have been assessed and plans, programmes and projects developed to assist the Municipality in dealing with these impacts.

The Lejweleputswa Integrated Development Plan indicates the existence of the structure to facilitate engagement around environmental management and planning. Environmental management is currently a division under Environmental Health Services & Disaster Management, which includes Fire Fighting. There are existing mechanisms to capacitate local communities i.e. Environmental Calendar Days (water week, Arbour week). The Integrated Development Plan reflects waste management projects funded by the local municipalities, as well as some Expanded Public Works Programmes (EPWP) projects managed by the district. There are municipal by-laws as well as a Disaster Management Plan in place, which covers all the local municipalities.

The District has produced an Environmental Management Plan (EMP) which was adopted by Council and processes of developing a Climate Change Adaptation and Mitigation Strategy as well as the Air Quality Management Plan have gained momentum. Lejweleputswa District Committee on Environmental Co-ordination

comprised of representatives from variety of stakeholders is central in terms of facilitating discussions on issues relating to environment such as:

- Different sectors in the various levels of government e.g., environment, planning, agriculture etc. from local municipalities, the district municipality, the provincial department and the national environment department.
- The provincial nature conservation authority.
- Bulk public services providers.
- Private sector stakeholders representing industry and other sectors.
- NGOs that are active in the District such as the World Wide Fund for Nature (WWF), the Endangered Wildlife Trust (EWT) and many other.

This committee will sit in the Lejweleputswa District Municipality's Project Steering Committee on the development of Environmental Management Framework.

Other areas of focus relating to environmental management and governance will include:

- Waste Management and Pollution
- Air Quality
- Biodiversity Management
- Climate Risk and Vulnerability
- Environmental Awareness
- Disaster Management
- Policy and Legislative Mandates
- SCM Processes (Bid Committees)
- Coordination of Environmental Related Matters

- **Public Participation**

During this phase sector focus groups will be established and workshops held to verify information, and this draft report must be submitted to the project technical team and project steering committee for comments prior to finalisation.

- **Transition from Status Quo to Desired State**

The Status Quo Report must be used to facilitate a consultative public participation process through which the desired state of the environment for the area will be established. Based on the spatial component of the desired state of the environment / development vis-à-vis bio-physical constraints and opportunities, the study area must be divided into environment and development control zones. The purpose of such strategic zoning would be to facilitate future decision-making regarding sustainable development requirements and acceptability of development applications.

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LIST OF ACRONYMS

AMD	Acid Mine Drainage
BTEX	Benzene, Toluene, Ethyl Benzene and Xylene
DEA	Department of Environmental Affairs
DST	Decision Support Tool
DWS	Department of Water and Sanitation
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
EIMS	Environmental Information Management System
EMF	Environmental Management Framework
FDQC	Flow Derived Quinnary Catchments
GIS	Geographic Information System
IDP	Integrated Development Plan
INR	Institute of Natural Resources
IRIS	Integrated Regulatory Information System
NFEPA	National Freshwater Ecosystem Priority Area
NO_2	Nitrate
PES	Present Ecological State
PO4	Phosphate
RIFSA	Road Infrastructure Strategic Framework for South Africa
SAHRIS	South African Heritage Resources Information System
SDF	Spatial Development Framework
SO4	Sulphate
WWTW	Waste Water Treatment Works

1. INTRODUCTION

1.1 Background

The Department of Agriculture, Land Reform and Rural Development (DALRRD) in collaboration with the Department of Forestry, Fisheries and the Environment (DFFE), the provincial departments responsible for environmental affairs and district municipalities listed below, appoint a professional service provider to conduct a strategic assessment of the environment by compiling Environmental Management Frameworks (EMFs) and develop listed activities' exclusion standards in and for six (6) prioritized and adjacent District Municipalities namely: OR Tambo and Chris Hani District Municipalities in the Eastern Cape, Lejeleputswa and Thabo Mofutsanyane District Municipalities in the Free State, Nkangala District Municipality in Mpumalanga, and Dr Ruth Segomotsi Mompati District Municipality in the North West Province over a period of twenty-four (24) months.

The purpose of the EMF is to guide sustainable land development within the above six (6) identified District Municipalities. The intention is to conduct a pre-assessment of the environmental sensitivities and opportunities within these six (6) districts to streamline environmental authorizations. The EMFs are to be developed through an extensive consultative process which includes all relevant sector departments, provinces and municipalities, as well as any other Interested and Affected Party (I&AP). The EMFs will be developed through the extensive use of spatial tools, positive and negative mapping of environmental attributes, sensitivity mapping and detailed assessment of potential impacts including cumulative impacts and risk assessments.

Additionally, the project aims to also develop standards for the exclusion of certain activities in these six (6) specified district municipalities.

1.2 PROJECT MOTIVATION

The Department of Agriculture, Land Reform and Rural Development (DALRRD) is identified in Schedules 1 and 2 of NEMA as having a mandate that can both affect and promote the environment, and hence is required to develop an Environmental Implementation Plan (EIP) and an Environmental Management Plan (EMP) at least every five years. In response to these obligations especially in relation to projects that can affect the environment, the Department is required to obtain environmental authorisation for activities which may significantly affect the environment in terms of chapter 5 of NEMA.

To strengthen project planning, the Environmental Policy of the Department provides for measures to reduce red tape and streamline environmental authorisation processes. It provides that the Department should explore various legally acceptable avenues for obtaining environmental authorisation.

Chapter 5 of the National Environmental Management Act (NEMA) No 107 of 2008 and Integrated Environmental Management Guideline Series of the then Department of Environmental Affairs (DEA) introduces a suite of Integrated Environmental Management instruments to inform and guide environmental impact management.

The need to streamline and integrate regulatory processes while ensuring sustainability in the implementation of rural development projects is one of the requirements in the National Development Plan (NDP). The NDP found that the lack of interdepartmental integration around regulatory requirements and the constrictive nature of the regulatory framework hampered project delivery. It also challenged government to deliver a coherent and predictable yet adequate regulatory framework that reduces red tape and the cost of compliance to support the national developmental needs.

The National Environmental Management Act (NEMA) No 107 of 1998 makes provision for the use of instruments to ensure environmental protection in certain cases instead of command and control measures. Specifically, sections 24(2) (e) makes provision for the Minister to exclude certain listed activities from the requirement to obtain an Environmental Authorisation based on an environmental management instrument adopted in the prescribed manner and an EMF is one such instrument.

In line with the need to streamline authorization processes, Department of Agriculture, Land Reform and Rural Development (DALRRD) has initiated collaboration between itself, the Department of Forestry, Fisheries and the Environment (DFFE), the above listed provincial departments of environmental affairs and the six (6) district municipalities. The collaboration is outlined in detail in the Department's Consolidated Environmental Implementation and Management Plan (CEIMP).

The environmental obligations of the DALRRD as contained in the CEIMP in terms of section 11 of NEMA Schedule 1 include the need to compile Environmental Implementation Plans (EIP) to show how the Department will comply with legislation and according to Schedule 2, the need to compile Environmental Management Plans (EMP) to show what and how the department's programmes contribute towards Environmental Management (SPLUMA, SG office, Deeds, etc.).

NEMA provides that EIPs & EMPs should help government to:

a) coordinate and harmonise environmental policies, plans, programmes and decisions of the various national departments to:
   i. minimise the duplication of procedures and functions; and
   ii. promote consistency in the exercise of functions that may affect the environment;
b) give effect to the principle of cooperative government in Chapter 3 of the Constitution;
c) secure the protection of the environment across the country as a whole;
d) prevent unreasonable actions by provinces in respect of the environment that are prejudicial to the economic or health interests of other provinces or the country.
e) enable the Minister to monitor the achievement, promotion, and protection of a sustainable environment;

The objectives of the project are:

- To compile six (6) Environmental Management Frameworks (EMFs) to streamline the environmental authorisation processes in the identified districts.
- To develop standards for excluded certain activities in the Six (6) identified district municipalities (refer to NEMA S24).

The aim is to have the EMFs and their Activities' Exclusion Standards gazetted as instruments to allow certain development activities to be streamlined insofar as environmental authorizations is concerned. Most of the projects identified in various District's Rural Development Plans are of medium to large scale in nature and they generally occur in sensitive environments and in the South African environmental legislative context, they trigger the need for Environmental Authorization. Given the scarcity of financial resources to implement a rural development project for each community in South Africa, the savings of funds and time derived from conducting EMFs instead of individual project EIA would go a long way in expanding the beneficiary database of government in general. More people may be enrolled in the programme hence results in more job opportunities being created.

Although these Environmental Management Frameworks (EMFs) would be compiled according to the Environmental Management Framework (EMF) Regulations 2010, the Department intends to develop EMFs that map sensitivities and opportunities of the identified study areas whilst juxtaposing them with various key commodities identified through District Rural Development Plans (DRDPs).

Furthermore, Sections 12 and 21(j) of SPLUMA respectively determine that spatial tools should take cognisance of any environmental management instruments and that spatial tools must include a strategic assessment of the environmental pressures and opportunities.
The Lejweleputswa District Municipality's Environmental Management Framework (EMF) was initiated through a concurrent agreement between the national and provincial ministers responsible for environmental affairs in terms of Chapter 5 of the National Environmental Management Act (1998). It was prepared as a collaboration between the Department of Agriculture, Land Reform and Rural Development (DALRRD) and the Department of Forestry, Fisheries and the Environment (DFFE), and the Free State's Department of Economic, Small Business Development, Tourism & Environmental Affairs (DESTEA).

The need for the EMF was driven by authority concerns in the District regarding the following issues:

- The pressures to deliver services and enhance development, list many potential project, however some might occur in sensitive environments and trigger the need for Environmental Authorisation (EIA Regulations, 2014);
- Currently individual projects require separate EIA processes and authorisation which consume financial resources and time to deliver;
- Conducting a district wide EMF saves time and funds spent on individual projects.
- EMFs maps sensitivities (constraints) and opportunities of the identified study areas.

Muvuledzi Consulting (PTY) Ltd has been appointed to conduct the EMF process on behalf of and in collaboration with the collaborating local, provincial and national authorities together with other key role players in the District.

1.3 PURPOSE OF THE ENIVIRONMENTAL MANAGEMENT FRAMEWORK

The National Environmental Management Act: EMF regulations 2010 and the EMF guidelines of 2012 outline the purpose and set the legislated requirements for developing an EMF. The main purpose of an EMF is to streamline and facilitate efficient implementation of the environmental authorisation process. This is possible due to the proactive nature of the EMF which allows for the anticipation and prevention of environmental damage before development proposals are evaluated.

The EMF includes a strong spatial output, namely the Environmental Information Management System (EIMS), Environmental Management Framework Plan (EMFP) and implementation protocol, defined in this process as the Decision Support Tool (DST) as well as exclusion standards. The DST facilitates access to the EMF information and outputs by users of the EMF which includes developers, planners, decision makers and broader society.

- ***Aim***

In view of the above context, the specific aim of the EMF is to: ***proactively support and integrate environmental considerations into decision-making and development planning across the District Municipality, by supporting sustainability, securing environmental protection and promoting cooperative environmental governance through a land-use management mapping tool.***

- ***Objectives***

The following objectives need to be met in order to fulfil this aim:

i) Document and provide spatially referenced information indicating the location, sensitivity and value of resources and systems (Present State).

ii) Document the drivers, factors and trends responsible for the Present State and analyse these in determining the key sustainability issues.

iii) Establish the Desired Future State (DFS) and environmental management priorities in the area.

iv) Define opportunities and constraints for different land-uses and development activities.

v) Develop tools that provide for the effective application of the information and outcomes of the process at a planning and project level, and appropriate responses to address and manage the environmental issues identified in each the district municipality.

1.4 ENVIRONMENTAL MANAGEMENT FRAMEWORK PROCESS

The aim is to gazette the EMF and Exclusion Standards as instruments to allow certain development activities **(many identified in DRDP and other Spatial Targeting instruments)** to be streamlined insofar as environmental authorizations is concerned.

The EMF regulations require that an EMF contain the following:

a) *identify by way of a map or otherwise the geographical area to which it applies;*
b) *specify the attributes of the environment in the area, including the sensitivity, extent, interrelationship and significance of those attributes;*
c) *identify any parts in the area to which those attributes relate;*
d) *state the conservation status of the area and in those parts;*
e) *state the environmental management priorities of the area;*
f) *indicate the kind of developments or land uses that would have a significant impact on those attributes and those that would not;*
g) *indicate the kind of developments or land uses that would be undesirable in the area or in specific parts of the area;*
h) *indicate the parts of the area with specific socio-cultural values and the nature of those values;*
i) *identify information gaps;*
j) *indicate a revision schedule for the environmental management framework; and*
k) *include any other matters that may be specified.*

Items a) to d) and item h) are to be addressed in this, the Status Quo phase of this EMF. The purpose of the Status Quo phase is to lay a foundation for sustainable development by generating an understanding of the current situation in the District with respect to environmental attributes and their management.

1.5 SCOPE OF WORK

This project is a collaboration between DALRRD (the financial sponsor and beneficiary of the project (NDP, IGRF Act, DDM)) and DFFE (the Content Sponsor (NEMA Custodian)) as well as the provincial departments responsible for the environment as the product owner and Competent Authority (NEMA), who will chair the district PSC (as Owners) and will be responsible to Gazette the final EMF and Exclusion standard, while the district municipalities will be the beneficiary and main users when implementing projects.

Table 1 below summarizes the aims, objectives and deliverables of the project phases, whereas this report contributes to Phase 2: Status Quo Phase of the project.

Table 1: Summary of the aims, objectives and deliverables of the project phases.

Phases	Status

PHASE 1: INCEPTION PHASE ***What do we want to achieve and how are we going to do it?*** **Purpose:** Define the aims, objectives and nature of the project deliverables and the proposed approach and methods for achieving these. Establish objectives of the project / confirmation of the Project Scope. Establishing Project governance structures and comprehensive costing plan. Review legal and domestic as well as international literature and develop a stakeholder management plan. **Deliverables:** Inception report, Literature review, Stakeholder management plan Public Participation Process: Advertise and generate awareness of the project (Webpage development, BID distribution, public notices). Register I&APs for involvement in the project. Inception report made available for information purposes (Webpage and public places).	Completed 31 January 2022
PHASE 2: STATUS QUO ASSESSMENT ***Where are we now?*** Situational analysis by compiling spatial and narrative representation of the status quo of the environment. Synopsis of the approved spatial development perspective. **Purpose:** Map, classify and document the Present State of the receiving environment (socioeconomic, biophysical, etc.) as well as trends and causes of the present state and environmental issues **Deliverable:** Status quo and supporting specialist reports **Public Participation Process:** Establish sector focus groups and hold workshops to verify information, and draft of this report must be submitted to the project technical team and project steering committee for comments prior to finalisation.	**Timeframe:** 31 March 2022
PHASE 3: OPPORTUNITIES AND CONSTRAINTS LIST ***What are the priority commodities and enterprises?*** Identify the key commodities and enterprises. List the opportunities and constraints. Do a strategic assessment and compile a Commodity Analysis report. **Purpose:** Map, classify and document the Present State of the receiving environment (socioeconomic, biophysical, etc.) as well as trends and causes of the present state and environmental issues. **Deliverable:** Commodity Analysis report, Opportunity and Constraints report, PP report. **Public Participation Process:** Conduct public open days to present the draft EMF, Commodity Analysis report, Draft Opportunities and Constraints report and get input on broad issues regarding environmental constraints and opportunities. Establish sector focus groups and hold workshops to verify information, a draft of this report must be submitted to the project technical team and project steering committee for comments prior to finalisation.	**Timeframe:** 31 May 2022

PHASE 4: ENVIRONMENTAL MANAGEMENT FRAMEWORK ***How do we get there?*** The following aspect must be developed and then integrated to form the basis of the EMF: • The desired state of the environment • Proposed environmental control zones **Purpose:** The Status Quo Report must be used to facilitate a consultative public participation process through which the desired state of the environment for the area will be established. Based on the spatial component of the desired state of the environment / development vis-à-vis bio-physical constraints and opportunities, the study area must be divided into environment and development control zones. The purpose of such strategic zoning would be to facilitate future decision-making regarding sustainable development requirements and acceptability of development applications. **Deliverable:** Draft EMF	**Timeframe:** 31 August 2022
PHASE 5: STRATEGIC ENVIRONMENTAL MANAGEMENT PLAN ***Who will be responsible?*** **Purpose:** Draft a Strategic Environmental Management Plan that will address management guidelines and responsibilities. **Deliverable:** Strategic Environmental Management Plan **Public Participation Process:** PMT and ERG workshop and circulation of reports for review.	**Timeframe:** 30 November 2022
PHASE 6: ACTION PLANS FOR IMPLEMTING THE EMF ***How will this be used?*** Include recommendations on how the EMFs should be implemented, monitored and updated on a regular basis, sustainable parameters and all the relevant action plans required in the SEMP. **Purpose:** Draft a document that include all the relevant action plans required for the implementation of the EMF and all the strategies that form part thereof. **Deliverable:** Action Plan **Public Participation Process:** PMT and ERG workshop and circulation of reports for review.	**Timeframe:** 30 November 2022
PHASE 7: EXCLUSION STANDARDS **What should be excluded and what standards will be used?** **Purpose:** Draft exclusion standard for listed activities relating to certain commodity enterprises and make available for public review.	**Timeframe:** 30 April 2023

Deliverable: Draft Exclusion standards, Public comments **Public Participation Process:** Circulation of standards for review.	
PHASE 8: FINAL EXCLUSION STANDARDS AND IMPLEMENTATION PROTOCOL ***What forms and protocols are required for implementation?*** **Purpose:** Develop a final draft exclusion standards for listed activities relating to certain commodity enterprises to be adopted terms of Sections 24(2)(10)(a) read with Section 24(10) (d) of NEMA. Develop project registration forms and protocols. **Deliverable:** Final draft exclusion standards, Final Version of the GIS Viewer, Relevant forms and implementation protocols. Gazetting of documents. **Public Participation Process:** Circulation of documents for review.	**Timeframe:** 30 June 2023

1.6 STUDY APPROACH

Leading on from the literature review, the development of the status quo assessment has involved technical work undertaken as specialist studies and has also been informed by input from stakeholders through a consultation process and guidance from the Project Steering Committee (PSC). The specific approach, methods, and timing of the activities for each of these elements are described in this section.

1.6.1 Specialist Investigations

The specialist studies listed in Table 2 included the following activities:

- ***Describe the governance framework***

Identification of the relevant governance framework (institutional, legal and regulatory arrangements and /requirements) which is applicable to the specialist field. This is largely understood in terms of the national and provincial government structures and legislation but has been enhanced and refined for the local governance structures.

- ***Map the spatial extent of relevant resources or features***

The EMF has a particularly strong spatial focus. As part of the baseline assessment, the mapping of the location and extent of environmental features and systems is required. Only current and available data has been used for this exercise. As far as reasonably possible, at least high quality provincial data was sourced and incorporated. The data layers used are considered appropriate for informing municipal planning at a district scale and for informing more specific mapping and investigation required in the environmental authorisation process.

- ***Classify and define the conservation or social use value/importance/status***

Conservation and/or social use value has been assessed where appropriate according to relevant legal standards and/or environmental thresholds. Again, where appropriate, this assessment has been couched in the socio-economic context of the District.

- ***Identify Condition and Environmental Issues and Drivers***

The data is analysed, identifying the key direct and indirect (secondary) drivers of environmental change. This task also assesses the cross-cutting issues relating to the various resources and features. For example, in the case of the biodiversity sector – "Transformation and fragmentation of habitats is leading to increased threat status of systems. This is reducing the opportunities for supporting the tourism industry".

Table 2: List of specialist studies and authors for the EMF Development Project

Component	Specialist
Cultural Heritage	Ms Jennifer Mokakabye
Geohydrology	Mr Azwindini Mukheli
Infrastructure and Services, Socio-Economic & Planning	Ms Avhatakali Sithagu
Public Participation Process	Ms Dipitseng Manamela
GIS Specialist	Dr Timothy Dube
Biodiversity	Mr Jerry Molepo

1.6.2 Policy and Legislative Review

In line with the need for the EMF to facilitate development planning and decision making being 'legally compliant", a legislation and policy review has been undertaken. The review lists relevant Policy and Acts, categorizing them according to National, Provincial and Local levels of governance. The intention is that this baseline is built on by defining what the specific requirements or implications of the policy/act are for the development and/or outcomes of the EMF. In addition to the references provided in the TOR and listed below, Table 3 summarizes the initial policy and legal review.

Table 3: Relevant Legislation (List from Literature review)

NAME OF REPORT	DATE
A. NATIONAL ENVIRONMENTAL LEGISLATION	
The Constitution of the Republic of South Africa Act 108 of 1996 (The Constitution)	1996
The National Environmental Management Act (Act No. 107 of 1998), NEMA as amended	1998
Specific Environmental Management Acts (SEMAs) promulgated in terms of NEMA, 1998, as amended, all fall under the auspices of the overarching National Environmental Management Act, (Act No. 107 of 1998), (NEMA). • National Environmental Management: Protected Areas Act (Act No. 57 of 2003), known as the NEM:PAA • National Environmental Management: Biodiversity Act (Act No. 10 of 2004), NEM:BA • National Environmental Management: Air Quality Act (Act No. 39 of 2004), NEM:AQA National Environmental Management: Waste Act (Act No. 59 of 2008), NEM:WA	 2003 2004 2004 2008
Conservation of Agricultural Resources Act (Act No. 43 of 1983), as amended	1983
Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).	1970
National Forests Act, 1998 (Act No. 84 of 1998)	1998
National Water Act (Act No. 36 of 1998)	1998

The Water Services Act, 1997 (Act No. 108 of 1997)	1997
Municipal Systems Act (Act No. 32 of 2000)	2000
Infrastructure Development Act, (Act No. of 2014)	2014
The Spatial and Land Use Management Act, (Act No. 16 of 2013) and SPLUMA regulations	1998
Electricity Regulation Act	2006
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)	1983
Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA)	2002
South African Weather Services Act	2001
The Development Facilitation Act, 1995 (Act No 67 of 1995) (DFA)	1995
The Mineral and Petroleum Resources Development Act, (Act No. 28 of 2002) and regulations.	2002
Disaster Management Act (No. 57 of 2002)	2002
Electricity Regulation Act (Act No. 4 of 2006)	2006
The World Heritage Convention Act, 1999 (Act No. 49 of 1999)	1999
National Heritage Resources Act (Act No. 25 of 1999)	1999
Provincial Planning and Development Act, (Act No. of 2009)	2009
Carbon Tax Act	2019
Environment Conservation Act	1989
Free State Nature Conservation Ordinance	1969
Local legislations	
ENVIRONMENTAL REGULATIONS	
Environmental Impact Assessment regulations in terms of Chapter 5 of NEMA (Act 107 of 1998) as published in Government Notice R.543 of 18 June 2010.	1998
The NEMA EMF Regulations, 2010	2010
B. PROVINCIAL DOCUMENTATION AND STUDIES	
Free State Green Economy Strategy	2014
Climate Change Adaptation Response Strategy for Free State	2017
DESTEA Strategic Plan (2020/21 – 2025/26)	2021
Free State Province Biodiversity Plan (Study)	2016
The quality and effectiveness of Environmental Management Frameworks (EMF) in South Africa (Study)	2015
Effectiveness of Environmental Management Frameworks in South Africa: Evaluating stakeholder perceptions and expectations (Study)	2010
C. LOCAL DOCUMENTATION AND STUDIES	
LDM District Development Model Draft 2 (August 2021)	2021
LDM Annual Report 2019-2020	2020
LDM Final Draft IDP 2021-2022	2021
Masilonyana Local Municipality Infrastructure Masterplan (2009-2039)	2010
Masilonyana LM Draft IDP (2017-2022)	2017
Matjhabeng LM Final IDP (2021-2022)	2021
Matjhabeng LM Land Use Scheme 2021-22	2021
Matjhabeng LM Local Economic Development Strategy 2019	2019
Matjhabeng LM Spatial Development Framework (2020/21 – 2024/25)	2021
Nala LM IDP 2015/16	2015
Tokologo LM IDP 2017/18	2017
Tswelopele LM IDP 2018/19	2018
OTHER SOURCES OF INFORMATION	
SMME Baseline Study: Summary Report and Operational Guidelines	

The Guideline Document developed by the National Department of Environmental Affairs and Tourism on Strategic Environmental Assessment in South Africa, February 2007	2007
DEA (2020) Environmental Management Frameworks in terms of the EMF Regulations of 2010, Integrated Environmental Management Guideline Series 6, Department of Environmental Affairs (DEA), Pretoria, South Africa.	2020
National development Plan (NDP)	

1.6.3 Stakeholder Consultation Process

According to the DEA (2010), the EMF Guidelines place the emphasis of public participation in getting inputs to existing practices and baseline situations, and the determination of the desired state of the environment under consideration. The PPP should therefore have three the following three goals:

ii. To inform interested and affected parties (I&APs) of the EMF process and its objectives.
iii. To provide an opportunity for I&APs to engage in the process.
iv. To provide I&APs with an opportunity to review and comment on deliverables.

The way in which these objectives have been addressed in the Status Quo Phase is detailed below.

1.6.3.1 Inform and Register Stakeholder Participation

The requirements of the first bullet were met in the beginning of the Status quo phase when the project was publicly advertised and interested and affected parties (I&APs) were provided with a background document and afforded the opportunity to register their wish to formally participate in the EMF development process. This objective has been addressed in this phase through the maintenance of the stakeholder database, which has been updated as additional interested parties have participated in the process.

1.6.3.2 Stakeholder Engagement

The stakeholder engagement process during this phase has involved the following activities undertaken to elicit feedback and input from key stakeholders. The EMF is based primarily on the use of existing information. An important aspect of the status quo phase was therefore obtaining inputs from stakeholders on the literature review to seek confirmation that the information used and the interpretation thereof is accurate.

This was achieved through the establishment and inception of the Project Steering Committee (PSC) held at the Heimat Accomodation and Conferencing Centre, Welkom, under the Matjhabeng Local Municipality of the Lejweleputswa District Municipality, on the 17th of March 2022. The PSC inception meeting involved representatives from various stakeholders from the National Departments, Province, District and Local municipalities and other development agencies. The record of this engagement is included as Appendix 1.

This will be followed up by focus group meetings which will include sectors including agriculture, conservation, business, mining and industry, and residents.

The draft findings will be also presented at the 2$_{nd}$ PSC meeting which will be followed by stakeholder workshop in order that the feedback from the workshop could inform discussions within the PSC.

1.6.3.3 Comment on Deliverables

This draft Status Quo report will be made available to all registered I&APs and the PSC for a 14-days period during which an invitation will be extended to make formal written comment that will inform the finalization of the

report. The report will also be made available to the public via the project webpage on the Muvuledzi website. All comments will be captured in a comments and response register which will confirm that the comments have been noted, and how they have been addressed in finalizing the status quo report.

1.7 DATA GAPS AND LIMITATIONS

Several data/information gaps and limitations were encountered in the study and importantly, several relate to the key environmental issues facing Lejweleputswa District. The most important of these is a lack of spatially comprehensive monitoring data for various studies including air quality, environmental sensitive areas and water quantity data, all of which have been identified as critical issues.

The non-participation of mining stakeholders in the EMF process also represents a significant limitation given the importance of the mining sector for environmental management in the District.

2 LEGISLATIVE CONTEXTUALISATION

Development planning is undertaken in a hierarchy that encompasses national, provincial and regional level policy. This section documents the influence of this framework and other relevant legislation on Lejweleputswa District Municipality's planning.

2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

According to Section 24, everyone has the right to an environment that is not threatening or harmful. Measures are in place to protect the environment such as promoting conservation, environmentally sustainable development and pollution prevention. Moreover, promoting social and economic development and using renewable resources ensures such an environment. Co-operative governance is also included within the constitution; this cooperation needs to be undertaken between national, provincial and local organs of state especially during the development and preparations of an Environmental Management Framework (EMF). This chapter in terms of the EMF is important as it allows for coordination of environmental policies, plans and programmes between a number of spheres of government which play a significant role in terms of its relationship to the environment.

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The National Environmental Management Act No. 107 of 1998 (NEMA) provides principles and guidelines to be considered in integrated environmental management (IEM). It guides cooperative environmental governance by confirming governments' role in ensuring sustainable development and the role of society in participating in environmental governance. Chapter 1 of the Act aims to ensure that actions and decision making of all officials relating to the legislation which may affect the environment is binding.

Chapter 5 of NEMA provides a guide for environmental planning and management and promotes the use of appropriate environmental management tools in order to ensure the integrated environmental management of activities. These activities can include policies, plans, projects and processes. NEMA is the parent statute under which a set of environmental laws and regulations have been developed. The environmental management framework is a tool whose overall objective is to promote integrated environmental management (IEM). The objectives of integrated environmental management include: evaluating, predicting and identifying potential threats to the environment, including the socio-economic environment and heritage resources together with determining alternatives and mitigation measures to ensure negative impacts to the environment are adequately minimised, while maximising benefits together with promoting compliance with the general principals of environmental management. To ensure that all processes of IEM are adhered too, public participation around

decisions that affect the environment must occur, consideration of environmental attributes and the environmental management style best suited for a particular activity in accordance with the legislation must occur.

2.3 NATIONAL, PROVINCIAL AND REGIONAL PLANNING FRAMEWORK

2.3.1 National Framework

The primary development policies at a national level are the National Development Plan, The New Growth Path, The Comprehensive Rural Development Programme, the Comprehensive Plan for The Development of Sustainable Human Settlements, the Accelerated and Shared Growth Initiative of South Africa (ASGI-SA) and the National Spatial Development Framework (NSDF).

The National Spatial Development Framework (NSDF) - The NSDP guides government in implementing its programmes in order to achieve the objectives of ASGI-SA of halving poverty and employment by 2014. Of relevance to the EMF is Objective 4: which requires that *"In order to overcome the spatial distortions of apartheid, future settlement and economic development opportunities should be channelled into activity corridors and nodes that are adjacent to or link the main growth centres*".

2.3.1.1 National Environmental Management Act (Section 24(3))

The national environmental management act has a legislation in place that provides guidelines for the development of an environmental management framework (EMF). This legislation stipulates that the minister and MEC can compile information and maps that identify specific attributes of a geographic area. These attributes include location, extent, sensitivity and relationships between the natural and social environments. These significant attributes need to be interrogated by the competent authority.

2.3.1.2 Spatial Planning and Land Use Management Act No. 16 of 2013

Commonly known as SPLUMA, the intention of this national legislation is to introduce the norms and standards for spatial planning and to specify the relationship between spatial planning and land use management.

2.3.1.3 National Environmental Management Act No.107 of 1998 (NEMA)

It promotes for the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities. LDM has prepared and adopted the **Disaster Management Plan (DRMP), Air Quality Management Plan (AQMP) and Integrated Waste Management Plan (IWMP)** to manage the state of the environment and associated planning parameters.

2.3.1.4 Integrated Coastal Management Act No. 24 of 2008 (ICM Act)

The act defines wetlands as transitional land between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water and supports vegetation typically adapted to life in saturated soils. Wetlands are a critical part of the natural environment as they reduce the impacts of floods and absorb pollutants to improve water quality in the area. There are no RAMSAR sites within the Lejweleputswa District, however, wetlands cover 5.5% of the Matjhabeng Local Municipality and 5.7% of the Tswelopele Local Municipality. The Tokologo Local Municipality has wetlands concentrated around the Dealesville region. There is a sensitive wetland ecosystem located south of Wesselsbron, within the Nala Local Municipality.

2.3.1.5 National Environmental Management: Waste Management Act No. 59 of 2008 (NEMWA)

Lejweleputswa District is mandated to provide waste management services in terms of NEMWA. There are several landfill sites, waste handling facilities, effluent waste/sewage treatment works within LDM, however; some of them do not comply with the minimum requirements leaving most people including farmers relying on their own refuse dumping systems such as burning and burying waste in open fields leading to increased environmental degradation.

2.3.1.6 National Waste Management Strategy (NWMS)

All municipalities are required to develop an Integrated Waste Management Plan (IWMP). The IWMP must highlight roles and responsibilities within the municipality covering areas such as Integrated Waste Management Planning, Waste Information System, Waste Minimisation, Recycling, Waste Collection and Transportation and Waste Disposal.

2.3.1.7 National Environmental Management: Air Quality Act No. 39 of 2004 (NEMAQA)

It is purposed to protect the environment and improve air quality through the minimisation of air or atmospheric pollution. Lejweleputswa District Municipality has developed an Air Quality Management Plan (AQMP) with the assistance of the DEA and has eight facilities issued with Atmospheric Emission Licences (AEL); three are situated in Masilonyana Local Municipality, four in Matjhabeng Local Municipality and one in Nala Local Municipality.

2.3.1.8 National Environmental Management: Biodiversity Act No.10 of 2004 (NEMBA)

The Biodiversity Act requires that in order to fulfil the rights contained in Section 24 of the Constitution, the State through its organs that implement legislation applicable to biodiversity, must manage, conserve and sustain South Africa's biodiversity and its components; and must implement the Act to achieve the progressive realisation of those rights. It however does not impose any obligations on municipalities because it is implemented through the National Biodiversity Strategy and Action Plan (NBSAP).

2.3.1.9 National Environmental Management: Protected Areas Act No. 57 of 2003 (NEMPAA)

The National Environmental Management: Protected Areas Act (NEM:PAA) provides for protection and conservation of South Africa's biodiversity within a system of protected areas. The Act provides a legislative framework for the declaration, management, monitoring and supervision of areas protected for conservation purposes, as well as restrictions applicable to protected areas.

2.3.1.10 NEMA Section 24 (5) Government Notice R.547 (2018)

Subsequent to previous legislation the Minister of Water and Environmental Affairs in regulation 24 (5) pertaining to EMFs in government notice R.547 of June 2018 stipulates that the purpose of the regulation is to ensure that:

The maps created are used to inform environmental management frameworks, environmental authorisations and the geographical areas within which these frameworks apply.

- The regulations also provide specifications around the procedure that needs to be followed in terms of preparation, evaluation and adoption of EMFs.
- The regulations governing the EMFs have been put into place to promote sustainability, cooperative environmental governance and secure environmental protection.

2.3.1.11 National Forests Act No. 84 of 1998

The National Forests Act provides for the conservation and sustainable management of forests and trees in South Africa. It further makes restrictions to cut, disturb, damage, or destroy any living tree in or remove any such tree

from a natural forest unless a license to do so has been issued or an exemption published in the Government Gazette (GN R. 650 of 2014). Local government and all others will have to obtain a permit to remove any indigenous or protected trees or for clearing of an area.

2.3.1.12 National Water Act No. 36 of 1998 (NWA)

The NWA is concerned with the overall management, equitable allocation and conservation of water resources in South Africa. To this end, it requires registration of water users, and licenses to be obtained for various uses of water resources. The Act further provides for the establishment of catchment management agencies for the integrated management of all aspects of water use in South Africa.

2.3.1.13 Water Services Act No. 108 of 1997

The underlying rationale of the Water Services Act is the provision of water supply and sanitation services consistent with the goals of water resource management. Furthermore, the Water Services Act gives effect to the substantive Constitutional rights of access to basic water supply and basic sanitation. The Act provides a regulatory framework for water services institutions and intermediaries. Local authorities fall into the definition of the former term. As such the Act sets out the parameters for them to supply water and sanitation services in their respective areas, and the conditions under which these services are supplied to consumers.

2.3.1.14 Conservation of Agricultural Resources Act No. 43 of 1983 (CARA)

The objective of the CARA is to provide for the conservation of the natural agricultural resources of South Africa by the maintenance of the production potential of land. In order to maintain production potential of land, the CARA provides for the following mechanisms: Combating and prevention of erosion and weakening and destruction of water sources; Protection of vegetation; and combating of weeds and invader plants.

2.3.1.15 National Heritage Resources Act No. 25 of 1999 (NHRA)

The NHRA governs the protection and management of natural and cultural heritage resources. It provides for the establishment of heritage authorities, whose purpose it is to administer the Act and all regulations promulgated under it. It further imposes certain restrictions such as: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

2.3.1.16 National Climate Change Response White Paper (2011)

The main objectives of the Paper are to manage climate change impacts through various interventions (adaptation response) and to reduce the emissions that South Africa produces (mitigation response). The overall approach of the policy is the promotion of “climate change resilient development” and incorporates both mitigation and adaptation interventions.

2.3.1.17 Local Government Transition Act No.97 of 1996

This law can be seen as the first step in the transformation of local government in line with the Constitution where local government is a sphere of government in its own right and no longer a function of Provincial Government (Campbell et al., 2007).

2.3.1.18 National Building Standards and Regulations

South Africa faces an energy generation capacity backlog, which has resulted in the country encouraging energy efficiency in all sectors while fast-tracking the development of renewable energy generation capacity through

the Department of Energy's Renewable Energy Independent Power Producers Programme (REIPPP). These actions are supportive of the aims of the National Climate Change Response White Paper, which require a significant change in the country's Greenhouse Gas Emissions trajectory over the next 10 to 20 years. This can only meaningfully be achieved by changing the country's energy generation mix from its current scenario, which comprises a predominance of coal-fired electricity generation, to a greater renewable energy generation capacity. As part of the process of addressing energy efficiency, the National Building Regulations have been updated to include a number of energy efficient building standards. These are included in SANS 204-1 and 204-2 (thermal efficiency in buildings) and SANS 10400-XA (energy usage in buildings). All new buildings constructed within the Tswelopele Local Municipality will need to comply with these standards.

2.3.1.19 Municipal Structures Act No. 117 of 1998

It provides for the establishment of municipalities in accordance with the requirements relating to categories and types of municipalities; to establish criteria for determining the category of municipality to be established in each area and to define types of municipality that may be established within each category. Furthermore, it indicates that Integrated Development Plan (IDP) is a function of municipal governance (Campbell et al., 2007).

2.3.1.20 Municipal Systems Act No.107 of 1998

It provides for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure a universal access to essential services that are affordable to all. Furthermore, it defines the legal nature of a municipality as including the local community within the municipal area; working in partnership with the municipality‟s political and administrative structures; to provide for the manner in which municipal powers and functions are exercised and performed; to provide for community participation; to establish a simple and enabling framework for the core processes of planning, performance management, resource mobilization and organizational change which underpin the notion of developmental local government (Campbell et al., 2007).

2.3.1.21 National Spatial Development Perspective (NSDP of 2003)

It provides a framework within which to discuss the future development of the national space economy by reflecting the localities of severe deprivation and need, of resource potential, of infrastructure endowment and of current potential economic activity by describing the key social, economic and natural resource trends and issues shaping the national geography (Campbell et al., 2007).

2.3.2 Provincial Policy

2.3.2.1 The Free State Provincial Growth and Development Strategy (PGDS)/Vision 2030

It guides planning in the province and serves to give effect to the National Development Plan (NDP) and the NSDF. The PGDS identified the following pillars as essential towards driving a responsible growth of the province and addressing unemployment and poverty:

- Inclusive Economic Growth and Sustainable Job Creation;
- Education, Innovation and Skills Development;
- Improved Quality of Life;
- Sustainable Rural Development;
- Building Social Cohesion;
- Good Governance.

The Free State Spatial Development Framework (FSSDF) proposed a nodal approach to ensure focussed development to various sectors contributing to economic growth. These nodes prioritises and amplify objectives for the Lejweleputswa District given the existing importance of the agricultural sector, the tourism opportunities, and the strategic importance of the water resources located within the municipality. These nodes are as follows:

- Collective Economic Nodes – Welkom in Lejweleputswa.
- Retail and Private Services Nodes – Welkom as Collective Economic Node, as well as Odendaalsrus, Bothaville and Virginia in Lejweleputswa District.
- Manufacturing Nodes
    - High Value Differrentiated Goods – Welkom as a collective economic hub in Lejweleputswa.
    - Labour-Intensive Mass-Produced Goods - Welkom as a collective economic hub in Lejweleputswa.
- Mining - Welkom as Collective Economic Node, as well as Theunissen, Odendaalsrus and Virginia in Lejweleputswa District.
- Agricultual Nodes
- Tourism Nodes - Welkom and Virginia (predominantly events, entertainment and mining tourism) are identified as important Tourism Nodes within the Lejweleputswa District.
- Nature Reserves and Conservancies Nodes - The Sandveld Nature Reserve, Erfenis Dam Nature Reserve, the marshes within the rural hinterland around Wesselsbron in Lejweleputswa District are environmentally sensitive and should be preserved.
- Bio-fuel Nodes - Bothaville and Bultfontein in Lejweleputswa District.
- Presidential Nodes - localities identified by the office of the State President as priority areas for infrastructural and social upliftment.
- Industrial Development Zone (IDZ) Nodes
- Land Reform Nodes
    - Restitution Nodes,
    - Redistribution Nodes,

2.3.2.2 The Free State Spatial Development Framework (2007)

The Free State Provincial Spatial Development Framework (PSDF) is a provincial spatial and strategic planning policy that responds to and complies with the National Development Plan Vision 2030 and the National Spatial Development Perspective. Together with the FSGDS, the PSDF is a critical instrument in guiding the use of the resources of the province in a manner that will ensure sustainable outcomes based on provincial development needs and priorities. It further expands by identifying higher level nodes with concentrated development facilities, services and economic opportunities as Hubs. These Hubs are connected through corridors such as those for transport, tourism and developmental (Free State COGTA, 2007). PGDS overall strategic thrust is a focus on development which can be realised through these nodes and corridors. To give effect to developmental frameworks at a district level, the Free State Vision 2030 must be aligned with in the development of municipal strategies. These strategies must address each of the independent pillars as highlighted in **Error! Reference source not found.** below.

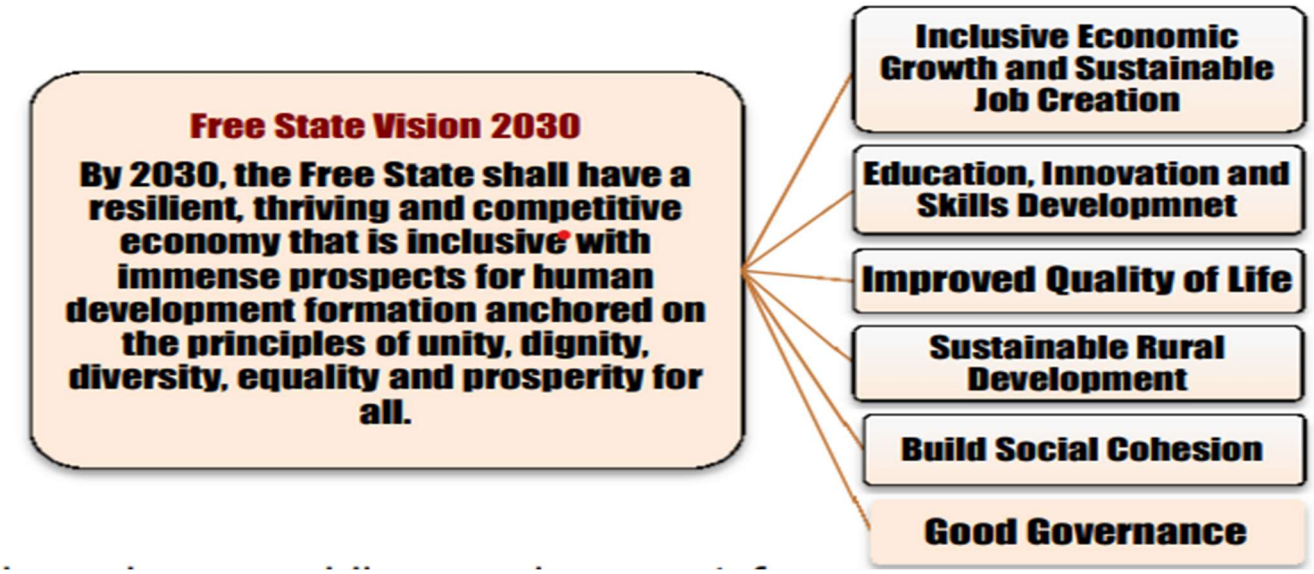


Figure 1: The Free State Provincial Strategic Growth and Development Pillars (Source: Free State Province, 2012).

2.3.2.3 Free State Environmental Outlook: A Report on the State of the Environment (2008)

The report highlights challenges that the province is facing with regard to the current state of the environment and the need for implementation of a developmental agenda without negatively impacting on the environment. Issues relevant to Lejweleputswa District Municipality includes the following:

- The Free State is experiencing increasing rate of unemployment and poverty due to the negative growth in the mining and agricultural sector, and as a consequence people are migrating to urban areas to seek work opportunities. These migrants generally settle on the periphery of urban areas in informal settlements that are under-serviced, extending urban sprawl and increasing pressure on environment.
- Increasing urbanisation also puts greater pressure on existing services, such as provision of water, refuse removal, sanitation and electricity, which without concomitant upgrades to infrastructure, results in an overloaded facility. Inadequate operations and maintenance of sewage treatment facilities are contributing to deteriorating condition of rivers and ultimately water quality.
- Water requirements in the province are currently met by augmenting resources with imported water. As a result, increased future demand will require all sectors, particularly the agricultural sector as the largest consumer of water, to use water effectively and efficiently.
- At present, the tourism potential of the province is not being fully exploited due to inadequate planning and information. In order to protect biodiversity, which has an important role to play in strengthening the tourism potential and supporting economic development, it needs to be taken into consideration and be integrated into social and economic development. This is particularly important given the decline in mining and agricultural sectors.
- Climate change is expected to impact on all sectors, threatening food security, water resources and biodiversity, as well as economic growth and development. Mitigation and adaptation strategies for the future must be based on the conservation of the natural resources to meet the growing needs of society.
- In general, environmental management has been neglected in the province due to a lack of awareness of the importance of the role of natural resources in supporting both social and economic development, as well as the competition for limited resources. Effective planning and implementation of an integrated approach to environmental management requires adequate institutional capacity in all levels of government (Diederichs, Van Niekerk, & Wolf; 2015).

2.3.2.4 Free State Air Quality Management Plan (AQMP)

The vision of the AQMP (2009) is to provide a co-ordinated approach to the management of air pollution in the Free State for a sustainable healthy environment. Most significant contributors to air pollution in the Free State could be attributed to particulate matter less than 10g/m3 (PM10).

Farming is identified in the AQMP as one of the main contributors of dust (PM10) emissions experienced in the Free State. The emissions are result of harvesting, soil tilling, application of pesticides and fertilisers, vehicles driving on unpaved roads, livestock farming activities, and veld fires. Interventions suggested by the AQMP include raising public awareness of veld fires and minimising emissions from agricultural activities.

Domestic fuel burning by low-income households in rural or some urban areas is also identified in the AQMP as main source of PM10, as well as indoor air pollution, which can cause of adverse health effects, such as upper respiratory problems. Interventions suggested by the AQMP include improving the efficiency of fuel burning, electrification of households, and use of renewable energy sources.

2.3.2.5 Free State Green Economy Strategy (2014)

The strategy draws up Free State province's transitional plan and associated interventions and resources necessary towards low carbon economy. It also make recommendations towards efficient cost reduction measures to ensure smooth transition. The strategy further highlights challenges such as energy security whilst combatting climate change impacts, reducing pollution and access to economic hubs without travelling long distances. Efficient natural resource protection and utilisation such as water, land and biodiversity services should be prioritised and policies and guidelines must be developed to ensure stricter but effective management of these resources (DETEA, 2014). In addition to policy developments, the strategy also recommends partnerships as fundamental mechanisms towards addressing developmental challenges.

2.3.2.6 Climate Change (2019)

The Free State province is a semi-arid areas of high climate variability. The province is a summer-rainfall region and is extremely cold during the winter months. The climate of this province is largely driven amongst others by its diverse topography with altitudes of <1200 m in the southern and western parts and >1800 m in the eastern Free State. The eastern mountainous regions which also include the Thabo Mofutsanyane DM where temperatures can drop to as low as -9.5 degrees C. The monthly Tmax for Free State indicates that on average October has the lowest mean value (26.2 °C) and January has the highest mean (30.1 °C) (Mavis et al., 2018). The Lejweleputswa DM in the western boundaries of the province and other southern areas districts are semi-desert. Rainfall varies a lot over the Free State province, with a clear north-eastward gradient, and with the lowest values of less than 300 mm accumulated rainfall from November to March being over the western and southwestern parts at 20%. Thabo Mofutsanyane district has the longest rainy season duration mainly due to early onset of rains experienced in the area. Over the Lejweleputswa districts municipality duration of the rainfall season ranges from less than 80 days over the western parts and increases eastwards to values up to 160 days (Moeletsi & Walker, 2012). Average annual rainfall for the entire province ranges from 300 mm to over 900 mm with more than 70% of the rainfall occurring in September to May (Moeletsi et al., 2011). The mean annual rainfall is 532mm (FSDGS, 2007).

2.3.3 Regional Policies

2.3.3.1 Lejweleputswa District Municipality Integrated Development Plan

Development planning involves the development of several planning tools at the national, provincial, district and local authority levels. These are informed by a number of different legislation, policies and best practices. During the development of both the integrated development plans (IDP) and the spatial development framework (SDF), the Lejweleputswa District Municipality (LDM) aimed to incorporate and adhere to all legislation. This included and was developed in conjunction with the municipal systems act (Act 32 of 2000), Municipal Finance Management Act (Act 56 of 2003), the intergovernmental relations framework (Act 13 of 2005), the spatial planning and land use management act and other related legislation. Batho Pele principles, the Provincial 2030 vision and the alignment with national and provincial strategies were also adhered too.

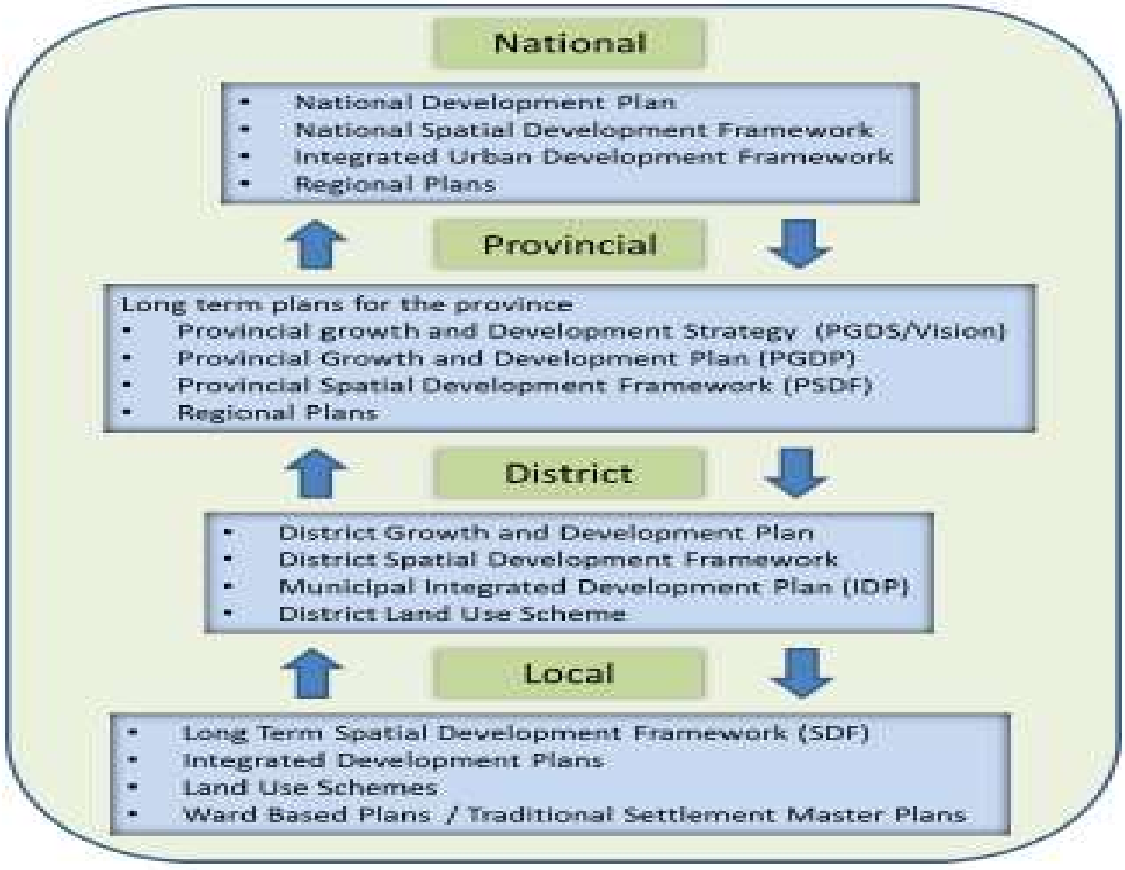


Figure 2: Interactions between levels of government development planning.

Several development issues and aspects indicated in the FSSDF and the IDP are summarised below:

- **Demographics -** The demographics of LDM are indicative of a developing municipality. Lejweleputswa District Municipality has more females at 50.31% (319 172) than males at 49.69% (315 291). The district has a median age of 27 years which is a little higher than the figure in Free State at 26 years and about 10 percent higher than the figure in South Africa which is 25 (COGTA, 2020).

- **Sanitation -** According to the Community Survey, in 2016, 84, 2% of households had access to toilet facilities either flush or chemical toilets. 1,5% had no access to any toilet facilities, 09% had access to pit

latrines facilities, 03% were still using bucket toilets whilst 02% were using other unspecified toilet facilities. By 2018, Lejweleputswa district municipality had a total number of 160 000 flush toilets (84.07% of total households), 5 310 Ventilation Improved Pit (VIP) (2.78% of total households) and 13 000 (6.83%) of total households' pit toilets. The municipality within Lejweleputswa with the highest number of flush toilets is Matjhabeng local municipality with 113 000 (70.41%). The municipality with the lowest number of flush toilets is Tokologo local municipality with a total of 2 910 (1.81%) (COGTA, 2020).

- **Solid waste management** - This is the responsibility of the local municipality and not the LDM. Data has indicated that solid waste management is improving in terms of waste collection within the local municipality. Lejweleputswa with the highest number of households where the refuse is removed weekly by the authority is Matjhabeng local municipality with 108 000 (71.36%) of the households within LDM. Some of the problems associated with solid waste management include inconsistent waste removal and limited waste disposal. Some proposed interventions include a litter control programmes, recycling programmes and the identification of suitable waste disposal sites.

- **Air quality management -** In an effort to comply with the Integrated Pollution and Waste Management Policy and the National Environmental Management: Air Quality Act (Act 39 of 2004) an establishment of atmospheric emissions standards have been developed. For each development activity that triggers these legislations, an atmospheric license will be required to operate.

- **Transportation infrastructure -** Due to the importance of road infrastructure and networks which have the ability to bridge the geological divide and also to provide communities with access to better social and economic opportunities, the Lejweleputswa DM have focused on key areas to improve transport infrastructure. These areas include: hospitals, clinics, police stations, schools and government departments both at a provincial and district level. Some of the challenges in terms of road infrastructure that the LDM faces include lack of qualified workers, lack of qualified audits for financial bookkeeping and performance indicators, the lack of coordination of projects between the head office and cost centres and the lack of capacity in project monitoring and compliance.

- **Energy -** Eskom supplies the energy to the LDM and it is demand driven. Presently municipalities within LDM provides electricity to about 85.6% of its population with an estimated 3 720 (1.95%) households having electricity for lighting only, 175 000 (91.56%) households having electricity for lighting and other purposes and a total number of 12 400 (6.50%) households not using any form of electricity.

- **Human settlements -** Lejweleputswa DM is characterised by human settlement patterns that are fragmented and disintegrated. There is a high number of households (76%) that stay in formal houses which are fully owned and fully paid up (61%), whilst 5% stay in flats in the backyard and 1% stay in apartments. 15.7% of the population stay in informal dwellings (shacks). Ongoing work is being done to improve this situation.

- **Agricultural potential -** Another key aspect of the District SDF is the designation of Agriculture priority areas. These are "*areas where high potential agricultural land exists, and where non-agricultural development which would detract from the production potential of these areas should be discouraged*". About 76000km^2 or 58.8% of land use in the Free State Province is characterised by commercial agriculture. Commercial agricultural land use in the province comprised of mainly grazing land (52000km^2), which is used for livestock and game farming; and arable land (25000km^2) which caters for crop production. Lejweleputswa has the second highest number of farms in the province, equating to 2069 farm units, signalling a very good potential for agricultural activity in the district.

Out of the five districts in the province, LDM has the third highest proportion of grazing land (11 269.58km^2 or 21.8% of total grazing land) and the highest proportion of arable land (8 137km^2 or 35.6% of total arable land). Identifying areas with high agricultural potential is therefore critical for Lejweleputswa DM as most of land use within the DM is mainly for cultivation or farming purposes as seen in the figure below.

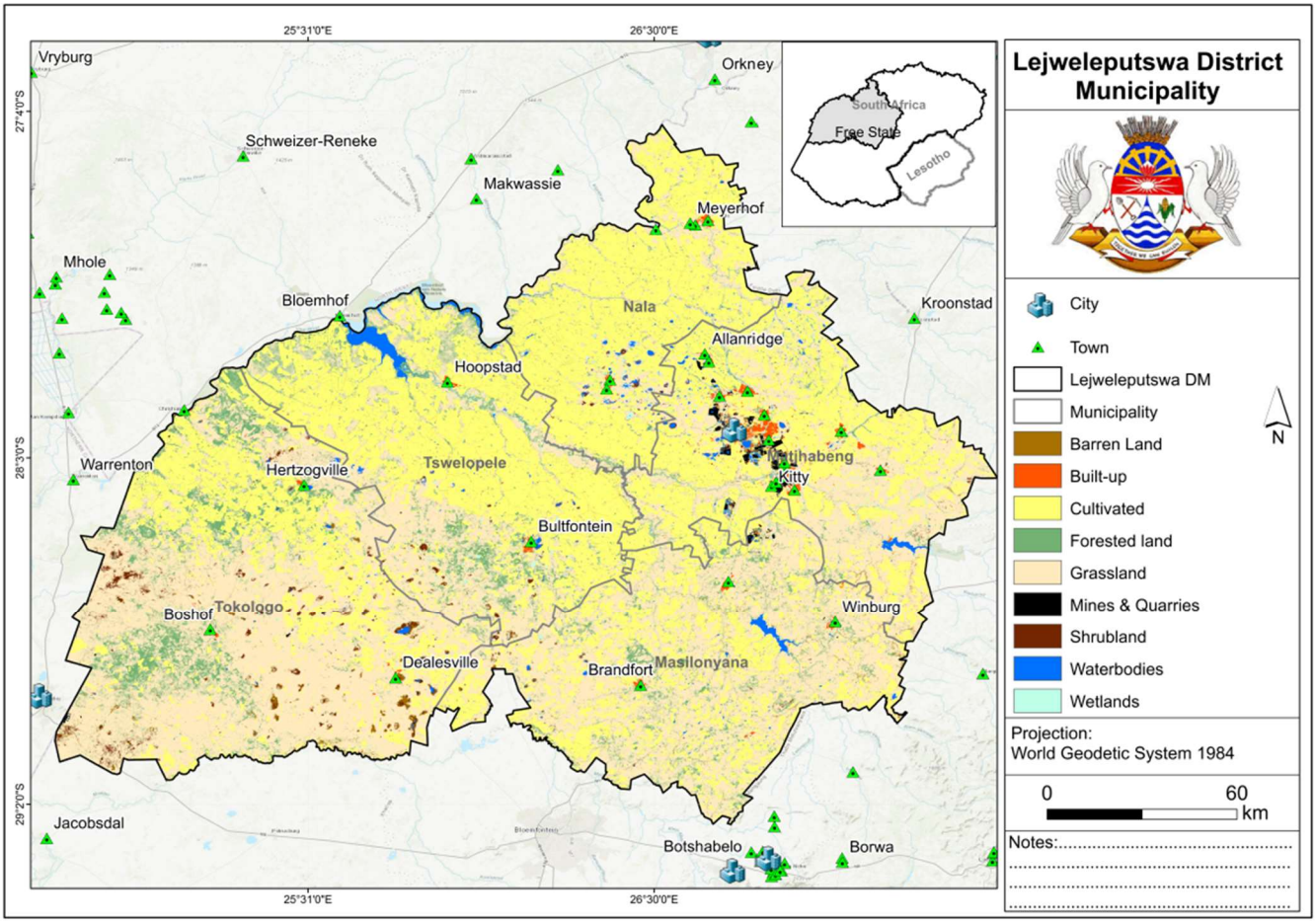


Figure 3: Lejweleputswa District Municipality Land-use or Land Cover (Source: Muvuledzi, 2022).

2.4 INSTITUTIONAL ARRANGEMENTS

Within the Lejweleputswa DM, environmental management is housed within the Environmental Health Services & Disaster Management: Including Fire Fighting. It is mandated to ensure broader framework of cooperative governance which includes important relationships with the National Department of Forestry, Fisheries and Environmental (DFFE), the Provincial Department of Economic Development, Tourism and Environmental Affairs (EDTEA), and relationships with all its local municipalities in the District.

Importantly, the District hosts the Lejweleputswa District Committee on Environmental Co-ordination which is integrally involved in environmental management and its members comprise representatives from a wide variety of stakeholder groups including:

- Different sectors in the various levels of government e.g. environment, planning, agriculture etc. from local municipalities, the district municipality, the provincial department and the national environment department.
- The provincial nature conservation authority.

- Bulk public services providers.
- Private sector stakeholders representing industry and other sectors.
- NGOs that are active in the District such as the World Wide Fund for Nature (WWF), the Endangered Wildlife Trust (EWT) and many other.

This committee was invited to sit on the project steering committee for the development of this EMF.

Functions and areas of responsibility of the District's planning and development services directorate, specifically the environmental management department, include:

i. Climate Change section.
ii. Environmental awareness.
iii. Assessment of BID, Scoping and EIA reports.
iv. Policy Advice to other units.
v. Conducting investigations or attending to complaints related to water or waste management pollution.
vi. Coordination of environmental related matters within the district.
vii. EPWP projects for Environment and Culture Sector: Develop business plans & implement projects.

3 PROJECT AREA

3.1 GEOGRAPHY

The Lejweleputswa District Municipality is a Category C municipality, located in the north western part of the Free State province and is about 32 287 square km². It shares a boundary with North West province to its north west, Fezile Dabi and Thabo Mofutsanyana district municipalities to its east, Mangaung metropolitan and Xhariep district municipalities to its south, and the Northern Cape province to its west (Cooperative Governance and Traditional Affairs, 2020).

Lejweleputswa, meaning 'grey rock', describes the area with a rich history in gold prospecting and mining. The Lejweleputswa district is rich in gold deposits and lies at the heart of the province's goldfields. The Free State

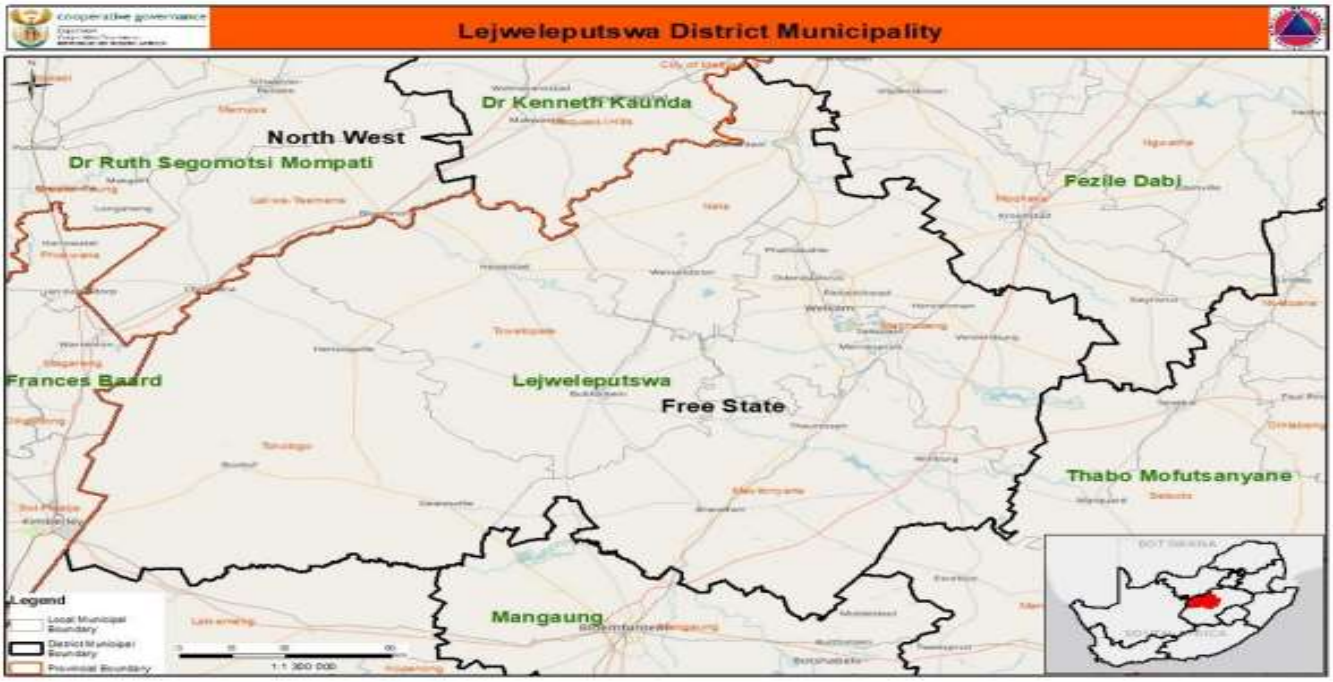


Figure 4: Lejweleputswa District Municipality (Source: COGTA, 2020)

Goldfields were discovered in the early 1940s after a borehole sunk for water found gold ore lava instead. The district has a rich political history, which includes the National Military Museum and the Winnie Mandela House, where she was sentenced to House Arrest during the State of Emergency in the 1980s. The district is also a major maize and sunflower producer (Cooperative Governance and Traditional Affairs, 2020).

3.1.1 Municipal Boundaries

The Lejweleputswa DM comprises of five (5) local municipalities (LMs) i.e. Tswelopele LM, Masilonyana LM, Matjhabeng LM, Tokologo LM, and Nala LM. The project area is shown in 6 below. The economy of Lejweleputswa thrives on mining and farming. The district is rich in gold deposits and lies at the heart of the province's goldfields. In terms of farming, the district is a major producer of maize and sunflower.

Mining and farming as the primary sector of the economy in the district contributes about 28.6%. Activities in the secondary sector (manufacturing: 6.9%, electricity: 1% and construction: 5.7%) collectively contributed 13.6% to the GVA of the district. The tertiary sector (trade: 22.7%, transport: 4.4%, finance: 9.9% and community services: 20.8%) accounts for 57.8% of the GVA of the district. Economic activities in the tertiary sector comprises of finance, insurance, real estate and business services, wholesale and retail trade, catering and accommodation and general government sectors (COGTA, 2020).

There are transport and nodal links to Johannesburg, Cape Town, Durban and Richards Bay ports through the two national roads, the N1 and the N5 which pass the Lejweleputswa DM.

Figure 5: Map of Lejweleputswa District Municipal boundaries (Source: COGTA, 2020).

3.1.2 Topography and Land Use

The Lejweleputswa DM landscape mainly comprises wide open plains (flat) interrupted by a number of small hills and ridges in the central and western parts. The south eastern extents (Masilonyana and Matjhabeng Local Municipalities) of the Lejweleputswa District Municipality are, however, more mountainous as it represents the southern extents of the Maluti mountains which is a prominent feature extending from the borders of Lesotho.

Lejweleputswa is lying on the slightly undulating plains and pans, low lands with hills, plains and pans are slightly irregular undulating plains and hills. A biome is a major geographical area of ecologically similar communities of plants, animals, and soil organisms often referred to as ecosystems. Lejweleputswa is in the Grassland Biome West to East. The area consists of Kimberly thorn bushveld dry clay Highveld grassland, dry sandy Highveld grassland and moist cool Highveld grassland (Lejweleputswa District Municipality, 2012).

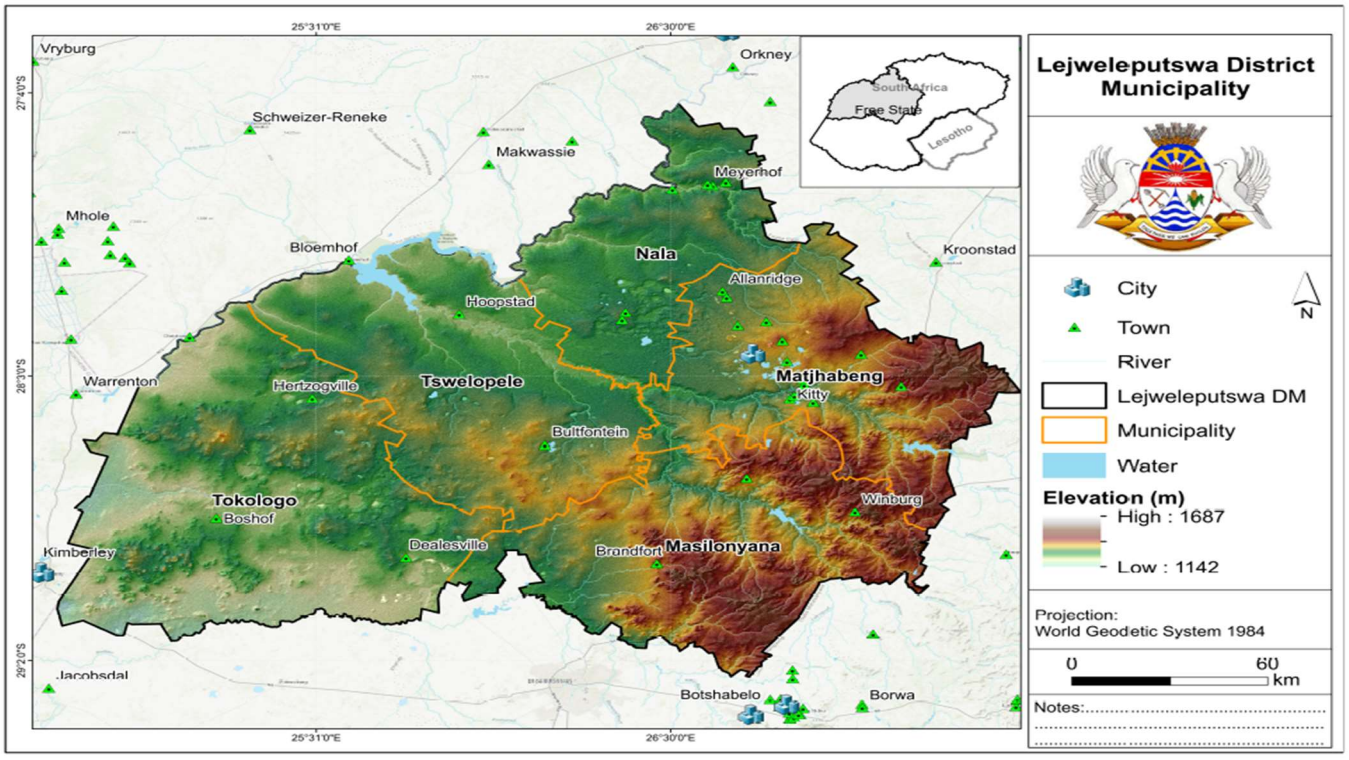


Figure 6: Map showing topographical features of the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

The majority of the Lejweleputswa District Municipality is dominated by land reserved for cultivation, highlighting the importance of farming in the District Municipality as seen in Figure 8 below. There are however several other land use such as Wetlands, Built Land, Forested Land, Waterbodies, Shrubland, etc., within the Lejweleputswa District Municipality as shown in the map below.

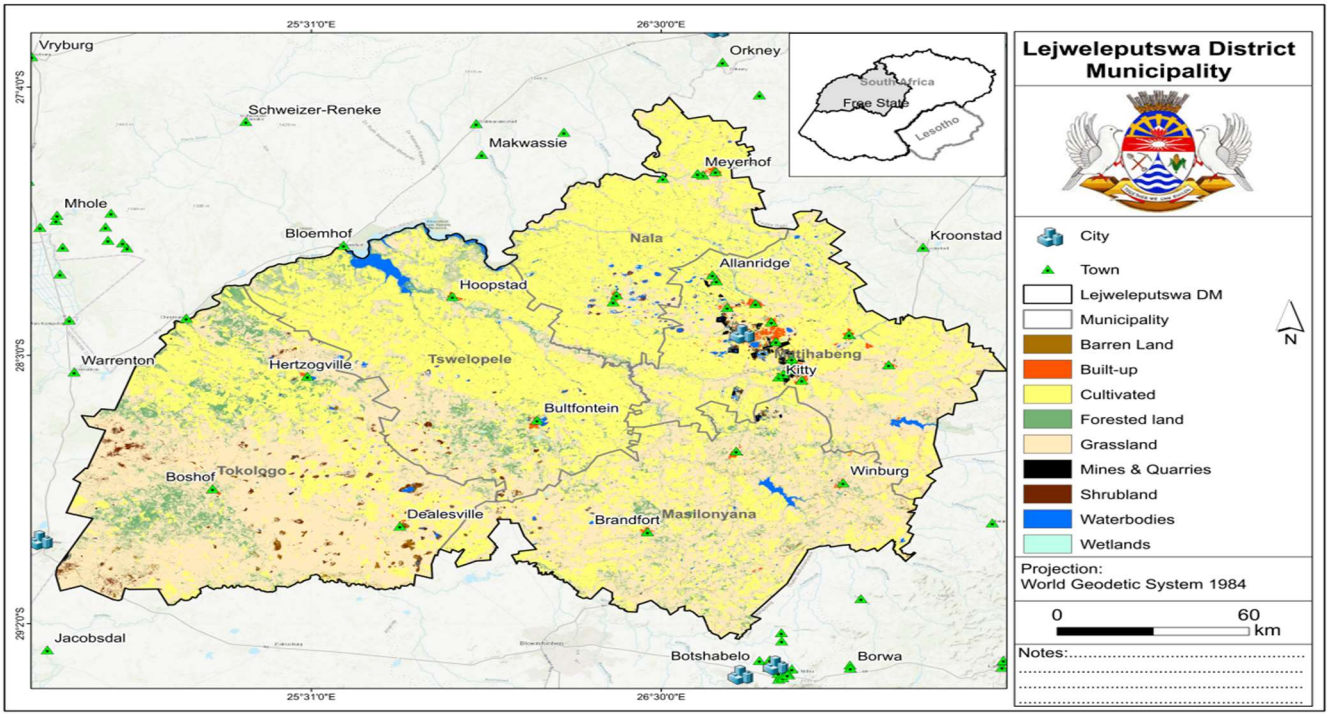


Figure 7: Land Use Map for Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

3.1.3 Geology and Soils

The district is underlain by sedimentary sequences of the Karoo Supergroup and are mostly covered by quaternary sediments. The stratigraphic relationship of these strata to anther is presented in the **Error! Reference source not found.** and their distribution are shown in below. The most dominating lithologies are the mudstones and shales of the Volskrust formation which underlays the district mainly in the central region covering areas in Welkom, Virginia, Theunissen, Brandfort and Winburg.

The second dominant type of rock formation is the mudstone and sandstone of the Adelaide Subgroup, which underlies Masilonyana and Matjhabeng areas. The other type of rocks in the area is the shale, sandstone and siltstone of the Tierberg formation which overlays the Volkrust formation in the Ecca Group. These formations have been intruded by the swarms of dolerite dykes and sills.

Table 4: Simplified lithostratigraphic subdivision of strata with Lejweleputswa DM.

Basic lithology	**Lithostratigraphic Unit**		
	Formation	**Group**	**Supergroup**
Sand, red and grey Aeolian dune sand (Qs)	Quaternary		
Alluvial diamondiferious gravel (Qa)			
Calcrete, calcified pandune and surface limestone (Qc)			
Dolerite dyke (Jd)	Intrusive rocks		
Mudstone and Sandstone (Pa)	Adelaide Formation	Beaufort Group	Karoo Sequence Supergroup
Shale, Siltstone, Sandstone (Pt)	Tierberg Formation	Ecca Group	
Bluish-grey or dark grey mudstone and shale, subordinate siltstone (Pvo)	Volkrust Formation		

Soil types of the LDM are broadly classified as:

- Moderate to deep sandy soils with less than 15 % clay and susceptible to erosion, covering most of the district area.
- Moderate to deep soils derived from dark grey shale, siltstone and sandstones of the Volkrust formation.
- Moderate to deep soils derived from the mudstones and sandstones of the Adelaide formation.

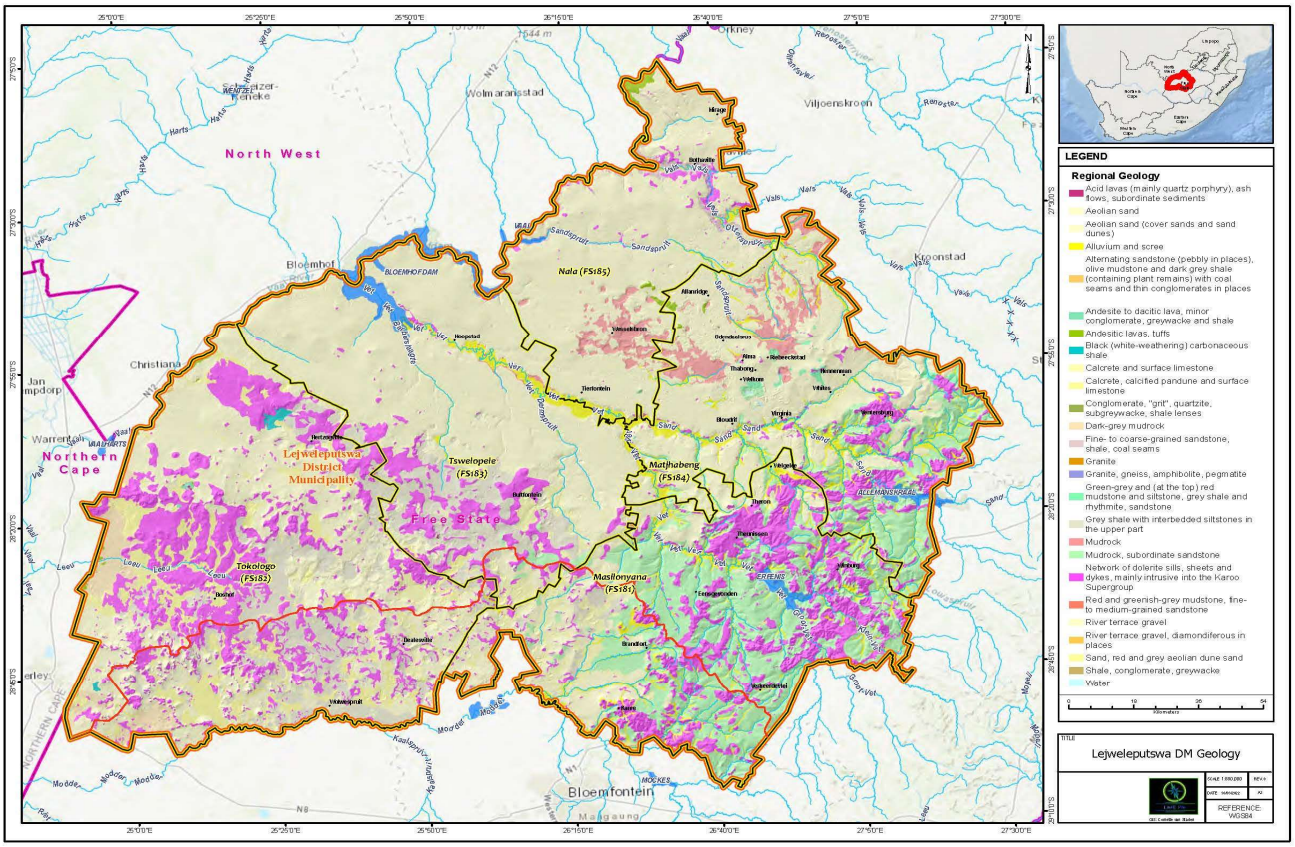


Figure 8: Regional geological settings of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

The most dominating type of rock in the region is the volskrust Fm, Ecca Group of rock formation which is located mainly in the central region covering areas in Welkom, Virginia, Theunissen, Brandfort and Winburg. The second dominant type of rock formation is the Adelaide Sb group, Beaufort Grp in the Masilonyana and Matjhabeng area, followed by Madzaringwe Fm, Karoo Sp Group which has become a belt lying along the borders of both Nala and Tswelopele and the North West province. The other type of rock is the Prince Albert fm, Ecca Grp located in the Tokologo area beyond Boshof. All planning must consider the strategic importance and handicaps

that may be presented by these types of geological formations prevalent throughout the district (Lejweleputswa District Municipality, 2012).

The geology in the Lejweleputswa district consists mostly of shale, mudstone, sedimentary and dolomite.

- Tokologo 5% sandy clay soils
- Tswelopele 15% loam-sandy clay soils and 28% sandy clay soils
- Nala 45% sandy clay soils
- Matjhabeng 45% loam-sandy clay soils and 25% sandy clay soils
- Masilonyana 75% loam-sandy clay soils and 63% sandy clay soils.

Clay percentages towards the western parts of Lejweleputswa are less than 15% and increase to the east between 15% and 35%. Masilonyana has more than 35% clay percentage (Lejweleputswa District Municipality, 2012).

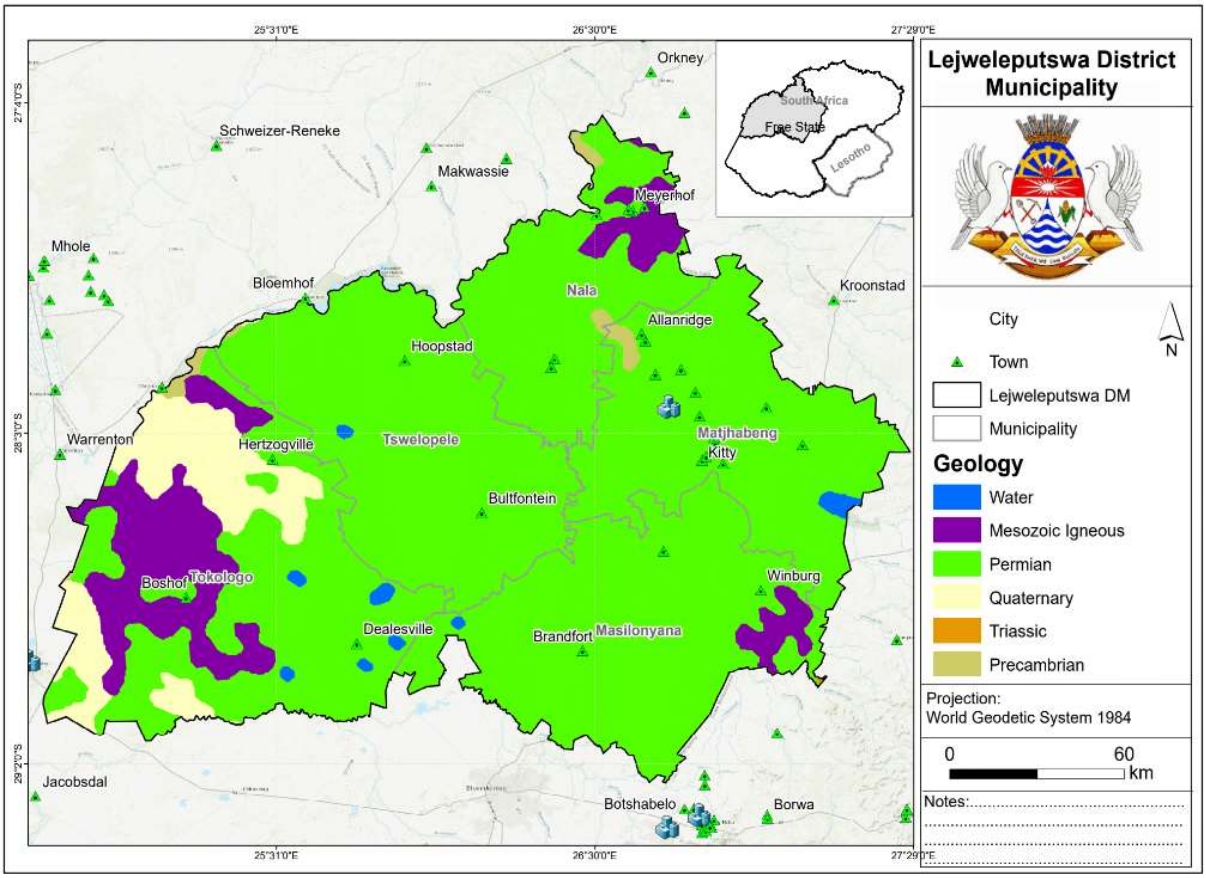


Figure 9: Geology of the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

3.1.4 Vegetation

The most dominant cover type of vegetation in the district is the central Free State grassland which dominates the central part including Matjhabeng and Tswelopele and a section of Masilonyana areas. The second dominant cover is the Kimberley thornveld which also covers parts of Tokologo and Kimberley and other parts of the Free State region. The third grass species that covers the area is the Vaal Vet Sandy grassland which is also prevalent in the central region but continues towards the Tokologo and Tswelopele areas of Hoopstad and Hertzogville (Lejweleputswa District Municipality, 2012).

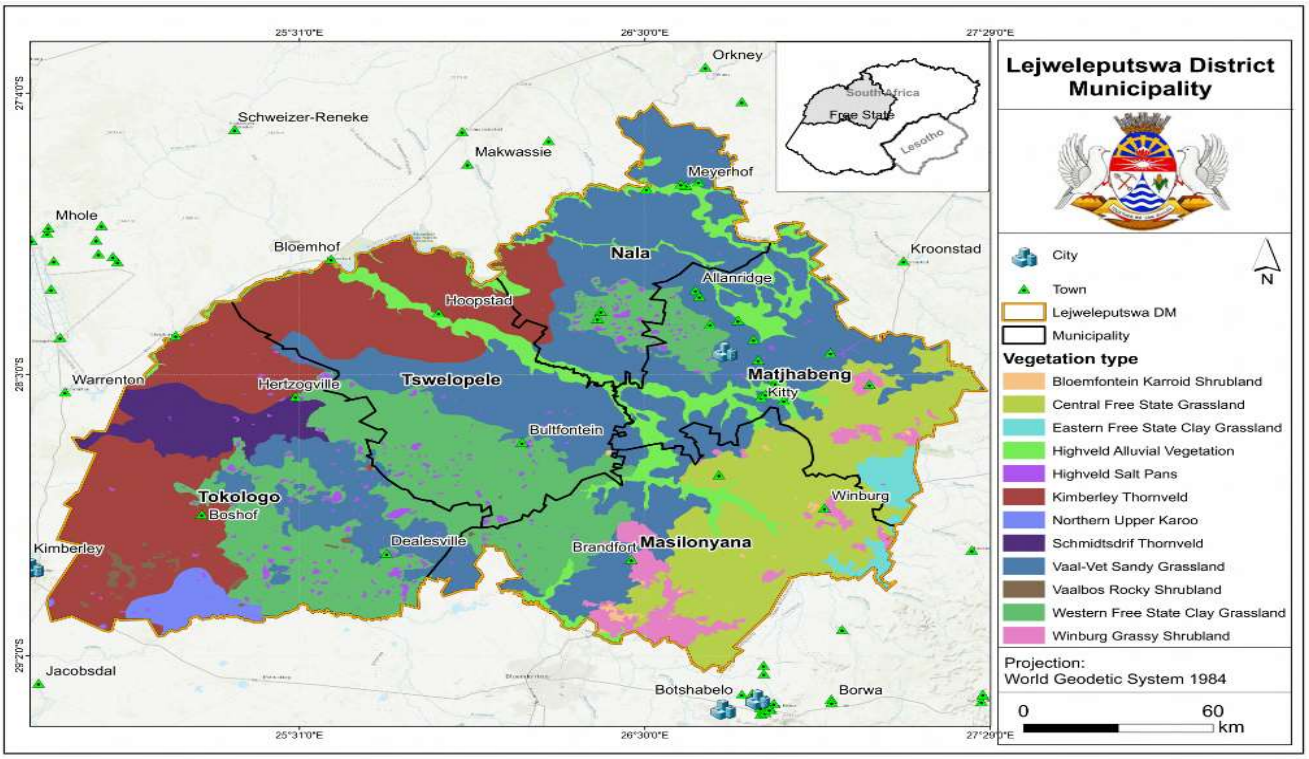


Figure 10: Vegetation in the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

3.1.5 Rivers and Wetlands

Rivers flowing through the District Municipality play a major role in providing water to Lejweleputswa. The Vaal, Modder, Vals, Sand and Vet Rivers are the essential sources of water supply in Lejweleputswa. Bloemhof, Erfenis and Allemanskraal Dams provide drinking water to rural towns, communities, and farmers in the District Municipality (Lejweleputswa District Municipality, 2021a).

Wetlands cover 37 304.9ha (5.7%) of the total area size of Lejweleputswa. The District Municipality has many Ecological Aqua areas that support the endangered and water species. The area around the Agri Park in Wesselsbron is an Ecological Support Area characterised by mainly aqua environment and species. Protected and conservation areas are scattered throughout the Lejweleputswa District Municipality with prominent areas around Bloemhof, Erfenis and Allemanskraal Dams (Lejweleputswa District Municipality, 2021a).

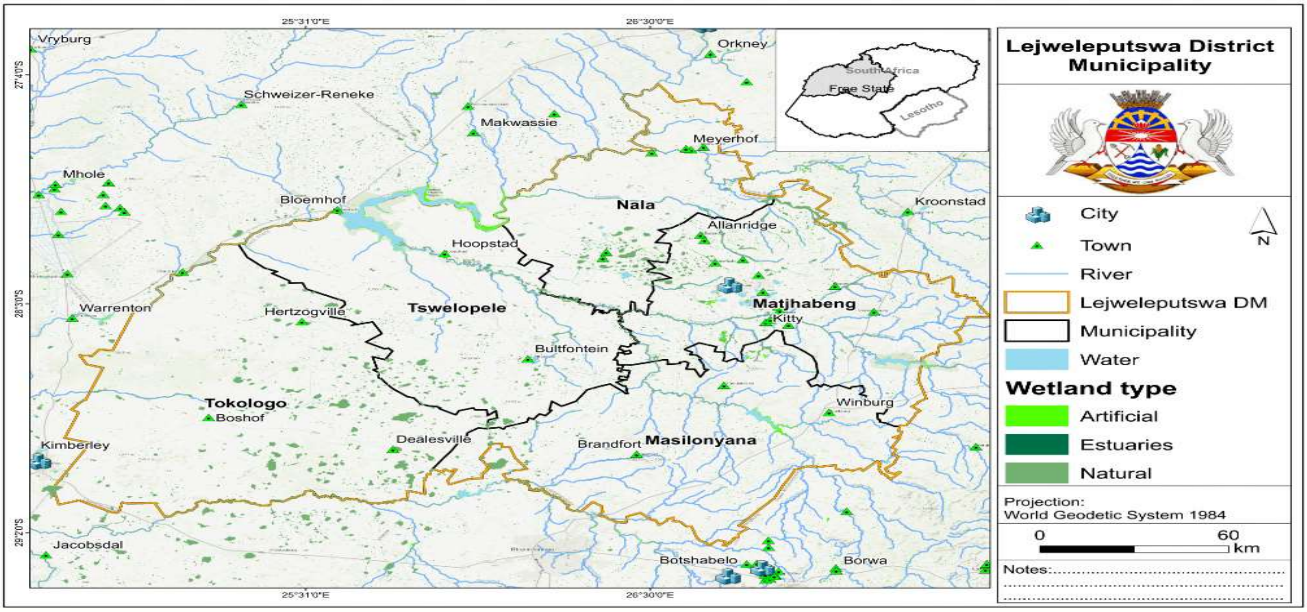


Figure 11: Rivers and wetlands in the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

3.1.6 Rainfall and Temperature

The Lejweleputswa district municipality falls within the summer rainfall area of South Africa. It receives an average annual rainfall of between 400mm and 550mm, with the east section having the highest average compared to the western section. The district has an average daily temperature of between 7°C and 26°C, with the western section having higher temperatures than the eastern section. It is also characterised by cold winter conditions (Lejweleputswa District Municipality, 2021a).

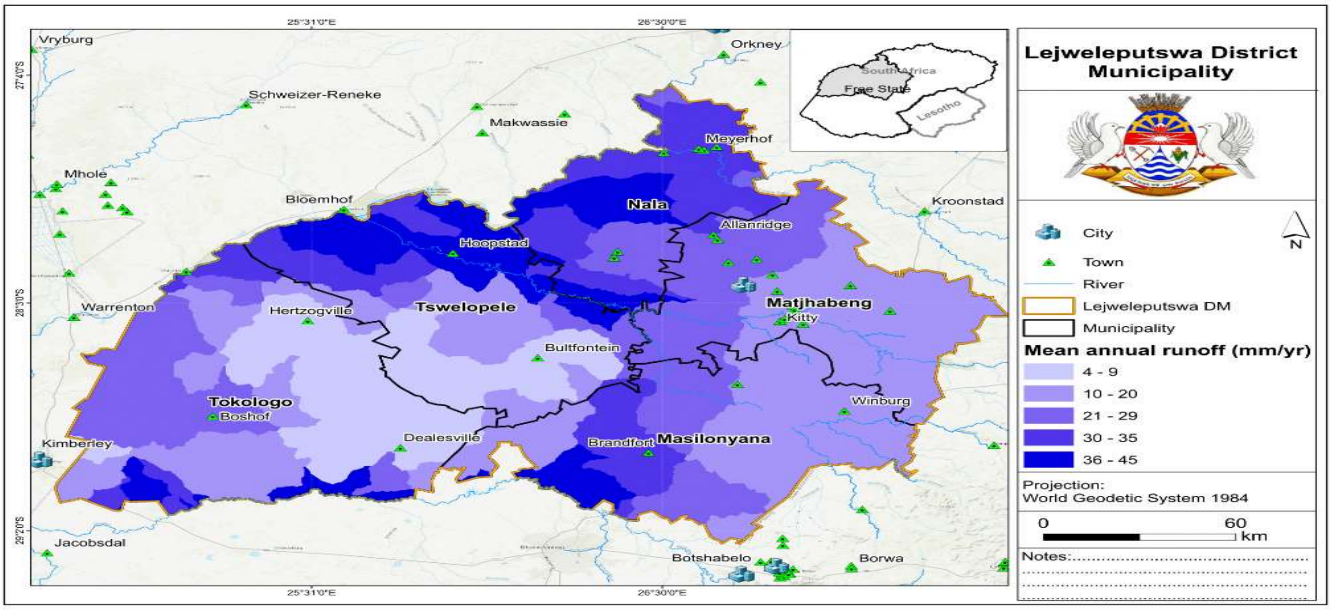


Figure 12: Mean annual runoff in mm/year in the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

3.1.7 Protected Areas

Overall, 47% of Lejweleputswa is designated as a natural habitat. The Bloemhof Dam Nature Reserve (632ha) and the Sandveld Nature Reserve (24 883.5ha) are the two-formal land-based protected areas in the District Municipality (Lejweleputswa District Municipality, 2021a).

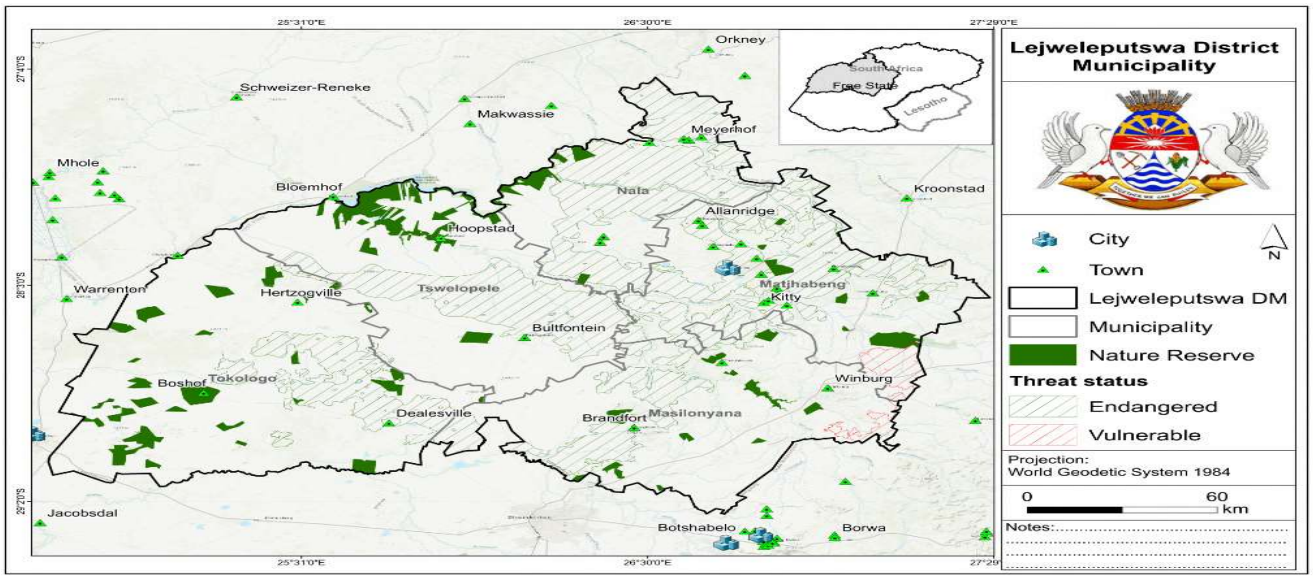


Figure 13: Protected areas in the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

4 SOCIAL AND ECONOMIC DEVELOPMENT CONTEXT

4.1 SOCIO-ECONOMIC ENVIRONMENT

4.1.1 Population Profile

The Lejweleputswa District municipality had a population of 624 746 in 2011 and increased to 646 920 in 2016. The highest population was in the Matjabeng Local Municipality with a population of 407 020 in 2011 and 429 113 in 2016. Tokologo Local Municipality accounted for the lowest population of 47 625 in 2011 and 47 373 in 2016 (Stats SA, 2018).

Table 5: The population of Lejweleputswa in 2011 and 2016 (Source: StatsSA, 2018).

Local Municipality	2011	2016	Growth Rate (%)
Masilonyana	59 895	62 770	1,1
Tokologo	28 986	29 149	0,1
Tswelopele	47 625	47 373	-0,1
Matjhabeng	407 020	429 113	1,2
Nala	81 220	78 515	-0,8
Lejweleputswa	**624 746**	**646 920**	**0,8**

With an annual population growth rate of 1.5 percent, the district has a population of 634 462 in 2019. This is 22 % of the total population of the Free State Province (Cooperative Governance and Traditional Affairs, 2020).

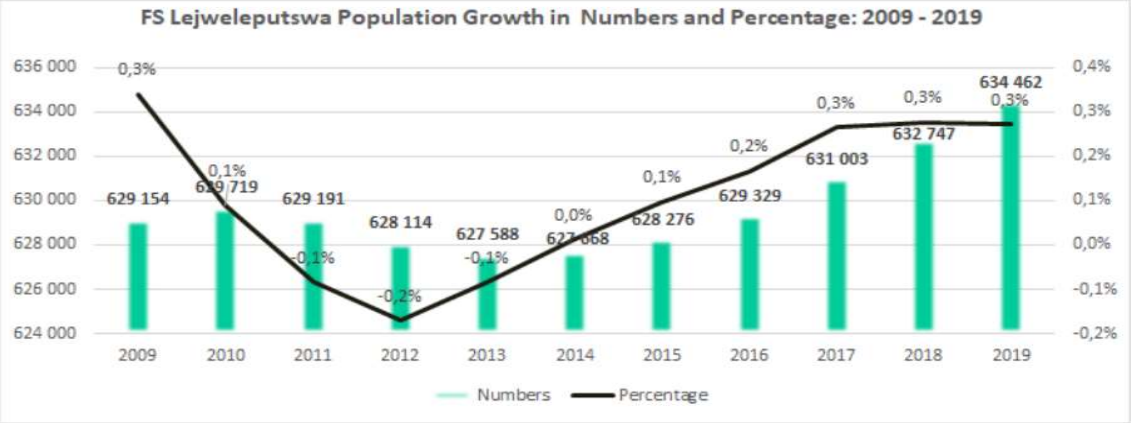


Figure 14: Lejweleputswa District Municipality population growth from 2009-2019 (Source: COGTA, 2020).

4.1.2 Population by Age and Gender

Lejweleputswa District Municipality has more females at 50.31% (319 172) than males at 49.69% (315 291). The district has a median age of 27 years which is a little higher than the figure in Free State at 26 years and about 10 percent higher than the figure in South Africa which is 25 (COGTA, 2020).

The largest share of the population is within the young working age (25-44 years) age category with a total number of 178 111 (28.07%) of the total population. The age category with the second largest number of people is the young children (0-14 years) age category with a total share of 27.52%, followed by the older working age (45-64 years) age category at 21.20%. The age category with the least number of people is the retired / old age (65 years and older) age category with only 48 508 people (7.65%).

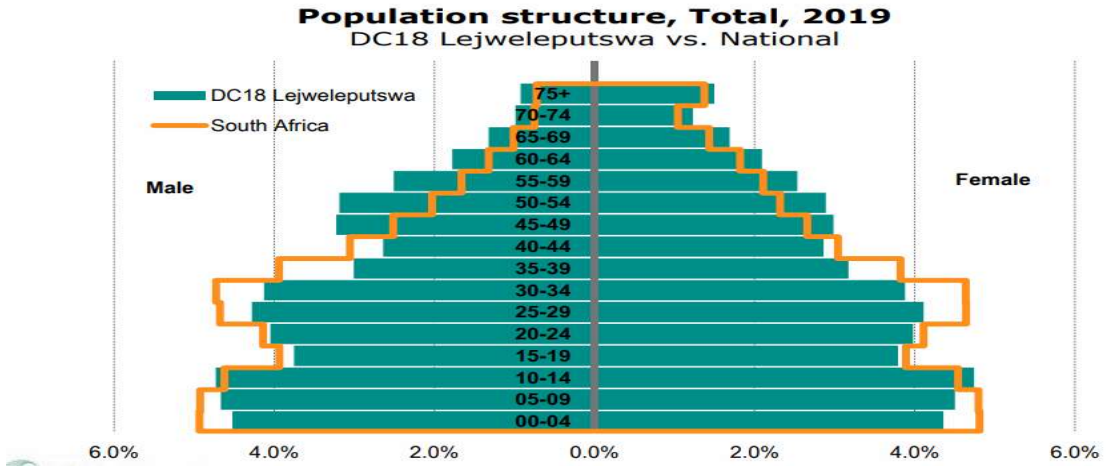


Figure 15: The population structure of the Lejweleputswa District Municipality in 2019 (Source: COGTA, 2020).

4.1.3 Population by Race

The Lejweleputswa District Municipality had the largest population of Africans, accounting for 89.45% of the population in 2016, followed by the White population, making up 8.4% of the population. The Coloured population accounted for 1.9%., while the Asian population was 0.3% in the same year (Stats SA, 2018).

The trend was similar in the local municipalities. The highest African population was in the Tswelopelo and Nala Local Municipalities, making up 92%. The highest White population was in the Masilonyana Local Municipality, making up 9,8%. The Coloured population was more concentrated (2.4%) in the Matjhabeng Local Municipality, while the Asian population remained at less than 0.4% (Stats SA, 2018).

Table 6: The Lejweleputswa DM population by race in 2016 (Source: StatsSA, 2018).

Municipality	**African**		**Coloured**		**Asian**		**White**	
	Number	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Lejweleputswa	578 586	89,4	12 291	1,9	1 777	0,3	54 266	8,4
Masilonyana	55 906	89,1	544	0,9	141	0,2	6 179	9,8
Tokologo	25 321	86,9	1 074	3,7	24	0,1	2 728	9,4
Tswelopele	43 662	92,2	337	0,7	99	0,2	3 274	6,9
Matjhabeng	381 335	88,9	10 112	2,4	1 204	0,3	36 462	8,5
Nala	72 361	92,2	223	0,3	309	0,4	5 622	7,2

4.1.4 Population Density

The latest (2020) population statistics from the NASA Socio economic Data and Applications centre show that the population density of the district is low (0-500 people per square kilometre) across all the municipalities. According to the map below, the most densely populated area is in the Matjabeng Local Municipality with a density of 510-1 800 people per square kilometre.

4.2 Education, Employment and Income

4.2.1 Education

According to Community Survey (2016), 68% of young people completed Grade 9 or higher and 37,4% completed matric or higher. However, in 2019, 18 900, people of the population of Lejweleputswa district (aged 15 years and older) had no education, while 83.9% (aged 15 years and older) of the population had completed primary schooling. The number of people without any schooling in Lejweleputswa district municipality accounts for 19.67% of the number of people without schooling in the province and a total share of 0.85% of the national. In 2019, the number of people in Lejweleputswa district municipality with matric only was 114,000 which is a share of 21.61% of the province's total number of people that have obtained a matric. The number of people with matric and a post-graduate degree constitutes 16.25% of the province and 0.75% of the national proportion (COGTA, 2020).

Those aged 15 and above who completed secondary education were 114,000 making up 21.6% of the provincial population with matric. In 2019 the matric pass rate in the district was 87.8%, which is comparable to the rest of

the districts in the province. In 2018, the district had a total number of 241 schools in ten circuits (19.8% of the province) and 157 321 learners (22% of the province), an indication of high population density and possible overcrowding in schools.

In terms of higher education, there is one TVET college (Goldfields TVET College) in Lejweleputswa District Municipality. Goldfields TVET College forms part of the fifty registered and accredited public TVET Colleges in South Africa. It operates on 3 Campuses and 1 satellite campus around the Lejweleputswa District Municipality. The college offers a wide range of courses/programmes in business and engineering studies. The University of the Free State (UFS) has two satellite campuses, one located in Thabo Mofutsanyane and the other in Welkom, Lejweleputswa (Lejweleputswa District Municipality, 2021).

4.2.2 Employment

In 2019, Lejweleputswa employed 142 000 people which is 18.26% of the total employment in Free State Province (779 000), 0.87% of total employment in South Africa (16.4 million). Employment within Lejweleputswa decreased annually at an average rate of -1.63% from 2009 to 2019. The economic sector that recorded the largest number of employments in 2019 was the trade sector with a total of 28 400 employed people or 20.0% of total employment in the district municipality.

Community services sector with a total of 26 400 (18.6%) employs the second-highest number of people relative to the rest of the sectors. The electricity sector with 1 320 (0.9%) is the sector that employs the least number of people in Lejweleputswa District Municipality, followed by the transport sector with 5 560 (3.9%) people employed (COGTA, 2020)

4.2.3 Income

The annual household income of the income group R10 000- R20 000 and R20 000- R40 000 was the highest in 2011, making up 20% of the total population, followed by 15% of the population that receives no income. 5% of the population receives an income of less than R4000 (COGTA, 2020).

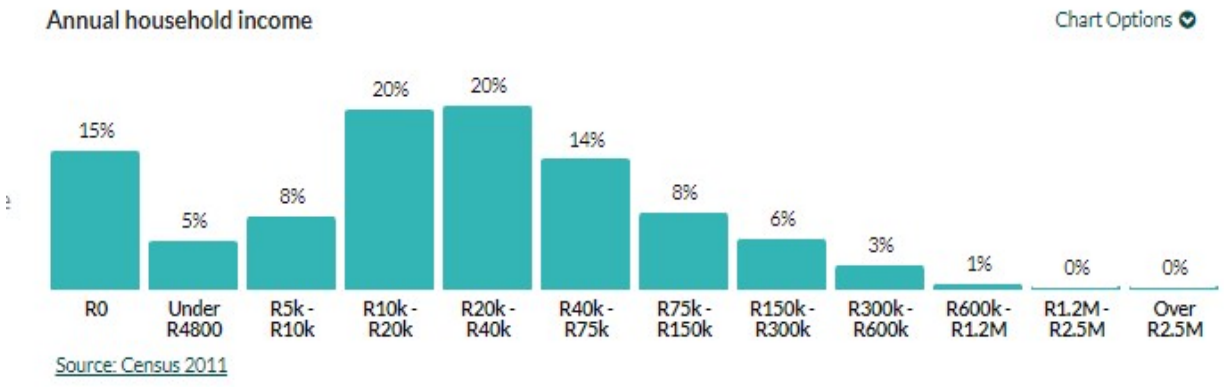


Figure 16: Annual household income of the Lejweleputswa District Municipality in 2011 (Source: COGTA, 2020)

4.2.4 Land Ownership

In Lejweleputswa District Municipality, a high number of households at 76% stay in formal houses which are fully owned and fully paid up (61%), whilst 5% stay in flats in the backyard and 1% stay in apartments. 15.7% of the population stay in informal dwellings (shacks) (COGTA, 2020).

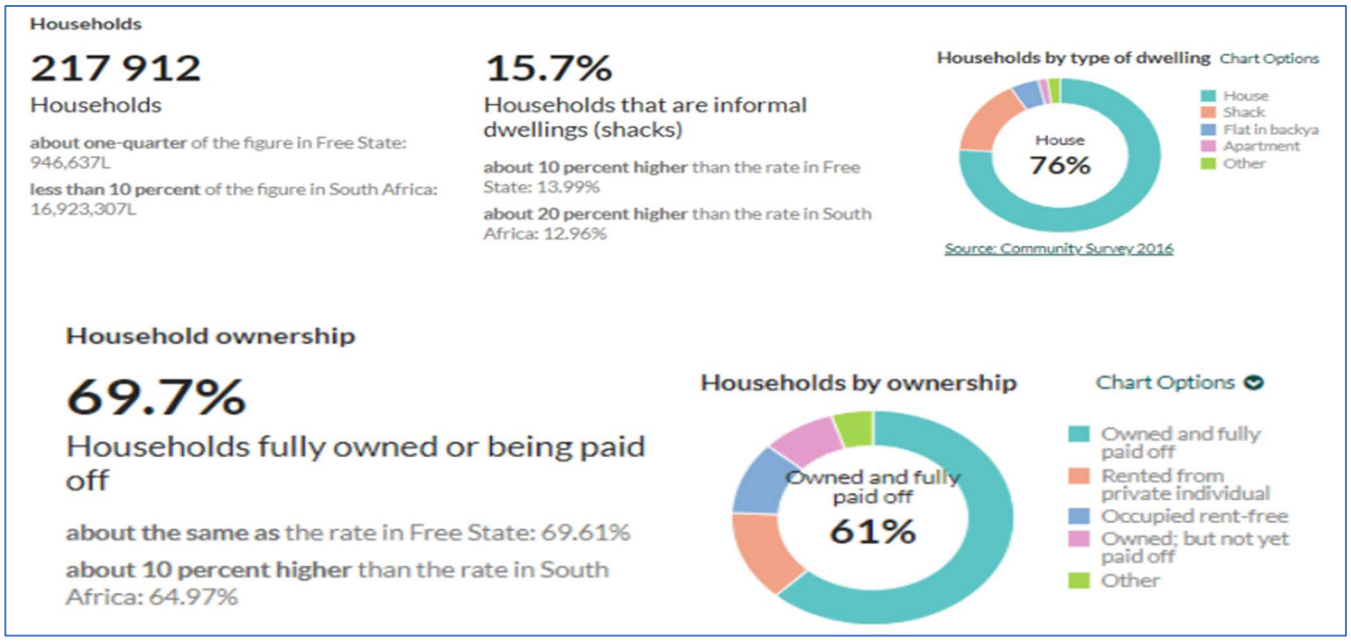


Figure 17: Landownership types within the Lejweleputswa District Municipality (Source: COGTA, 2020).

4.3 INFRASTRUCTURE AND SERVICES

4.3.1 Introduction

Infrastructure and services influence the state of natural resources and quality of life in the following ways. Where there is inadequate supply of services, either in terms of the coverage (waste collection limited to urban areas) of supply, or the quality of the supply (unstable power supply), the state of the receiving systems is impacted. In the case of inadequate waste water treatment (WWT) and sanitation infrastructure, it is the water resources that are impacted. This has negative consequences for people directly reliant on these resources for water domestic use. It may also negatively impact the recreational value of water and use by other sectors such as irrigated agriculture. Likewise, where electricity is not supplied, people rely on natural resources like natural forests, which have a negative impact on the biodiversity and state of these systems. Air quality is also impacted through the burning of fossil fuels. It is therefore important to understand the coverage and quality of supply of services as a driver of environmental quality. This has been done in the following way for the following services. The coverage is depicted via a map of infrastructure for each service. The 'state' of supply is then described.

- Electricity
- Roads
- Water and Sanitation
- Solid Waste

Responsibility for different services infrastructure within Lejweleputswa DM varies across different sectors. In addition, responsibility for bulk supply and distribution are separated in several cases. Individual LMs are responsible for waste management in their municipal areas and are solely responsible for the collection and disposal of waste and the management of their waste disposal sites.

Road hierarchy is a significant determinant in road infrastructure governance as national roads are the sole responsibility of National Department of Transport (DOT) and are maintained through the South African Roads Agency Ltd (SANRAL). Provincial roads (both Provincial main roads and Provincial district roads) are the responsibility of the Free State Provincial DOT.

4.3.2 Electricity

4.3.2.1 Extent of Electricity Supply

In 2016 all the municipalities in the district achieved access to electricity of above 85.6%. 79% had in-house prepaid meters, 15% had in-house conventional meters, 4% had no access to electricity, 2% had electricity from other sources not paid for and 1%had electricity from other sources. By 2018, Lejweleputswa district municipality had a total number of 3 720 (1.95%) households with electricity for lighting only, a total of 175 000 (91.56%) households had electricity for lighting and other purposes and a total number of 12 400 (6.50%) households did not use electricity (Cooperative Governance and Traditional Affairs, 2020).

High voltage power lines are running from the Northern Cape and intersecting Matjhabeng, as indicated in the map below.

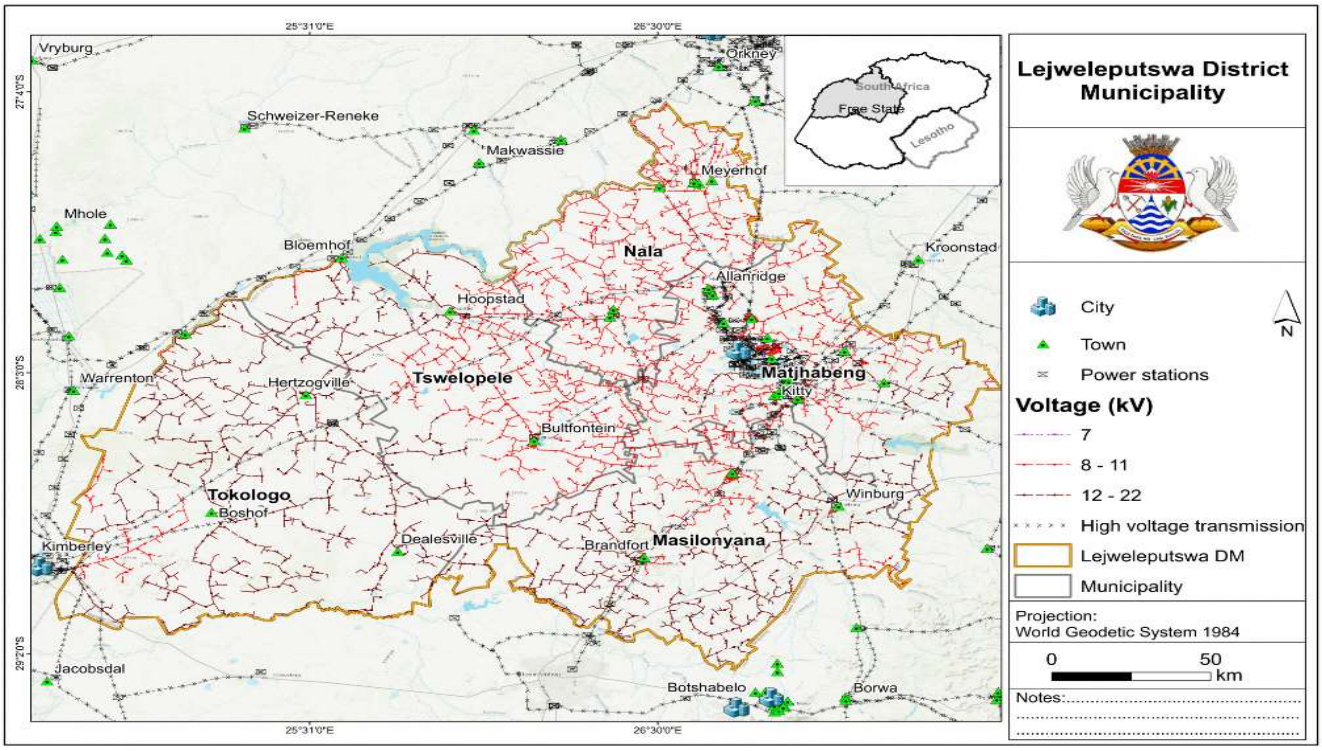


Figure 18: Electricity infrastructure in the Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

4.3.3 Road Network

4.3.3.1 Extent of the Road Network

The relevant road authorities in South Africa at different government levels are obligated to provide a reliable, effective and efficient integrated transport system. This is to be done with an overarching goal of supporting sustainable economic and social development objectives. Roads play an important role in connectivity and

mobility and have the potential to bridge not only geographical divides but also the ability to provide communities with access to improved economic and social opportunities.

The two national roads N1 (Johannesburg to Cape Town via Ventersburg and Winburg) and the N5 (connects the N1 at Winburg with the N3 at Harrismith) pass through the district. The R64, connecting Bloemfontein to Kimberley via Dealesville and Boshof, passing through Lejweleputswa district municipality is a busy corridor used to transport manganese to the Durban harbour. The spatial representation of the transport infrastructure in Lejweleputswa District Municipality shows the existing railway network that needs regeneration to stimulate economic growth (COGTA, 2020).

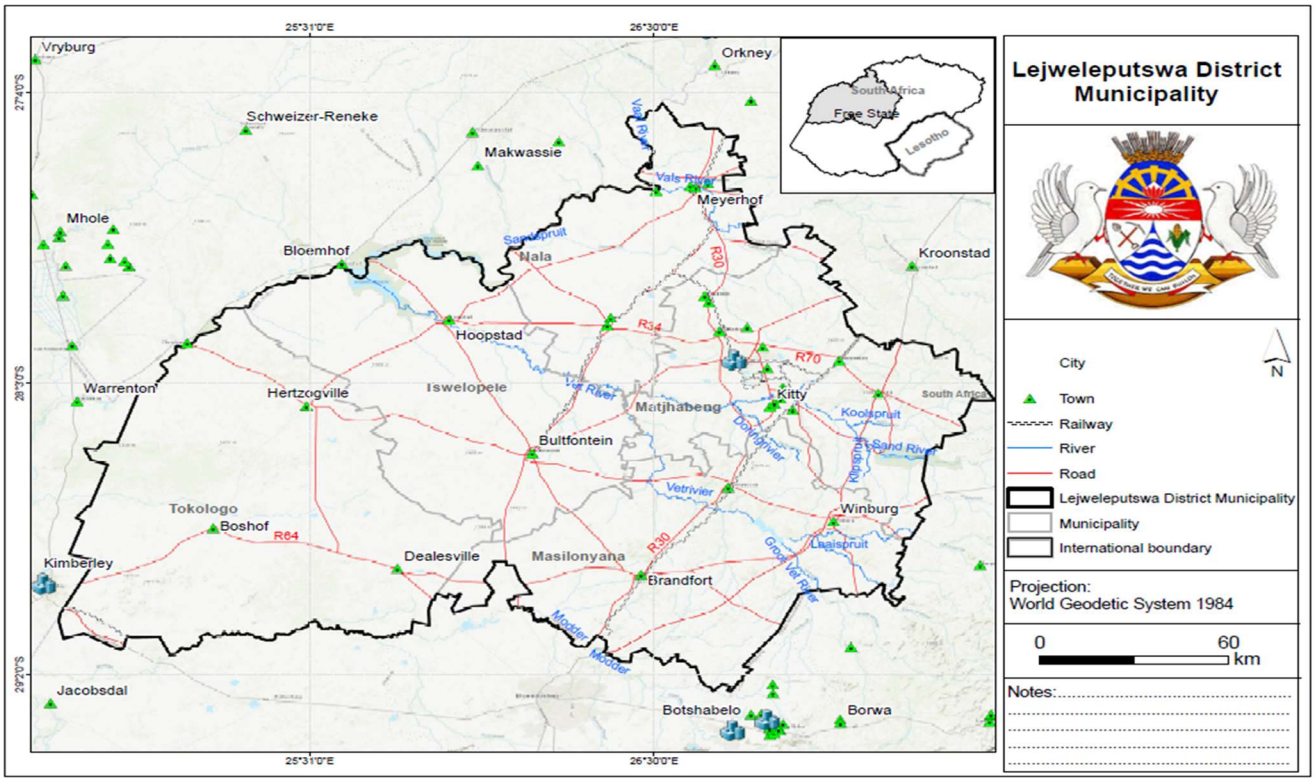


Figure 19: Transport infrastructure for Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

Road infrastructure is a critical element in the growth and development of regional economies. The Road Infrastructure Strategic Framework for South Africa (RISFSA) embodies the Road Infrastructure Policy and provides a blue print for roads planning and development.

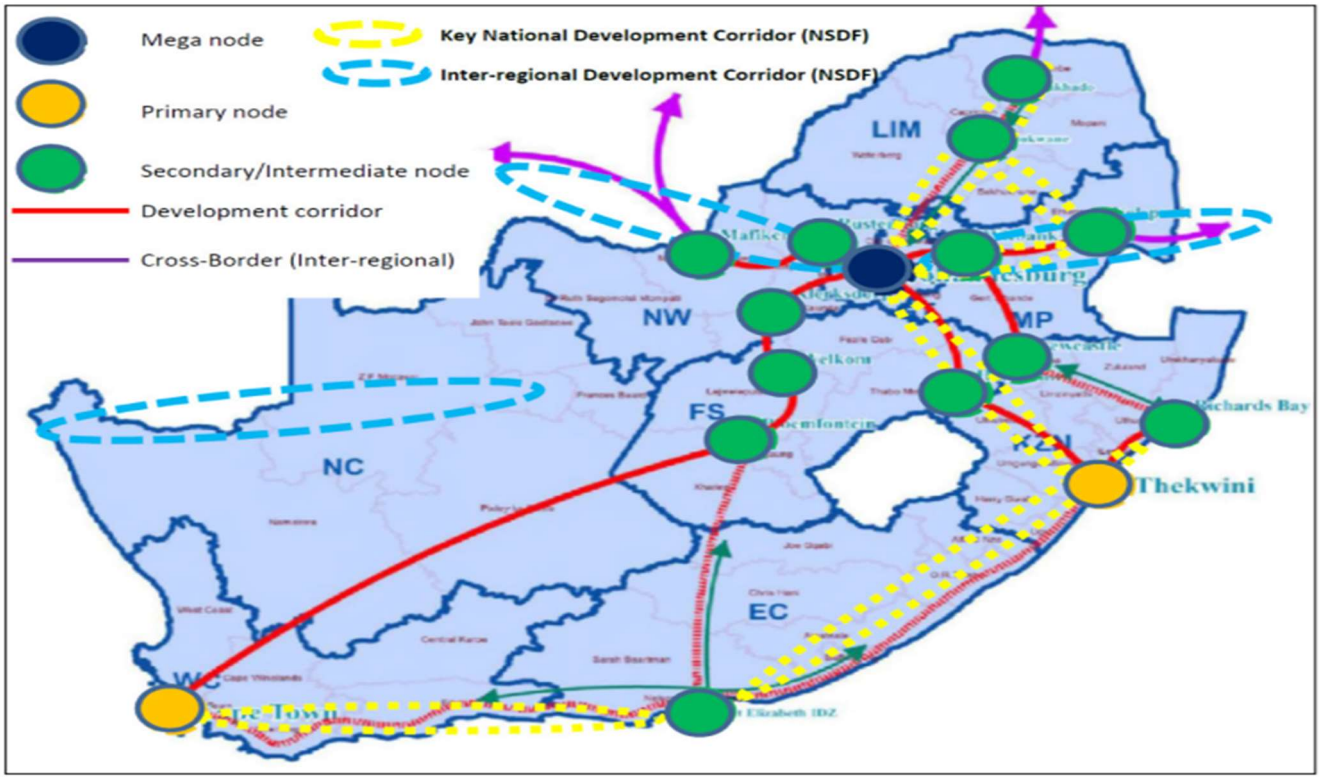


Figure 20: Potential corridor and nodal development opportunities (Source: Brand & Drewes, 2020).

4.3.3.2 State of Road Infrastructure

The majority of road surfaces within Lejweleputswa DM are gravel, with the majority of these gravel roads classed as district distributors. Blacktop (tar) roads cover a significant portion of the Lejweleputswa DM and are classified as primary and regional distributors.

The Lejweleputswa DM IDP 2020/21 identified the poor state of several regional roads as a weakness. This is corroborated by the spatial economic overview which identifies the poor condition of roads as a major challenge in economic development in the region. Most community access roads are unsurfaced gravel roads and according to the Lejweleputswa DM IDP, they are not constructed according to geometric design standards. The high level of usage by public transport vehicles results in high vehicle maintenance costs and unsafe traveling conditions for passengers. During wet periods, these surfaces become slippery or impassable resulting in unreliable transport options for the communities dependent on these roads.

4.3.4 Solid Waste Management

4.3.4.1 Spatial Extent of Waste Collection and Management Services

Waste collection services in Lejweleputswa District Municipality is the responsibility of individual local municipalities at their own landfill sites. In areas not receiving this formal waste removal service, such as the farms, it is common practice to have a “waste pit” in the backyard. The waste in these pits is often burnt to reduce the amount of waste buried.

Illegal dumping, particularly in urban parks and along the roads is a common occurrence. Many low-income households burn waste, such as plastics, in combination with firewood, coal and other sources of fuel, which causes localised air pollution. This practice also poses significant health risks as some of the particles released

into the air are carcinogenic. There are also several illegal waste dumps in backyards and on vacant land. This poses significant health risk to people and pollution risk to surface and groundwater resources.

The Lejweleputswa District Municipality's local municipalities have independent and comprehensive Integrated Waste Management Plan (IWMP) addressing issues associated with current municipal solid waste management infrastructure and systems and recommending interventions to address current and future needs.

In 2018, the IHS Markit indicated that Lejweleputswa district municipality had a total number of 151 000 (79.31%) households that had their refuse removed weekly by the authority, a total of 9 040 (4.74%) households had their refuse removed less often than weekly by the authority and a total number of 18 600 (9.73%) households which had to remove their refuse personally (own dump). The decline can be attributed to the decline in households (Lejweleputswa District Municipality, 2021a).

The municipality within Lejweleputswa with the highest number of households where the refuse is removed weekly by the authority is Matjhabeng local municipality with 108 000 (71.36%) of the households in Lejweleputswa. The municipality with the lowest number of households where the refuse is removed weekly by the authority is Tokologo Local Municipality with a total of 3 890 or a share of 2.57% of the total households where the refuse is removed weekly by the authority within the district municipality (Lejweleputswa District Municipality, 2021a).

When looking at the number of households with no formal refuse removal, it can be seen that in 2008 the households with no formal refuse removal in Lejweleputswa District Municipality was 30 300, this increased annually at 0.05% per annum to 30 500 in 2018. The total number of households within Lejweleputswa District Municipality increased at an average annual rate of 0.38% from 2008 to 2018, which is higher than the annual increase of 2.13% in the number of households in South Africa (Lejweleputswa District Municipality, 2021a).

4.3.5 DEVELOPMENT PRESSURE

4.3.5.1 Local Economic Development in Lejweleputswa District Municipality

Local economic development (LED) is an area of importance within the DM. Some of the challenges experienced around LED within the DM include: the fact that development potential of the municipality which is rated as an area where resource potential is low, human need is medium-high and economic activity is low. Agriculture is the largest sector within the DM together with wholesale and retail. There has been a noticeable decline in the agricultural sector within the DM, this can be attributed to large areas under land claim, difficulty in accessing funding for infrastructure especially as small scale farmers and a lack of access to markets and support structures. An important step to local economic development is an emphasis on infrastructure development. Although areas such as Newcastle have good infrastructure and development, other areas within the DM lack both social and economic infrastructure. This lack of infrastructure includes a lack of roads to support agricultural and mining activities, a lack of commercial and industrial spaces and a lack of irrigation for agricultural activities. Unemployment and poverty remain one of the main hindrances to LED and therefore a lot of focus has been put towards increased investment and economic growth.

4.3.5.2 Potential Areas of Development within the Lejweleputswa District Municipality

Development within the LDM has to adhere to specific guidelines and directives in terms of district development plan, IDP including:

- **N1 and N5 main travelling routes** - the N1 and N5 are the main travelling routes within the district and link between Lejweleputswa DM with other provincial and national economic hubs. There are high volumes of traffic on these roads, especially for trucks and other road freight vehicles. The heavy reliance on these roads therefore provides an opportunity for development in terms of road improvement and provision of facilities to capitalise on the existence of this heavily utilised route.

- **Human Settlement**- The Lejweleputswa DM is characterised by a mix of urban and rural dwellings with strong community and traditional land practices undertaken which shape settlement patterns. Commercial and office spaces are predominantly found in Welkom as well as service industries and community commercial centres. In terms of the development proposed, most of this development is set to take place within short to medium term timeframes. This development includes the development of office spaces, restaurants and motorcar showrooms. There is also an emphasis placed on the refurbishment of buildings that are underutilised or vacant because of the economic downturn or relocation. The main development in terms of settlement is that off mixed land use and commercial nodes together with areas of residential development.

- **Mining**- Mining is the primary sector of the economy in the district. The Lejweleputswa district mining activity is located in Matjhabeng and Masilonyana local municipalities. The minerals mined are gold and diamond. These are precious metals with many uses mainly in jewellery manufacturing. Gold mining is dominant in Matjhabeng. Two considerable gold reserves with an estimated 20-year life span still exist in some parts of Matjhabeng and Nala local municipalities (IDP 2020-2021).
    - There is significant potential for mining low grade coal in Matjhabeng and Nala local municipalities.
    - There is some lower value mining potential in salt in the municipalities of Matjhabeng, Masilonyana, Tswelopele, and Tokologo.
    - There are also gypsum fields in Tokologo.
    - Diamond Kimberlite outcrops are located in the vicinity of Boshoff and Theunissen.

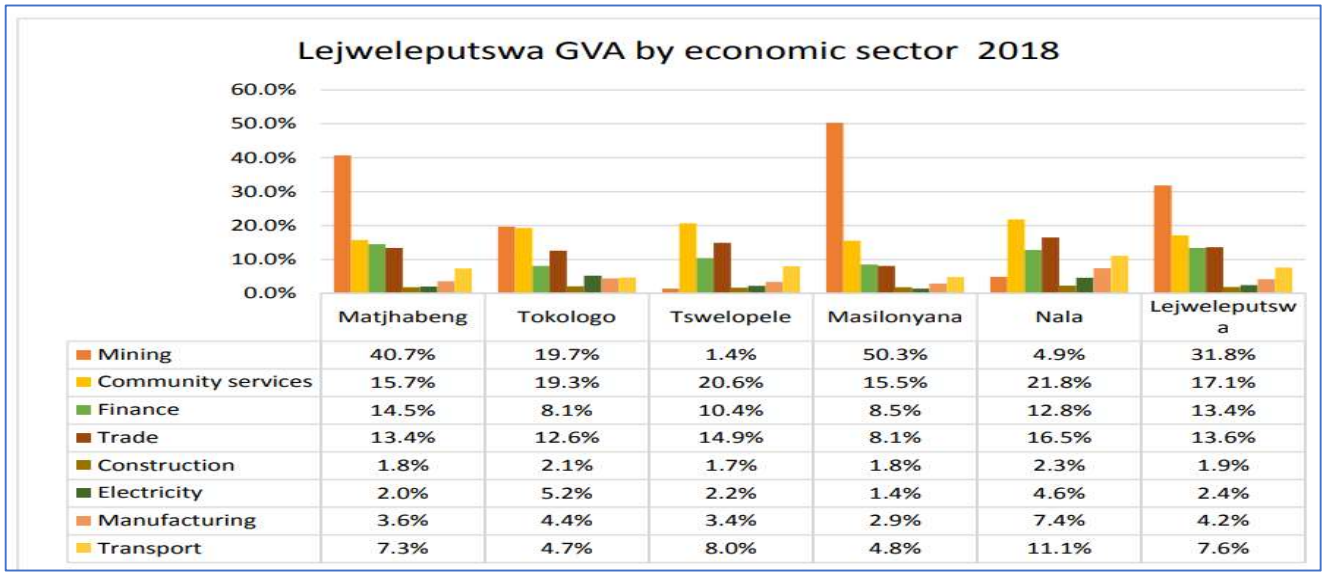
  Lejweleputswa District Municipality is rich in mineral resources. A gold reef of over 400 km long known as Lejweleputswa (formerly the Goldfields) stretches across Gauteng and the Free State. The largest gold-mining complex is the Free State Consolidated Goldfields, with a mining area of 32 918 ha. The district has 15 gold mines operating from the towns of Welkom, Virginia and Odendalsrus. Gold mining is dominant in Matjhabeng with two considerable gold reserves with an estimated 20- years life span that still exists in some parts of Matjhabeng and Nala Local Municipalities. Lejweleputswa has significant mining potential for the following:
    - Low-grade coal in Matjhabeng and Nala.
    - Salt in the municipalities of Matjhabeng, Masilonyana, Tswelopele, and Tokologo.

- Gypsum fields in Tokologo.
- Diamond Kimberlite outcrops in Boshof and Theunissen.

- **Manufacturing**- The manufacturing sector contributes 6.9% to the GVA of the district and is not a dominant sector. Manufacturing in Matjhabeng local municipality is aimed at the mining sector and exists to a limited extent in the towns of Allanridge, Odendaalsrus, Welkom and Virginia. Welkom has been identified as a specialized economic node with an above-average potential for high value differentiated goods (fuel, rubber, plastics, electronics).
  The Harmony Jewellery School is located in Virginia and trains students in the art of jewellery design. The school is intended to form part of the nucleus of a jewellery beneficiation hub. The Free State Development (FDC) has targeted farm machinery and equipment, leather tanning and finishing, gold jewellery and beneficiation and petrochemicals as the sectors for foreign direct investment. The farm equipment manufacturing industries will have linkages with the farmers in the area[1].

  The manufacture of sulfuric acid from gold ore and the mining of gold is another driver of the economy in the Lejweleputswa district. The Biofuel Plant in Bothaville produces bio-ethanol from maize and sorghum.

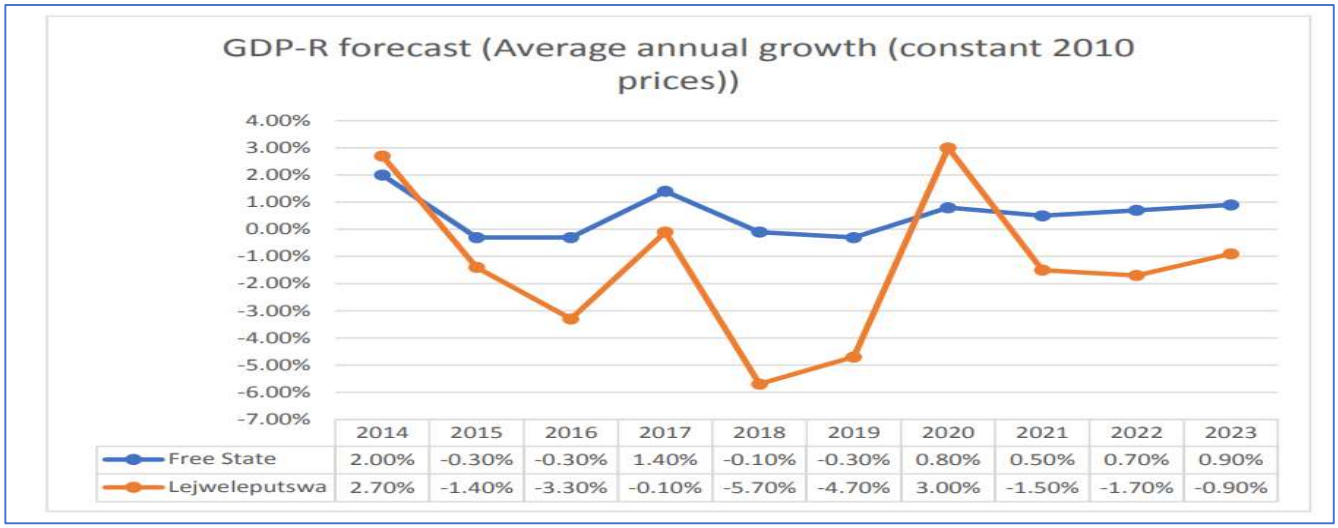
- **Commerce and trade**- The economy of Lejweleputswa thrives on mining and farming. The district is rich in gold deposits and lies at the heart of the province's goldfields. In terms of farming, the district is a major producer of maize and sunflower. Mining and farming as the primary sector of the economy in the district contributed 28.6%. Activities in the secondary sector (manufacturing: 6.9%, electricity: 1% and construction: 5.7%) collectively contributed 13.6% to the GVA of the district. The tertiary sector (trade: 22.7%, transport: 4.4%, finance: 9.9% and community services: 20.8%) accounts for 57.8% of the GVA of the district. Economic activities in the tertiary sector comprise of finance, insurance, real estate and business services, wholesale and retail trade, catering and accommodation and general government sectors. In recent years the contribution of mining in Lejweleputswa's economy has been declining due to several reasons and recently the effect of lower world commodity prices has fuelled the decline of the sector. The share of the primary sector in Lejweleputswa's GVA has also been on a decline, indicating a shift away from the primary sector to the tertiary sector. The community services sector is growing strongly in all of Lejweleputswa's municipalities and is also forecasted to grow further



	Matjhabeng	Tokologo	Tswelopele	Masilonyana	Nala	Lejweleputswa
Mining	40.7%	19.7%	1.4%	50.3%	4.9%	31.8%
Community services	15.7%	19.3%	20.6%	15.5%	21.8%	17.1%
Finance	14.5%	8.1%	10.4%	8.5%	12.8%	13.4%
Trade	13.4%	12.6%	14.9%	8.1%	16.5%	13.6%
Construction	1.8%	2.1%	1.7%	1.8%	2.3%	1.9%
Electricity	2.0%	5.2%	2.2%	1.4%	4.6%	2.4%
Manufacturing	3.6%	4.4%	3.4%	2.9%	7.4%	4.2%
Transport	7.3%	4.7%	8.0%	4.8%	11.1%	7.6%

Figure 21: The Gross Value Added (GVA) of the Lejweleputswa District Municipality per economic sector (Source: Lejweleputswa District Municipality, 2021).

The GDP growth rates for Lejweleputswa from 2014 to 2023 in comparison to the Free State are seen in the diagram below. It can be noted that the province's GDP growth rate has experienced gradual fluctuations from 2014 to 2019. Promisingly, the province is projected to have a slight increase in the GDP growth rate during the years 2021 to 2023 with 0.5% to 0.9%. It can also be seen that Lejweleputswa has followed the Free State trend however with steeper fluctuations from 2014 to 2019. Similarly, a gradual increase in GDP growth rate is projected for the years 2021 to 2023, from - 1.5% to -0.9%. These statistics are worrying as all these forecasted growth rates are below the expected growth rate of 5% as estimated by National Development Plan (NDP) to reduce the high rate of unemployment.



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Free State	2.00%	-0.30%	-0.30%	1.40%	-0.10%	-0.30%	0.80%	0.50%	0.70%	0.90%
Lejweleputswa	2.70%	-1.40%	-3.30%	-0.10%	-5.70%	-4.70%	3.00%	-1.50%	-1.70%	-0.90%

Figure 22: Forecasted annual Growth Domestic Product (GDP) of the Lejweleputswa District Municipality (Source: Lejweleputswa District Municiplaity, 2021).

5 WATER RESOURCES

5.1 OVERVIEW OF THE WATER SUPPLY

In 2016 (Community Survey, 2016), 95.3% of households were reported to have access to safe drinking water. By 2018, Lejweleputswa District Municipality had a total number of 92 900 (48.66%) households with piped water inside the dwelling, a total of 84 500 (44.25%) households had piped water inside the yard and a total number of 1 870 (0.98%) households had no formal piped water. The municipality within Lejweleputswa district municipality with the highest number of households with piped water inside the dwelling is Matjhabeng local municipality with 74 600 (80.24%). The municipality with the lowest number of households with piped water inside the dwelling is Tokologo local municipality with a total of 1 690 (1.82%) households (Cooperative Governance and Traditional Affairs, 2020).

Major dams and reservoirs in the district include:

- The Bloemhof dam is located on the western side of the district.
- The Alemanskraal dam is located on the eastern side of the district.
- The Sandveld dam is important for the supply of the irrigation scheme.

Constructed permanent waterways, e.g., irrigation canals, storm water trenches in the district include:

- Irrigation canals towards the centre of the district, feeding on the Vet and Sand River.

- There is an irrigation canal south of Boshof, feeding on the Vaalhartz irrigation scheme of the Northern Cape (Lejweleputswa District Municipality, 2021).

5.2 Sanitation

According to the Community Survey, in 2016, 84, 2% of households had access to toilet facilities either flush or chemical toilets. 1,5% had no access to any toilet facilities, 09% had access to pit latrines facilities, 03% were still using bucket toilets whilst 02% were using other unspecified toilet facilities. By 2018, Lejweleputswa district municipality had a total number of 160 000 flush toilets (84.07% of total households), 5 310 Ventilation Improved Pit (VIP) (2.78% of total households) and 13 000 (6.83%) of total households' pit toilets. The municipality within Lejweleputswa with the highest number of flush toilets is Matjhabeng local municipality with 113 000 (70.41%). The municipality with the lowest number of flush toilets is Tokologo local municipality with a total of 2 910 (1.81%) (Cooperative Governance and Traditional Affairs, 2020).

5.3 Surface Hydrology

Major rivers in the Middle Vaal Water Management Area include the Schoonspruit, Rhenoster, Vals, Vet and Vaal rivers. Rivers flowing through the District Municipality play a major role in providing water to Lejweleputswa. The Vaal, Modder, Vals, Sand and Vet Rivers are the essential sources of water supply in Lejweleputswa. Bloemhof, Erfenis and Allemanskraal Dams provide drinking water to rural towns, the communities and farmers in the District Municipality.

- Nala Local Municipality - There are two rivers flowing through the area, the Vet River south of Wesselsbron and the Vals River through Bothaville. The Vet River is a tributary of the Vaal River. It rises in the Thaba Nchu, Senekal and Marquard districts and flows 242 km westwards to enter the Vaal some 6 km south-east of Bloemhof. The Vals River is a tributary of the Vaal River and it rises in the Bethlehem district and flows northwest for 300 km to its confluence with the Vaal 16 km west of Bothaville. It is a strong seasonal river.
- Matjhabeng Local Municipality - Five rivers run through the municipality, including the Koolspruit, Sand, Sandspruit and Vet.
- Masilonyana Local Muncipality - Seven rivers run through the municipality, namely the Groot Vet, Klein Vet, Korannaspruit, Laaispruit, Modder, Taaibosspruit and Vet Rivers and further.
- Tokologo Local Municipality - This municipality is unusual in that it has only one significant river, the Leeu, that rises near Boshof dam and flows into the Vaal. This is an ephemeral river.
- Tswelopele Local Municipality - Two rivers run through the municipality, namely the Vet River and the Dermspruit tributary.

5.4 Water Management Area

Lejweleputwsa District Municipality has within its boundaries two Water Management Areas. However, the majority of the District Municipality falls within the Middle Vaal WMA. The Middle Vaal WMA is located downstream of the confluence of the Vaal and the Rietspruit Rivers and upstream of Bloemhof Dam. It extends to the headwaters of the Schoonspruit River in the north and the Vet River in the south, covering a total catchment area of 52 563 km^2. The Middle Vaal WMA includes parts of Free State and North-West provinces.

The Lower Vaal WMA is located downstream of Bloemhof Dam and upstream of Douglas Weir. It covers a catchment area of 51,543 km^2. It lies in the North West and Northern Cape Provinces, with the south-eastern corner in the Free State.

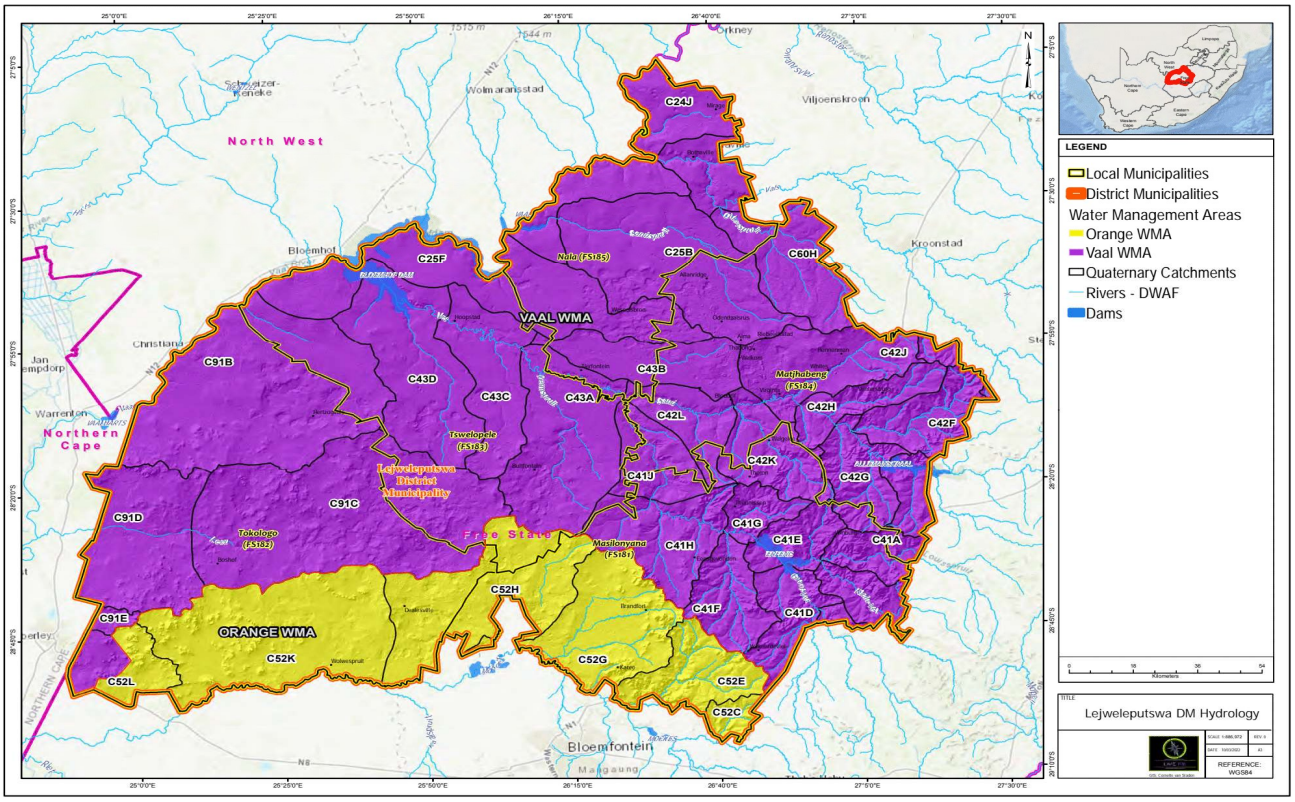


Figure 23: Surface water including catchment areas within Lejweleputswa (Source: Muvuledzi, 2022).

5.5 Catchment Overview

Catchment boundaries fall within WMAs and are, like the WMAs, based upon the topography of a region and do not follow administrative boundaries, hence the Water Management Areas do not fit into the district boundaries at all. Table below presents the quaternary catchments where the district municipality is located and major rivers flowing through the district municipality.

Table 7: Quaternary Catchments and Major Rivers within the DM.

WMA	Quaternary Catchments	Major River	Municipality
Middle Vaal	C25B, C24J, C43B	Sandspruit	Nala
	C42J, C42H, C42G,C42FC42L, C60H	Sand River	Matjhabeng
	C41A, C41D, C41E, C41F, C41G, C41H, C42K	Taaibospruit	Masilonyana
	C43A, C43C, C43D, C25F	Vet River	Tswelopele
Lower Vaal	C91B, C91C, C91D, C91E	Leeuspruit	Tokologo

5.6 Water Flows

The water in the Middle Vaal WMA flows from the Upper Vaal, across the Middle Vaal, Lower Vaal and Lower Orange WMAs before reaching the Atlantic Ocean near the town of Alexander Bay in the western corner of the country. According to the Middle Vaal WMA Overview of Water Resources Availability Report, DWAF (2003a), the bulk of the surface water in the Middle Vaal water management area is derived from the Vaal River, most of which originates in the Upper Vaal water management area. The Surface water flows that originate within the water management area are highly seasonal and variable, with intermittent flow in many of the tributaries. There are no natural lakes or swamps in the water management area.

The Lower Vaal WMA is dependent on the Upper Vaal and Middle Vaal WMAs for supply of utilisable surface water resources, with over 90% of the water required being sourced through releases from the Upper Vaal WMA and from Bloemhof Dam (DWAF, 2009). Very little surface run-off originates within the WMA itself due to the low rainfall, flat topography and sandy soils.

The water in the Lower Vaal WMA flows from the Upper Vaal, across the Middle Vaal, Lower Vaal and Lower Orange WMAs before reaching the Atlantic Ocean near the town of Alexander Bay in the western corner of the country.

5.6.1 Water Use

The National Water Act (NWA), Act No. 36 of 1998 requires that all water uses must be authorised. In order to determine if a water resource within a specific area is managed in a sustainable manner or not, it is necessary to identify indicators that reflect on elements of sustainability. Surface water resources in the LDM, as well as their tributaries should be regarded as sensitive to activities that might further deteriorate their quality.

5.6.2 Water Availability

According to the Middle Vaal WMA Overview of Water Resources Availability Report (DWAF, 2003), the total water available for use in the Middle Vaal water management area at the year 2000 development levels, is summarised in **Error! Reference source not found.**. Of the total yield available in the water management area, 80% is attributable to inflows from the Upper Vaal water management area, 60% of which flows through the Middle Vaal water management area into the Lower Vaal water management area. A significant quantity of water is also lost through evaporation and riparian vegetation along the Vaal River, which is in excess of the run-of-river yield contributed by local inflows, resulting in a negative yield for the Middle Vaal sub-area as shown in **Error! Reference source not found.**.

Table 8: Available water in year 2000 (million m³/a) at the Lejweleputswa District Municipality.

Sub-area	Natural resource		Usable return flow			Total local yield (1)	Transfers In	Grand Total
	Surface water	Ground-Water	Irrigation	Urban	Mining and bulk			
Rhenoster-Vals	22	12	3	7	0	**44**	1	**45**
Middle Vaal	(201)	25	3	15	16	**(142)**	828	**686**
Sand-Vet	112	17	10	7	1	**147**	59	**206**
Total	**(67)**	**54**	**16**	**29**	**17**	**49**	**829**	**878**

5.6.3 Future Water Requirements

According to the Middle Vaal WMA Overview of Water Resources Availability Report, DWAF (2003a), "A perspective on the possible future water supply situation is given by the table below. In both cases it was assumed that transfers from the Upper Vaal water management area would be equal to the requirements for augmentation of local resources, with a balance being maintained with respect to abstractions and the yield available from the Vaal River."

Similarly, water will be transferred from the Vaal River to the Welkom-Virginia area as required for urban, industrial and mining purposes. Virtually no change in water requirements is foreseen with respect to the Rhenoster-Vals and Sand-Vet sub-areas, with the assumption that mining use of water will remain approximately at the current levels.

Table 9: Water requirements and availability for the year 2025 (million m³/a).

Sub-area	Available water			Water requirements			Balance
	Local yield (1)	Transfers in	Total	Local require-ments (2)	Transfers out	Total	(3)
Rhenoster-Vals	49	2	51	65	0	65	**(14)**
Middle Vaal	(131)	910	779	152	628	780	**(1)**
Sand-Vet	149	72	221	200	2	202	**19**
Total	**67**	**911**	**978**	**417**	**557**	**974**	**4**

5.6.4 Ecological Water Requirements

Ecological water requirement is defined as the flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components.

The ecosystem in the Middle Vaal WMA where Matjhabeng and Masilonyana LMs are located is stressed by the mining and urbanisation related impacts occurring within the area. Area is also impacted by return flows from the urban centres, bulk water users and irrigation.
The maintenance of low flows and drought flows must be attained to support a healthy condition for the ecosystem and users. Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.

The ecosystem in the Lower Vaal WMA where Tokologo LM is located is highly stressed by the upstream dam and associated upstream activities and also by the land-based activities that occur in this area. Stream flows and also water quality is a constant threat to instream stability and must be managed to at least a D category as indicated in **Error! Reference source not found.** (DWS 2014).

The river stretch downstream of Douglas Weir is a very important migration corridor between the Vaal and Orange Rivers and therefore this area is of high Ecological (instream) Importance. Moderate high flows are important to provide ecological cues for the ecosystem. High flows need to be used to introduce variability as described in the Reserve. High flows need to be managed at a D category. The high flow requirements include flood and freshet flows and their associated flow duration requirements which are defined by the percentiles associated with the numerical limits of flows. Excessive nutrients also impact negatively on the ecosystem. Nutrients should be improved to a C category in order to maintain a healthy ecosystem (DWS 2014).

Table 10: Ecological water requirements for the Lejweleputswa District Municipality.

WMA	Municipality	Quaternary Catchments	EWR	PES	REC
Middle Vaal	Nala	C25B, C24J, C43B		C	C
	Matjhabeng	C42J, C42H, C42G,C42FC42L, C60H	EWR 15	D	D
	Masilonyana	C41A, C41D, C41E, C41F, C41G, C41H, C42K	ME1*	D	F
	Tswelopele	C43A, C43C, C43D, C25F	LB*		
Lower Vaal	Tokologo	C91B, C91C, C91D, C91E	EWR 16	D	D

Source: Muvuledzi, 2022.

5.6.5 Land use change and degradation

Water yield is also affected by land use changes. Conversion of natural veld to agriculture, industry, mining and urbanisation affects runoff and infiltration and in turn water yield in terms of quantity, quality and the timing of flows. Vegetation changes resulting from grazing decrease the surface cover and affects water yield. Decreased surface cover results in bare areas of soil resulting in erosion, increased runoff and decreased infiltration. Drought conditions and limited rainfall contribute to the decrease in water yield.

6 WATER QUALITY

6.1 Introduction

Water quality is affected by a number of processes, including natural changes due to seasonal fluctuations, climatic changes or rock and soil type changes as water moves through the landscape. Most well-known changes are however related to anthropogenic activities. There are many types of pollutants that negatively affect water quality. These include:

- micro-biological pollutants including viruses and bacteria,
- physical pollutants such as sediments

- organic pollution such as that from human or animal waste and
- Inorganic pollution from activities discharging metals and salts.

In the context of the Lejweleputswa DM, key water quality impacts are related to industrial activities, the discharge of wastewater and impacts associated with mining such as high salinity and low pH's resulting from acid mines drainage. However, for Lejweleputswa District Municipality, quality of surface water in the Middle Vaal water management area is good but can be of high turbidity. Water that enters the Middle Vaal water management area along the Vaal River, contains a large proportion of urban and industrial return flows from the Johannesburg area with part of the water having been through more than one cycle of use.

6.2 Water Quality Status Quo

The Middle Vaal WMA Overview of Water Resources Availability Report, DWAF (2003a) indicates that water quality of the main stem of the Vaal River is not only affected by the water quality of the flow from the tributaries within the WMA but also by the water quality of the water received from the upstream Upper Vaal WMA. The water quality received from Upper Vaal WMA is considered to be relatively poor. Despite the blending practiced in the Upper Vaal WMA, with releases from Vaal Dam used to maintain the TDS concentration in the Vaal Barrage at 600 mg/l, salinity has been reported as a problem in the Vaal river main stem.

Nutrients are also a water quality variable of concern. As a consequence, salinity levels in the Middle Vaal WMA can be very high and need to be managed through blending with fresh water so as not to exceed certain target concentrations. High nutrient concentrations also occur as a result of the large domestic component of return flows which, together with the low turbidity of the return flows, stimulates excessive algal growth.

The water quality of the Vaal main stem is impacted on by mining activities in the Schoonspruit, Koekemoerspruit and the Sand-Vet systems in the Middle Vaal WMA. The sources are mine dewatering discharges and seepage from tailings dams located close to the Vaal River. There are also large areas of the catchment where the runoff water quality is good. This water serves as dilution water, which results in an acceptable water quality in Bloemhof Dam.

The land uses in the WMA are largely agriculture, mining and urban areas with the larger urban centres located in the mining areas. There are significant areas of irrigation in the WMA. The return flow volume and qualities from the irrigation areas are not well quantified.

6.2.1 Spatial Distribution of Water Quality

Water quality has been assessed and spatially depicted using the flow derived quinnary catchments (FDQCs) developed for this study (in the water production component). This was in order to gain a finer level of resolution than that afforded by the more-often used quaternary catchments and to ensure continuity with the water production and aquatic ecological specialist studies. This approach also allows the consideration of the impacts of land based activities on catchment scale water resource units. Activities taking place in the terrestrial environment are key drivers of change in the quality of water in the aquatic environment through continuous sub-surface and surface flow interactions.

The current water quality situation across the District has been assessed using water quality data supplied primarily by the Department of Water and Sanitation. These data are associated with specific monitoring points located strategically in the catchment and provide measured information providing insight to impacting activities in upstream catchment areas. The limitation of this approach is the limited number and relatively biased (towards

key dams) distribution of monitoring points. This means that large areas of the District have no data with respect to water quality. For this reason, the Automated Land-based Activity Risk assessment Method (ALARM)[5] has been used to supplement the measured data to provide an indication of water quality concerns across the district.

6.2.2 Water quality status quo in Lejweleputswa District Municipality

Ecological water requirements is defined as the flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components. The ecosystem in the Middle Vaal WMA where Matjhabeng and Masilonyana LMs are located is stressed by the mining and urbanisation related impacts occurring within the area. Area is also impacted by return flows from the urban centres, bulk water users and irrigation.

The maintenance of low flows and drought flows must be attained to support a healthy condition for the ecosystem and users. Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category is met. The ecosystem in the Lower Vaal WMA where Tokologo LM is located is highly stressed by the upstream dam and associated upstream activities and also by the land-based activities that occur in this area. Stream flows and also water quality is a constant threat to instream stability and must be managed to at least a D category as indicated in the Table below (DWS, 2014).

The river stretch downstream of Douglas Weir is a very important migration corridor between the Vaal and Orange Rivers and therefore this area is of high Ecological (instream) Importance. Moderate high flows are important to provide ecological cues for the ecosystem. High flows need to be used to introduce variability as described in the Reserve. High flows need to be managed at a D category. The high flow requirements include flood and freshet flows and their associated flow duration requirements which are defined by the percentiles associated with the numerical limits of flows. Excessive nutrients also impact negatively on the ecosystem. Nutrients should be improved to a C category in order to maintain a healthy ecosystem (DWS, 2014).

Table 11: Ecological water status for the rivers in the DM.

WMA	Municipality	Quaternary Catchments	EWR	PES	REC
Middle Vaal	Nala	C25B, C24J, C43B		C	C
	Matjhabeng	C42J, C42H, C42G,C42FC42L, C60H	EWR 15	D	D
	Masilonyana	C41A, C41D, C41E, C41F, C41G, C41H, C42K	ME1*	D	F
	Tswelopele	C43A, C43C, C43D, C25F	LB*		
Lower Vaal	Tokologo	C91B, C91C, C91D, C91E	EWR 16	D	D

6.2.3 Modelled water quality risk data

The Vaal WMA are predominantly of low to no water quality risk, however, numerous significant risk areas were established and directly correlate with the extent of modification of water sources or areas. Significant risk areas were predominantly established downstream or within close proximity of urban centres, cultivated areas, mining developments as well as WWTWs.

WWTWs are especially of great concern as it is dominated by unacceptable to tolerable levels of most or all selected water quality parameters especially in terms of *Faecal coliform*. Most of the WWTWs facilities do not

comply with set standards and can be attributed to these facilities being mismanaged, inadequate or in need of proper maintenance or upgrading (du Plessis A, 2019).

Mining affects fresh water through heavy use of water in processing ore, and through water pollution from discharged mine effluent and seepage from tailings and waste rock impoundments. Increasingly, human activities such as mining threaten the water sources on which we all depend.

6.2.3.1 Introduction

Flood attenuation zones are those areas found adjacent to river systems and which are prone to flooding. Flooding usually occurs when a river channel's capacity is exceeded and overtopping occurs, allowing excess water to spill out onto a flood plain. Importantly, under such conditions, these areas play a significant role in dissipating the energy of a flood event and can reduce the impact of flooding on downstream people and infrastructure. It is obviously also important to identify flood zones from a development perspective as during a flood event these areas are flooded and any development or activities located within these areas are likely to be damaged or destroyed. Positively however, flood zones provide areas of flood attenuation especially of downstream users.

6.2.3.2 Location of Flood Attenuation Areas

In order to safeguard human life and property it is necessary to identify potential flood zones. This will be achieved by categorising and buffering rivers and streams by slope and altitude, based on the premise that high potential flood zones occur in larger rivers in lower lying flatter regions versus smaller rivers located higher up in mountainous regions.

6.2.3.3 Socio-economic and Conservation Value of the Resource

From a risk management perspective, flood zones need to be identified due to the potential risk they pose both socially and economically. Flood zone areas are obviously hazardous and flooding of these areas can cause loss of life, loss of or damage to homes, infrastructure and livelihoods. Informal settlements are particularly at risk given the fact that they are often situated on flood plain areas as they are generally relatively flat and uninhabited.

From an ecosystem services perspective, flood zones provide the benefit of erosion control, flood water quality improvement and flood attenuation which are especially important for downstream infrastructure, residents and users. Perhaps most importantly, flood zones allow flood water to spread out over a much larger area than their confined river channel. This dissipates energy, stores water temporarily, allows water infiltration and thus lowers the potential of the flooded river to inflict significant damage to infrastructure downstream. Where development occurs on flood plains, surfaces are hardened and many of these services are lost. Flood water is then allowed to push downstream with higher energy and destructive power.

Because of the deposition of sediments, flood zones are also usually rich in fertile alluvial soils providing good conditions for crop growth. Their topography is also conducive to cultivation meaning that they are often utilised for large scale commercial crop cultivation. This does place agricultural infrastructure at risk, though the greater rewards offered by cultivating in such fertile areas is likely to justify such risk.

The Vaal WMA are predominantly of low to no water quality risk, however, numerous significant risk areas were established and directly correlate with the extent of modification of water sources or areas. Significant risk areas

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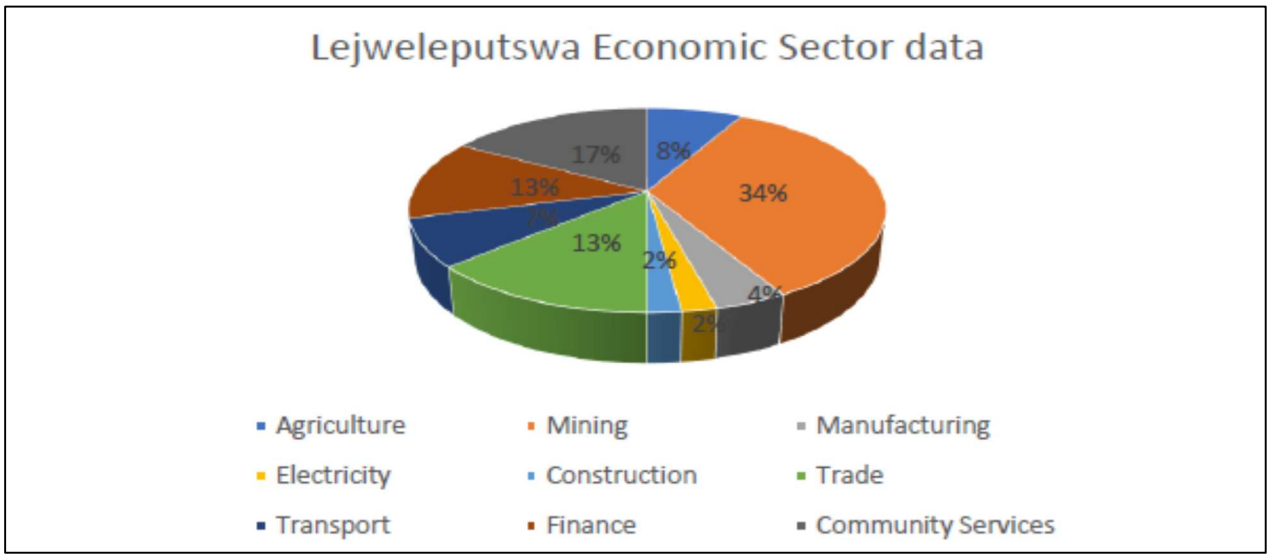

Figure 24: Lejweleputswa economic sector data (IDP 2020-2021).

6.2.4 RIVER HEALTH AND BIODIVERSITY

6.2.4.1 Introduction

River ecosystems provide essential goods and services for human and environmental well-being. In order to effectively manage the environment to ensure the achievement of a balance between use and protection of river ecosystems it is necessary to characterize each system in terms of its present ecological state (PES) and its ecological value. An assessment of river health not only takes the quality of water into account but looks at a number of biological components within the system which are used as bio-indicators to determine the state and health of rivers as integrated ecological systems. These bio-indicators can include fish, macro-invertebrates, diatoms and riparian vegetation.

6.2.4.2 Ecological priority areas

The National Freshwater Ecosystem Priority Areas (NFEPA) data set highlights areas within the district that are important for meeting biodiversity conservation goals for freshwater ecosystems. Rivers that are a category A or B according to Present Ecological State data are considered good in terms of NFEPA for biodiversity conservation. Many of the river reaches within the Lejweleputswa DM are characterised as river FEPAs. This indicates that these resources are in a good condition and are required to meet biodiversity targets for fish species and river ecosystems. In order to contribute to biodiversity of the region it is important for these resources to remain in a good condition.

The lower lying areas of the catchment have been characterised as fish support areas. These areas are fish sanctuary areas and are important in the migratory routes of fish species. The condition classes of these resources are fair to poor. It is still however important to conserve these areas in order to protect the threated fish species they contain.

A small area in the middle of the study area is defined as a phase 2 FEPA. This area is found in a moderately modified area and should not be degraded any further. The upstream management areas (MAs) have to be managed in terms of anthropogenic activities to prevent degradation in the downstream FEPA and fish support areas.

6.3 WETLANDS

Wetlands are defined as transitional areas between terrestrial and aquatic ecosystems (National Water Act). Wetlands are characterised as areas where the water table is at or near the surface and are periodically covered with shallow water. The wetland area is characteristic of being able to support vegetation that grows in saturated soils. Wetlands provide many functions such as water purification, flood control, groundwater replenishment, and sediment control and are areas of high biodiversity. The hydrology, geomorphology and vegetation within wetland systems are unique to provide their range of functions.

6.4 GROUNDWATER

6.4.1 Geohydrological features

Groundwater resources are available throughout the entire LDM, but in varying quantities, depending upon the hydrogeological characteristics of the underlying aquifer. The rocks underlying the Central Highveld, Western Highveld and North-eastern Pan Belt Hydrogeological Regions (Vegter, 2001), which covers the major parts of the LDM, are predominantly sedimentary of nature and mostly belong to Karoo Supergroup. The hydrogeological map of the area is shown in the figure below.

The 1:500 000 General Hydrogeological maps series for the Republic of South Africa published by the Department of Water Affairs and Forestry (DWAF, 2000) and the Groundwater Resource Assessment Phase 2 (GRA 2 – DWAF, 2005) database has been used to assess hydrogeological conditions of the study area.

The district is located within 1:500 000 hydrogeological map Kroonstad 2726 (Baran and Jonck, 2000) and Kimberley 2722 (Moseki and Meyer, 2003) sheets. Lejweleputswa DM area is underlain by fractured (b) as well as the intergranular and fractured (d) aquifer systems derived from the fracturing and weathering of the underlying geological formations.

a) Fractured aquifers

The tectonic forces and to a lesser degree the weathering processes have produced a network of fractures in the highly competent mainly quartzitic rock formations of Randian age. Little, or no decomposition of the rock mass took place due to their predominantly arenaceous and rudaceous nature.

The storage volume of groundwater stored in this type of aquifer is therefore limited, much lower than in other aquifer types. The groundwater pumped from the Free State Goldfields mines is considered to be stored in the network of interconnected fissures and fractures in the rocks of both the Witwatersrand and Ventersdorp Supergroups. It is isolated form the shallow, subsurface Karoo rock aquifer by the impermeable shales of the Ecca Group.

The yields of the fractured aquifer systems (b) is classified as b3, capable of supporting boreholes yields between 0.5 and 2.0 L/s.

b) Intergranular and Fractured aquifers

This aquifer system occurs practically in the entire map area. The action of tectonic forces together with the subsequent processes of weathering, created two hydraulically interconnected different zones that occur in a vertical profile namely: A shallower, weathered zone, where the original rock structure has been changed to a mass of more or less loose rock fragments, in a matrix of fine products of weathering, mostly sand, silt and clay.

A fractured zone, down to a depth where the rock is becoming solid and fresh in appearance. The transition to this deeper zone is usually gradual. The lateral movement of groundwater in the top zone is very slow and boreholes tapping it are weak

The yield potential of intergranular and fractured aquifer (d) systems within the district varies and are classified between d1 and d4, capable of supporting borehole yields between 0.1 and 5.0 L/s.

6.4.2 Recharge

According to the DWS data for recharge estimations using Chloride Mass Balance (CMB), the mean annual recharge to the groundwater system in Lejweleputswa DM is estimated to be between 50 and 100 mm per annum, (GRA II 3aC, 2005). The study by Musekiwa and Majola (2013) estimated the recharge to be between 10 and 50 mm per annum, but with some areas having an annual recharge of less than 5 mm (Moseki and Majola, 2013). The precipitation is the main source of recharge in the area and the mean annual rainfall for the district has been estimated to range between 500 and 700 mm per annum.

6.4.2.1 Hydrochemistry and Groundwater Quality

The scarcity of available data for the area, did not allow the assessment team for a more detailed analysis of hydrochemistry and groundwater quality. The assessment by DWS (2000) shows that the groundwater in the area is dominated by water with electric conductivity between 300 – 1 000 mS/m. The fluoride and nitrates are reported to be above 1.5 mg/l and 10 mg/l, respectively.

6.4.2.2 Groundwater Drainage, Transmissivity, Storativity and Recharge

The groundwater occurrence in the area is controlled by weathering, fracturing and dissolution of the dolomitic rocks. The groundwater flow is controlled by the topographical settings of the area as well as secondary geological features such as fault zone. The transmissivity and hydraulic conductivity of the underlying hydrostratigraphic units can be classified as low to intermediate.

The Ecca group consists mainly of shales and since the shales are dense, they are often neglected as source of groundwater. The porosity of the shales tends to decrease from 0.1 from the of the district to 0.02 in the southern part (Botha et al., 1998).

The estimated hydraulic conductivity values for aquifer systems within the district are presented below (Musekiwa and Majola, 2013). These approximate values were taken from geology literature, which lists typical values for different geology types. There were no field measurements conducted to verify these values.

Table 12: Hydraulic conductivities of different aquifers around Lejweleputswa District Municipality.

Aquifer type	Estimated hydraulic conductivity
Fractured	$1 \times 10^{1} – 1 \times 10^{-5}$

Integranular and fractured aquifer	$1 \times 10^{1} – 1 \times 10^{-1}$

6.4.3 Groundwater Development Potential

The groundwater yield potential of the fractured aquifers system is classified as:

- Fractured Aquifer system: classified as b3 capable of supporting borehole yields between 0.5 and 2.0 l/s.
- Integranular and fractured aquifer system: classified as d1 to d4 capable of supporting yields between 0.1 and 5.0 L/s.

The groundwater occurrence in these aquifer systems is generally associated with zones of deep weathering and fracturing as well as dissolution of dolomitic formations. Groundwater is often encountered in the weathered formation and the transition zone between weathered/fraction and fresh rocks and in karsts. The zones of deep weathering and fracturing normally coincide with the drainage pattern.

Although the intergranular and fractured aquifer types have a low to medium development potential, it can supply basic water to small rural settlements, with at least some capacity for community gardens. Many rural settlements in this region are, in all probability dependent on groundwater.

The groundwater development potential in the district can categorised as Low. Low development representing fractured and intergranular and fractured aquifer systems. These aquifer system supports borehole yields enough for water for either hand- and/or wind pumps, i.e. small supplies for small communities and/or stock watering or single households can easily be achieved. Additional groundwater for community gardening or other poverty alleviation actions will be available. At the high-end of the yield range larger communities from single boreholes and wellfields supplying large communities would be possible. However, due to large variability in borehole yields, an appreciable amount of boreholes will have to be drilled to obtain a yield at the high-end of the range. Pumping at 2l/s for 8hours per day, 2000 persons, @25l/day can be supplied comfortably.

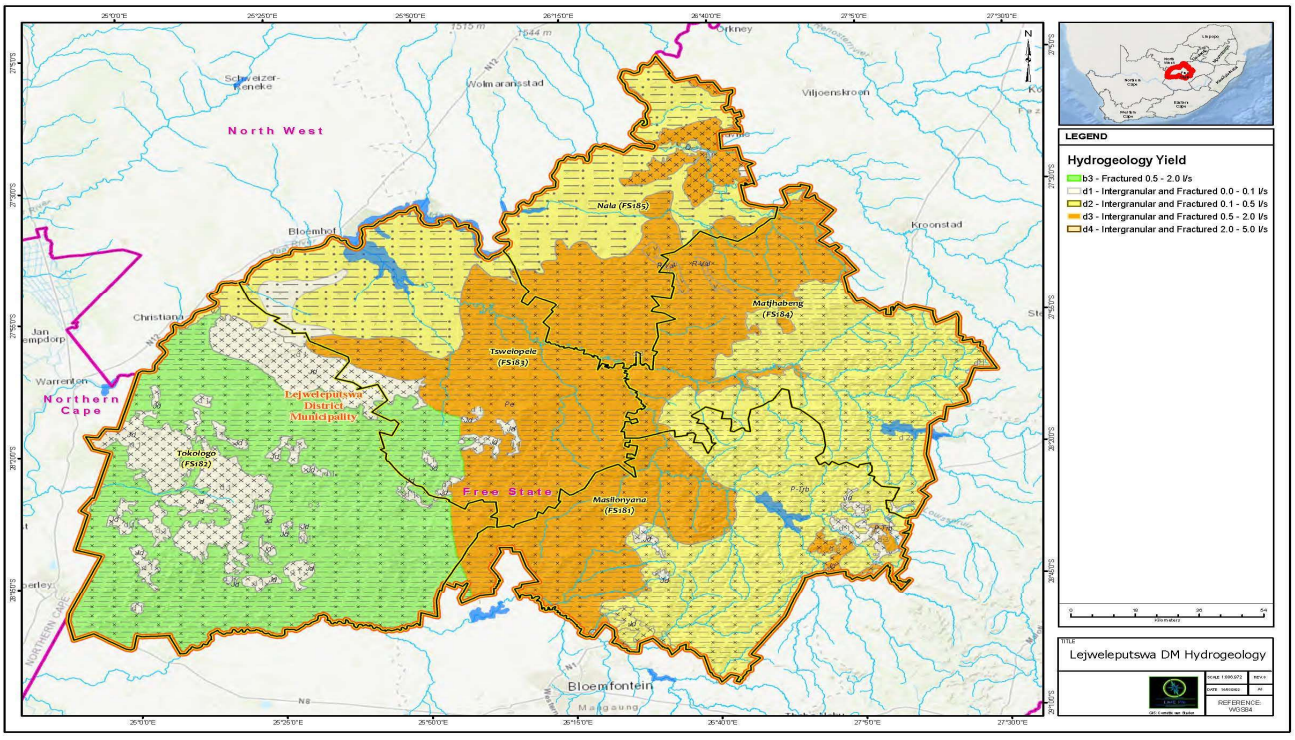

Figure 25: Hydrogeological settings of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

6.4.4 Groundwater Quality

Groundwater quality is relatively poorly understood in the District largely due to limited data availability. Sources of contamination are varied and some have been discussed with reference to the vulnerability of shallow groundwater tables. Other key impacts include mining and industry. The Newcastle LM IDP (2018 review) states that the quality of groundwater is moderate to poor and that the most probable causes are:

1. Poor rates of recharge
2. Mining activities – particularly coal mining
3. Industry
4. Farming activities.

The potential contaminants include:

- Heavy metals;
- Organic contaminants;
- Soluble salts;
- High turbidity.

6.4.4.1 Pollution

Possible water pollution sources in the Lejweleputswa DM primarily relate to land use activities such as agriculture, cemetery, mining and industrial uses. In addition, it also relates to facilities where wastes are treated and disposed of, such as landfill sites and waste-water treatment works.

Various forms of crop production whether dry land or under irrigation, can result in increased silt loads, due to soil erosion. Agricultural runoff enriched with fertilizers also contribute to eutrophication, while it can also lead to pollution with toxic substances such as herbicides and pesticides.

Other major contributors to eutrophication include runoff that originates from domestic sources, as well as the discharge of untreated or improperly treated wastewater into the rivers. On top of the discharge of nitrates and phosphates, domestic wastewater also contains substances such as endocrine disrupting compounds and faecal pollution.

Mining contributes pollutants such as salts and heavy metals that are released when rocks are crushed and minerals extracted, silt from tailing storage facilities, as well as chemicals used in the mining process.

Almost all (13) waste-water treatment works within Lejweleputswa district are reported to be failing and polluting both and groundwater resources in the areas in which are located (DWS, 2020).

6.4.5 Groundwater Vulnerability

Vulnerability of groundwater is a relative, non-measurable and dimensionless property, which is based on the concept that some land areas are more vulnerable to groundwater contamination than others are. Maps showing groundwater vulnerability assist with the identification of areas more susceptible to contamination than others (Musekiwa and Majola, 2013).

Aquifer susceptibility is a qualitative measure of the relative ease with which a groundwater body can be potentially contaminated by anthropogenic activities and which includes both aquifer vulnerability and the relative importance of the aquifer in terms of its classification. The aquifer vulnerability map for aquifers within the district is shown in **Error! Reference source not found.**.

The vulnerability of the aquifer systems within the district ranges from medium to high, with most of the aquifers vulnerability being classified as high and medium. Most of the aquifer system in the area are vulnerable to many pollutants except those strongly absorbed or readily transformed in many pollution scenarios.

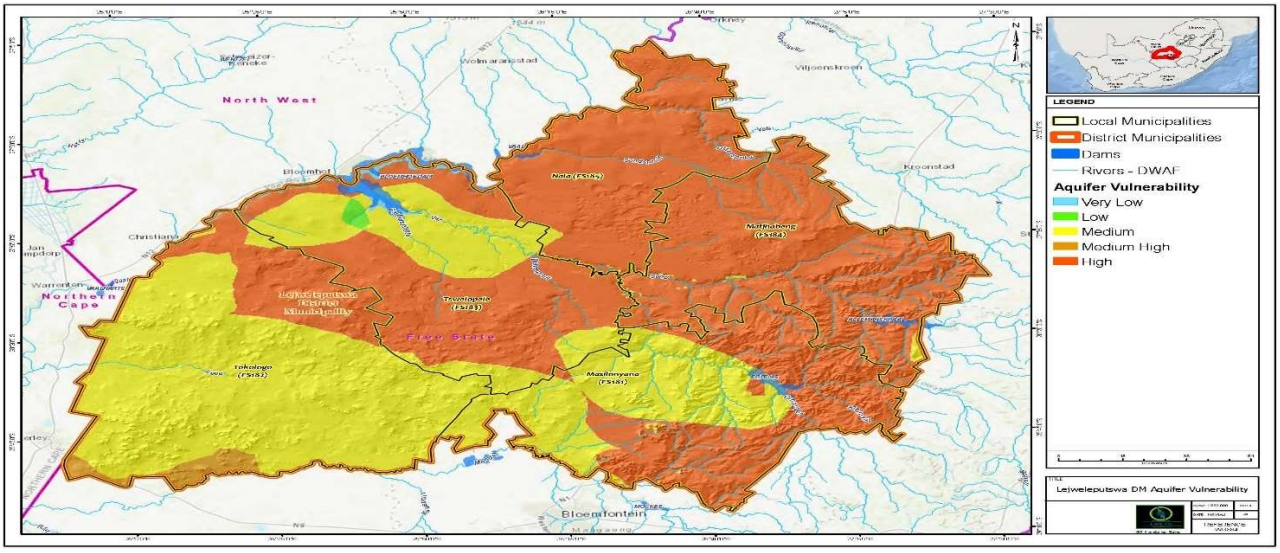

Figure 26: Aquifer vulnerability map of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

6.4.6 Depth to groundwater

DWS is monitoring groundwater level fluctuations in several boreholes within the district as part of the department national groundwater monitoring programme. The groundwater level map developed by Musekiwa and Majola (2013) based on data from the National Groundwater Database (NGDB) and using inverse distance weighting (IDW) shows that the groundwater levels in the area ranges between 5 and 30 meters below ground level (mbgl).

It should be noted that around the mines where there are active dewatering's, the depth to the groundwater level is influenced by the dewatering activities in the area.

6.4.7 Groundwater users

No detailed hydrocensus was conducted in LDM area as part of the current study to verify the groundwater users and abstraction volumes. It is known that most of the farmers and communities within the municipal boundaries are using groundwater for agricultural and domestic purposes. Verification of the water users will be done.

6.5 SPATIAL EXTENT OF IMPORTANT BIODIVERSITY FEATURES

6.5.1 Protected areas and Stewardship Sites

Formally protected areas are regions protected by law under the National Environmental Management: Protected Areas Act (Act 57 of 2003) such as nature reserves, national parks, and world heritage sites. Stewardship sites and protected environments also provide protection, however these occur on private land with various levels of stewardship.

6.5.2 Critical Biodiversity Areas and Ecological Support Areas

A Critical Biodiversity Area (CBA) is a natural / pristine or semi-natural feature, habitat or landscape that stretches across the terrestrial, aquatic and marine environments that is considered critical for

- Meeting national and provincial biodiversity targets and thresholds
- Assists in safeguarding certain areas in the landscape that are required to ensure the persistence and functioning of species, ecosystems as well as the delivery of ecosystem goods and services
- Preserving habitats that are important for biodiversity or rare species.

CBAs can be further divided into two categories; CBA Irreplaceable and Optimal.

CBA Irreplaceable: these areas are considered critical for meeting biodiversity conservation targets. Irreplaceable areas are necessary for the persistence of species as well as the overall functionality of the environment.

CBA Optimal: these are areas that are considered an optimal solution for meeting biodiversity conservation targets and aims to avoid areas where the risk of losing biodiversity is high.

Conservation of CBAs is a priority as areas that are not well maintained in a natural or near natural state have limited carrying capacity for biodiversity and rare species, which in turns reduces the chances of meeting national/ provincial biodiversity conservation targets.

An ESA is a functional area, whilst not necessarily in a natural or in near-natural state, that is used to ensure the persistence and maintenance of biodiversity, species and environmental processes within a CBA. ESAs are made up of four categories, ESA, ESA corridors, ESA Expert Input and ESA Species Specific.

CBAs and ESAs are used in the development of district biodiversity sector plans which makes recommendations regarding appropriate land uses and provides guidelines regarding land management. The distribution of CBAs and ESAs across the Lejweleputswa DM.

6.5.3 Agrobiodiversity Zones

Agrobiodiversity zones are zones that aim to highlight the importance of sustainable agriculture and biodiversity conservation, because they represent areas that are deemed to have both a high to moderate agricultural potential and a high biodiversity value. Importantly, they exclude land which is considered high priority from a crop cultivation perspective as this would place biodiversity conservation objectives at odds with that of agriculture in these areas. An agrobiodiversity zone therefore promotes the co-existence of indigenous biodiversity with agricultural activities.

These zones are also linked through “corridors” with formal protected areas. To enable or maintain species interaction between populations, the use of rangelands can be used to link or provide viable habitats for species that are prone to isolation. This encourages protecting indigenous vegetation and maintaining it in a good state and/or re-establishing natural species, the removal of alien plant species and buffering wetlands and watercourses.

Agrobiodiversity zones promote appropriate management of pesticide, herbicide and fertiliser use. They also aim to control surface runoff and prevention of soil erosion and degradation (in accordance with CARA (Act 43, of 1983)). The cultivation/ ploughing of virgin land are not supported in these areas as they do not contribute towards the above aims. Often, grazing is offered as an alternative. Natural resource harvesting is permitted, at low levels provided it is on a sustainable basis.

Climate change impacts from a terrestrial biodiversity perspective are likely to be considerable, with the loss of ecosystem goods and services. The change in rainfall patterns and temperature will have an effect on the geographical ranges of sensitive species, which ultimately affects ecosystem species composition, populations and communities. Over time, species and even biomes may shift towards more desirable conditions in efforts to persist. The future existence and distribution of sensitive species will depend on the ability of species to migrate.

Altitudinal corridors and ESAs therefore play an important role in facilitating the migration of species. Fragmented habitats hinder plant migration as they do not offer suitable areas for successful colonization.

The loss of grasslands through land conversion and alien invasion in the District can also exacerbate the effects of climate change. Grasslands and vegetation cover are known to act as carbon sinks, removing large amounts of carbon dioxide from the atmosphere and storing it in the soil. Grassland degradation and modification elevates the carbon levels in the atmosphere increasing the effects of climate change (increased temperatures / seasonal changes / elevated annual rainfall).

6.6 ECONOMIC GROWTH AND SOCIAL WELLBEING

The Constitution of South Africa provides for a fundamental right for all of an environment that is not harmful to one's health. Two physical elements that are essential for social health and well-being are clean air and clean water. Both of these are presently threatened in the region. Whilst economic activity and growth is important, the impact of various commercial and public service activities on water resources and air quality is clearly evident in the outcomes of this study. Achieving a balance between such activities and a healthy environment requires that infrastructure such as waste water treatment works and the management of such facilities be maintained at a high level of functionality. Without this, sustainable development in the District is threatened.

6.7 MUNICIPAL CAPACITY

Municipal capacity has been identified by a number of the specialist studies as being an important factor in driving deterioration or hindering improvements in the state of the environment in the ADM. This includes both capacity with respect to both financial and human resources. It also includes political will, which sits behind both of these elements and additionally drives the determination to deal with non-compliance with regulatory tools and processes.

7 HERITAGE RESOURCES

7.1 OVERVIEW

A rich archaeological landscape reflects the history of the Free State Province. A few sites illustrate Stone Age habitation, mostly located in open spaces along rivers or in sediments. Historically, Bantu-speaking groups have inhabited this region for millennia, and the presumably Basotho groups occupied the landscape from 1500-1800 during the Late Iron Age. Iron Age settlements were established along rivers and nearby rocky outcrops in plains. In the middle of the 19th century, European farmers moved to the area and divided the landscape into several farms. Parts of the district have experienced intensive agricultural and mining development in recent years.

The district was previously known as the Orange Free State and stood on its own as a country. Orange Free State was a Boer republic in southern Africa. The Boers, of Dutch ancestry, had settled the area earlier in the nineteenth century among the other settlers. Lejweleputswa is a goldfields district and a major agricultural area. It is situated within the Witwatersrand basin. A gold deposit was discovered in the early 1940s.

One of the district municipality's heritage sites is the National Military Museum, also known as Voortrekker Monument. The Florisbad National Quaternary Research Station is another notable site, which was the site of the discovery of the first human skull. Additionally, the district municipality hosts Winnie Mandela's Banished

home, now a museum in the small town once known as Brandfort (recently renamed Winnie Mandela).

Further details through the review of existing heritage resource databases (SAHRIS), literature and expert knowledge, heritage data for Lejweleputswa district municipality have been thoroughly investigated. Types of heritage found in the region include:

7.2 Archaeological sites

Majority of the district municipality's achaeological sites have been identified during Heritage Impact Assessment studies or investigations. Due to the history of the Basotho inhabitation of the area, majority of the archaeological materials found in the district are associated with them. SAHRIS noted a lot of artefacts belonging to the Iron Age group, which are notably the same age as the arrival of the Basotho speaking people in the district. Such artefacts are in the form of rock art engravings and paintings, ruins, stone wall and burial grounds and graves. The arrival of the European farmers is also noted in the artefacts through the reminants of structures and farms which were established through their arrival.

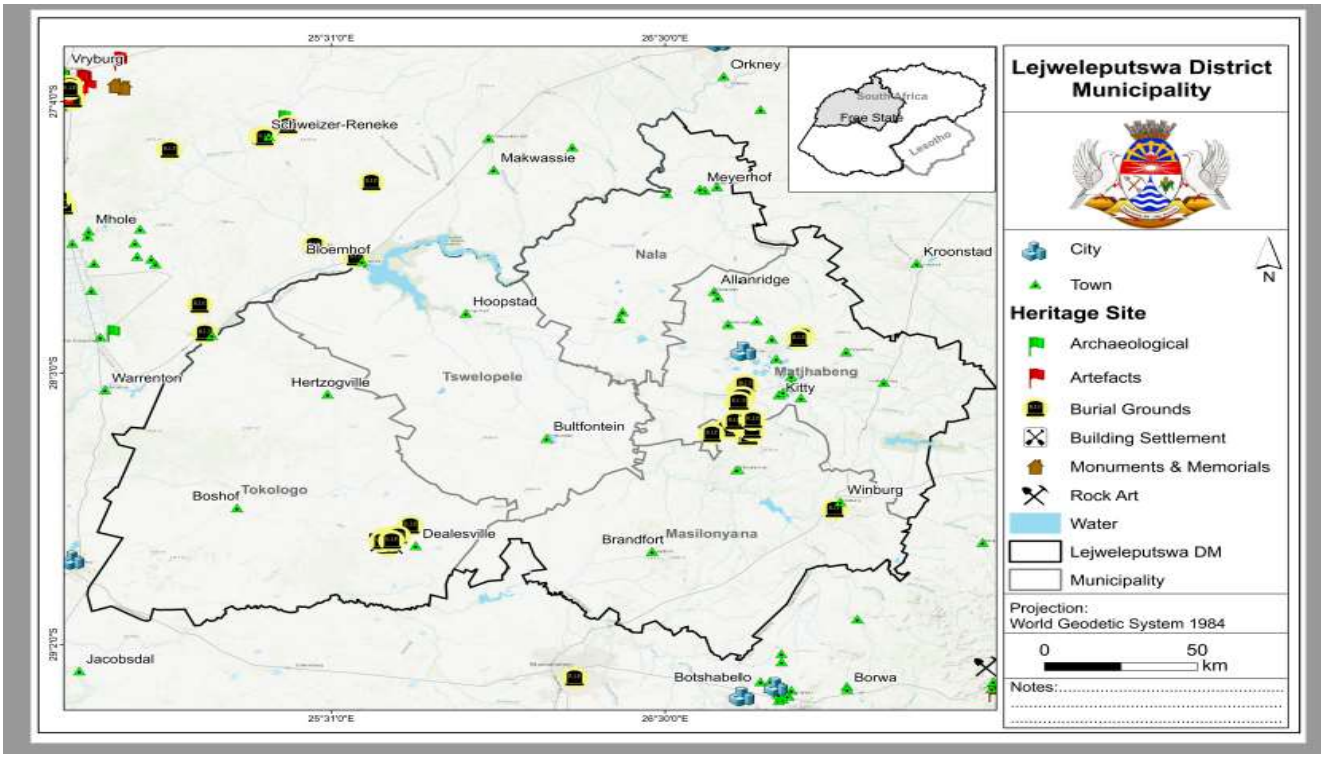

Figure 27: Heritage sites within Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

7.2.1 Military History

This district has perhaps one of the country's famous military activities, i.e., part of the Anglo-Boer war including a famous town of Brandfort (renamed recently to Winnie Mandela). Some of these wars took place in the 1800. The district is also known for its history about the concentration camp which the British set up on Dwyersdorp for Afrikaner women and children caught up in the Second Anglo-Boer war. There are also other structures and buildings associated with the area's military history. Amongst the military history is the war declared by the then

Orange Free State upon the British and fought alongside its sister Boer republic, the South African Republic, during the Boer War (1899-1902).

7.2.2 Buildings and Structures

Same as most parts of the Free State province, the district has some of the notable historical buildings that are important in terms of history, aesthetics, architecture and/or social values. Although some of these are well known in terms of their location, condition and management requirements; there is are some whose such details is still not properly documented and therefore not known. Among these is the building where Winnie Mandela stayed when she was banished by the then apartheid government and many other stuctures constructed by the apartheid and boer republic governemnets. The SAHRIS website however

7.2.3 Monuments and memorials

There are a couple of monuments and memorials in the district, however, most of these are mostly for the whites who settled the area later after the natives. Among these is the Voortrekker Monument. The SAHRIS website however note no monument and memorials in the area figure above. It should be noted that absenteeism of heritage materials does not necessarily mean unavailability. In the case of monuments and memorials, nomination and declarations is needed.

7.2.4 Burial Grounds and Graves

Given the rich history of human inhabitation and conflict during the interaction between the natives, settlers and the boer war that took place in the area,re are high chances of locating more burial gounds and graves than what is noted on the SAHRIS website. Although some of these appears in the SAHRIS website, there is high potential that most of these are yet to be identified in this district as depicted in the heritage site map above. The noted burial grounds and graves were due to development, chances are that there are a lot more graveyards and burial grounds that the developers completely avoid hence they are not found in the SAHRIS information platform. Majority of graves and burial ground are situated at Matjhaneng and Dealesville.

7.2.5 Living Heritage/Sacred Sites

The Lejweleputswa District has rich oral tradition and some of the living heritage resources. Among these this include some of the Basotho people who apper to be the majority of the inhabitants before the arrival of white settles. This living heritage of the Basotho include their performing arts, social practices and various rituals.

7.2.6 Conservation Areas, Cultural Landscapes, Natural Sites and Places

Overall, there is a need for formal protection of most already identified cultural landscapes, natural and sites and places across the district. However, the challenge is that there are still numerous areas that need to be identified in the Lejweleputswa District.

7.2.7 Cultural Heritage Sites

Across the Lejweleputswa District, there are a total of 378 identified heritage resources. Of these, over 110 are historical structures which are found across the district. Most of these historical structures are graded IIIc. These structures are mostly in Dealesville, a mixed farming town. There are also just above 80 artefacts identified in the SAHRIS website. These are also mostly found at the farming town, Dealesville. The histrocial buldings in the district identified and listed on the SAHRIS website are just over 30; these buildings are found mostly in

Theunissen, a small town located 95 km northeast of the city of Bloemfontein.

7.2.8 Proposed Sites for Freedom Route

Across South Africa, there are various areas whose inhabitants fought for freedom, in particular colonialism and suppression of native groups. The Lejweleputswa district has such sites, however, currently most of these are not official declared. The proposed sites not only have the historical value of what the individuals or groups of people fought for but also have a tourism attraction. Also, interesting about this district is the town of Brandfort which is well known as a place where Winnie Mandela stayed at when the Apartheid government banished her. The same town is said to have a school where Hendrik Verwoerd completed his high school studies in 1919.

Table 13: Proposed Freedom Routes for Lejweleputswa District Municipality.

Site name	Description	Coordinates	Grading
Winnie Mandela house	This is the house in which Winnie Mandela was banished from by the apartheird government in 1977.	28°41'7.93"S 26°27'34.09"E	Grade I
Dwyersdorp	named after Captain Dwyer who assisted white women and children who had been incarcerated at the camp	29°35'30.35"S 26°39'59.93"E	Ungraded
Site where General De Villebois-Mareuil was killed,	Place where the Boer leader was killed	-28.670526, 25.294049	Graded II

7.2.9 District Palaeontological Heritage

Fossils in South Africa are found predominantly in sedimentary rocks and not in igneous and metamorphic rocks. The palaeontological sensitivity is thus generally low to very high if there are Karoo Supergroup strata present, but locally high for the Quaternary and Prince Albert Formation, and low for kimberlite (Fourie, H. 2017). The Karoo Supergroup occupies vast areas of southern Africa. Ecca Group rocks date from the early to mid-Permian (545-250 Ma). Snyman (1996) describes Ecca group sediments as marine to fluvio-deltaic. This group is known for their coal deposits (primarily the Vryheid Formation) (five coal seams) and uranium.

The coalfields were created when plant material accumulated in large swampy deltas and shallow areas. The paleontological sensitivity of the district low to moderate and will only require desktop study in the case of development (see figure below). In despite the province as a whole having made headlines for the discovery of the Taung child closer to Vryburg and Florisbad near Bloemfontein which yielded archaic Homo sapiens, Letjweleputswa holds no records of significant paleontological materials.

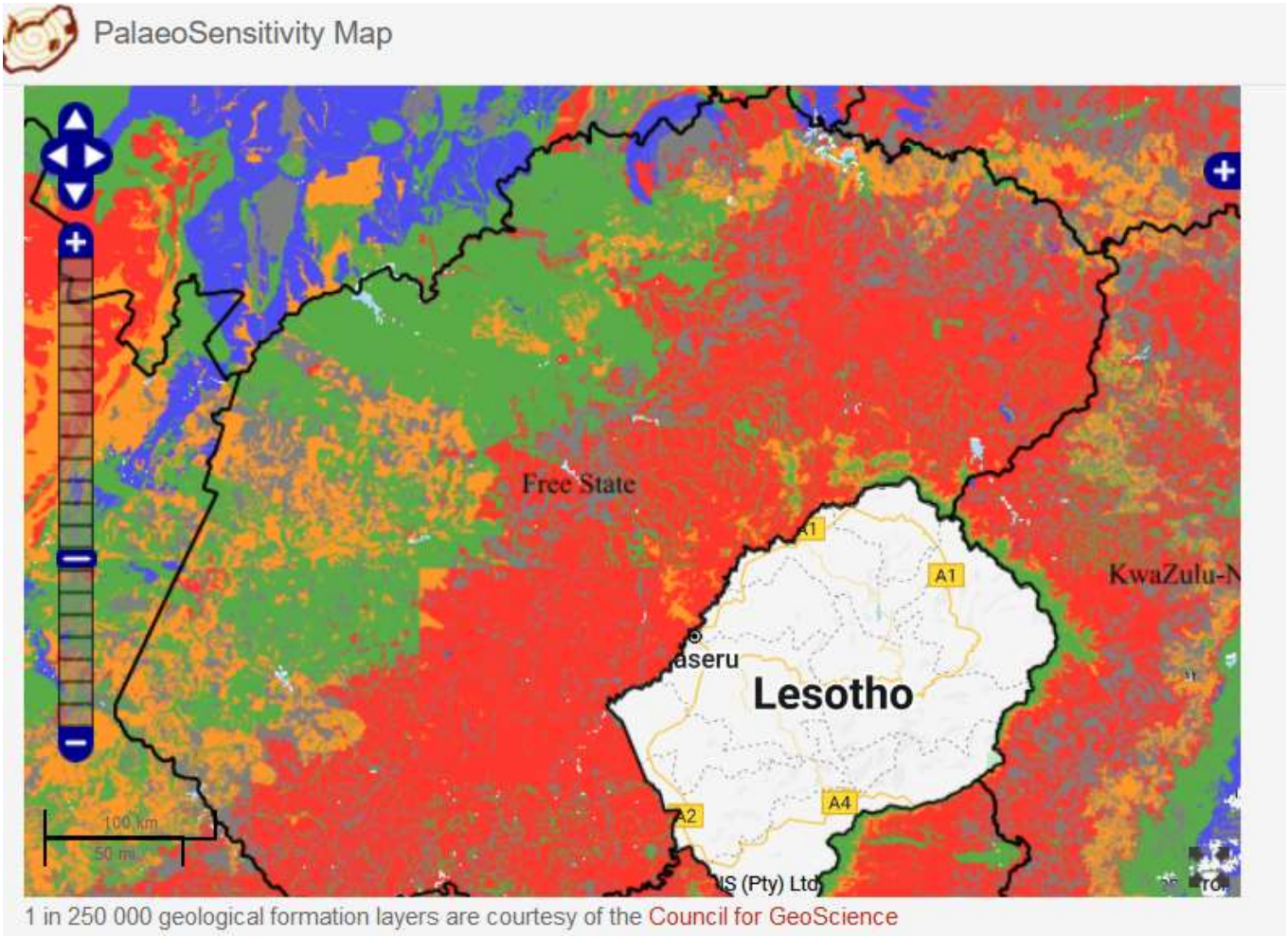

Figure 28: Paleontological sensitivity map for Lejweleputswa District Municiaplity.

7.2.10 CONSERVATION STATUS

7.2.10.1 Formally protected heritage resources

The SAHRIS website contained some formally procted and graded sites across the Letsweleputswa district. However, same as the rest of South Africa, most heritage resources are largely biased towards the settlers who arrived in the area.

7.2.10.2 Generally Protected Sites

There are a couple of sites that although identified on the SAHRIS website, they are not yet graded; these include the historic buildings and also structures.

7.2.10.3 Sites not currently on SAHRIS

Numerous heritage resources in Lejweleputswa District are not documented in the SAHRIS website, however, recently there has been an increase in the number of heritage resources which are being listed on SAHRIS.

7.2.10.4 Proposed Sites for Freedom Route

There are many sites that have pontential to be on the Freedom Route for Lejweleputswa District. Among, many of these include the house of Winnie Mandela's Banished Home, now a museum in the small town once called Brandfort (recently renamed Winnie Mandela). The proposed sites of Freedom Route as suggested above will yield more information of the history of the area and have economic potential.

7.2.10.5 District Palaeontological Heritage

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7.2.11 HERITAGE RESOURCES SOCIAL VALUE

These heritage resources identified in the Lejweleputswa District has potential to contribute in the economic development of the district. There are sites such Winnie Mandela's Banished Home, Boers Women and Children Concentration Camp Cemetery, Site where General De Villebois-Mareuil was killed, Paardeberg Battlefield and various religious buildings (in particular churches of settles).
The district was a host of the first aeroplane built in Africa in Brandfort on property owned by Rear-Admiral John Weston. The site has been nominated a National Heritage Site by SAHRA. This is where John Weston lived and designed both the aeroplane and Gnome engine now exhibited by the Bloemfontein Museum. He also designed the first RV/motorised caravan in the world. The site have the potential of having an economical value not only in South Africa but also in the whole wide world.

8 TERRESTRIAL BIODIVERSITY

8.1 BIOMES AND VEGETATION TYPES

The Free State province is mostly dominated by the grassland biome. The other two major biomes found in the province are Savannah in the north-west part and the Nama-karoo in the south-west part of the province. The Grassland biome contains at least 12 different vegetation types. LDM has about six biomes and the dominant biome is the Grassland (see figure below).

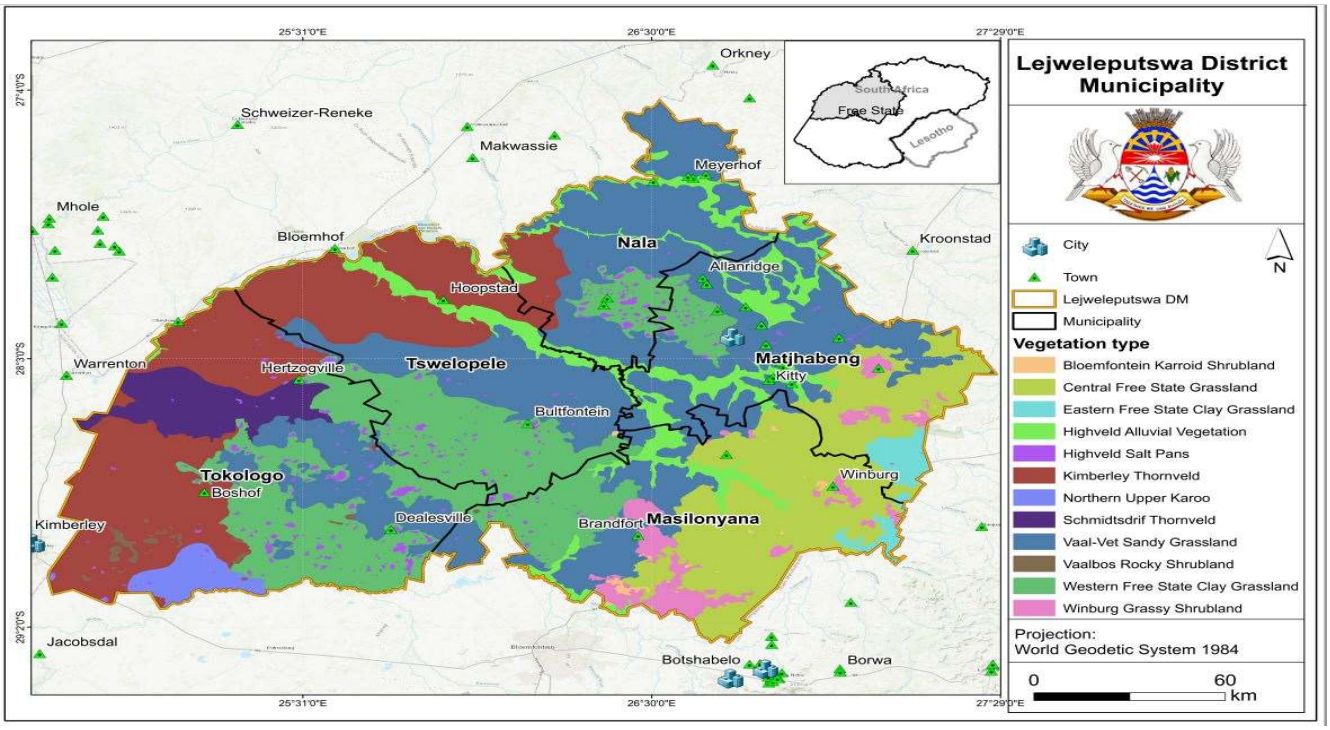


Figure 29: Lejweleputswa District Municipality Vegetation types (Source, Muvuledzi, 2022).

The six different biomes found in the Lejweleputswa District Municipality are the Alluvial Vegetation along most riverine and wetlands sites, the dominant Dry Highveld Grassland Bioregion (found across all local municipalities), the Eastern Kalahari Bushveld Bioregion along the extreme western parts of the DM, the Inland Saline Vegetation, the Mesic Highveld Grassland Bioregion found at the border between Masilonyana and Matjhabeng local municipalities, and finally the Upper Karoo Bioregion (see figure below).

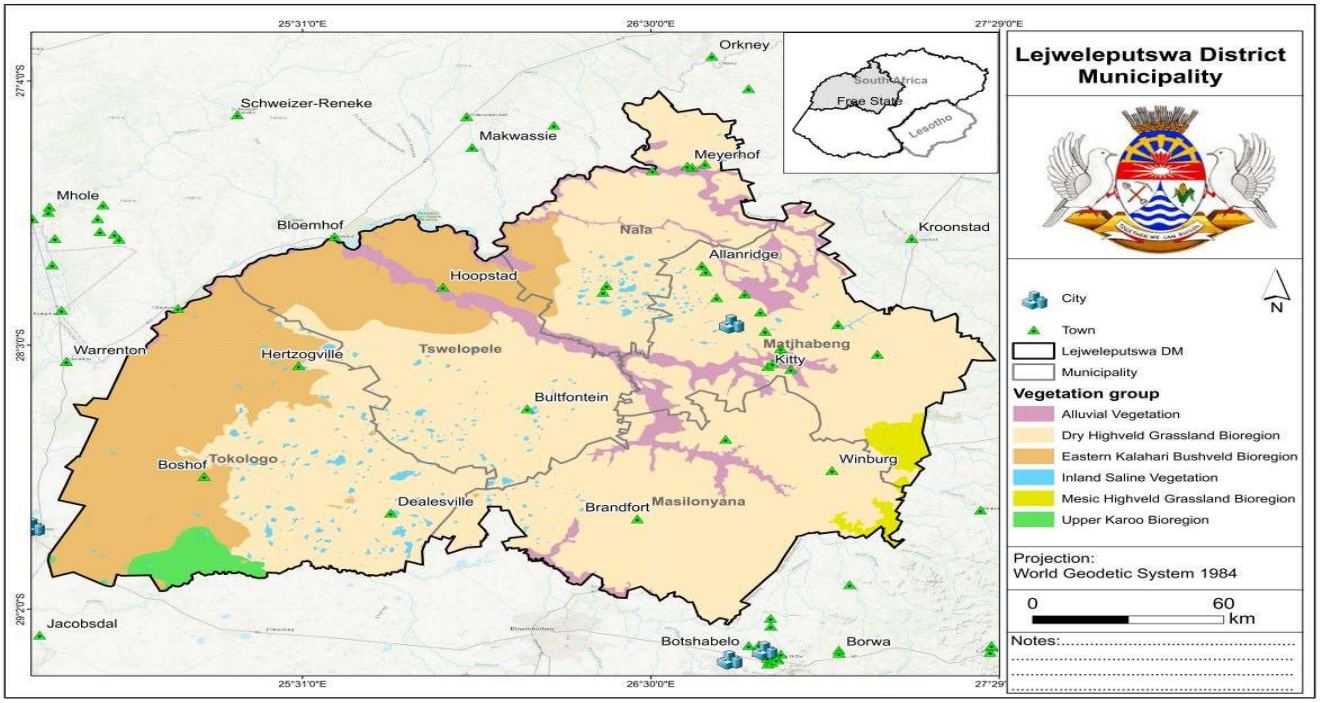


Figure 30: Lejweleputswa District Municipalities biomes (Source: Muvuledzi, 2022).

8.2 NEMBA THREATENED ECOSYSTEMS

LDM's ecosystems are not exempt from the environmental damage that has been experienced across natural landscapes. According to the National Environmental Management: Biodiversity Act (Act 10 of 2004), there are several ecosystems within the LDM that are considered "Threatened" (see figure below). These areas are associated with the Grassland vegetation.

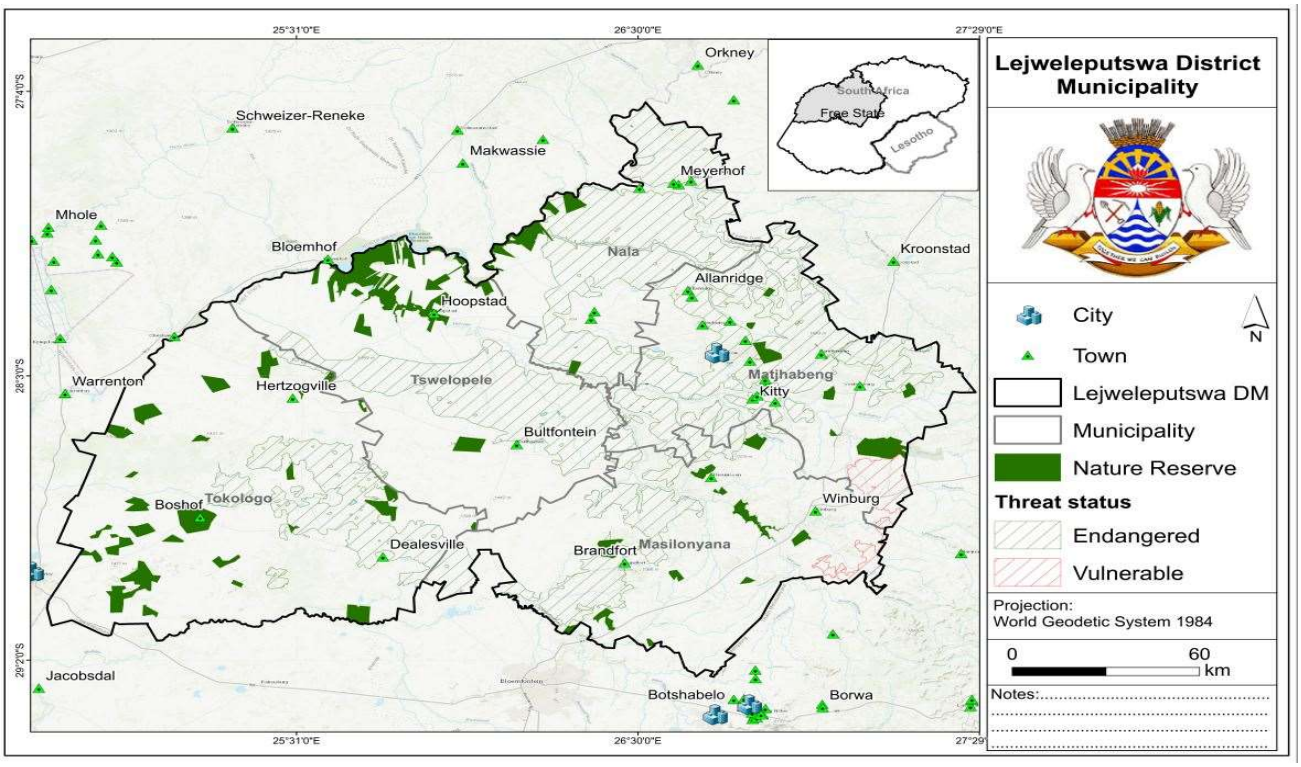


Figure 31: Conservation Areas and Ecosystem Status (Endangered or Vulnerable) of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

In terms of fauna, Lejweleputswa District Municipality has about 25 Red Data vertebrate species as classified in the table below.

Table 14: Threatened Fauna within the District Municipality.

Taxa	Vulnerable	Endangered	Critically Endangered	Total "Threatened" Species
Vertebrates	**14**	**10**	**1**	**25**
Amphibians	0	0	0	0
Aves	5	7	1	13
Mammals	8	3	0	11
Reptiles	1	0	0	1

Source: Muvuledzi, 2022.

8.3 CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

A CBA is a natural or semi-natural feature, habitat or landscape that stretches across the terrestrial, aquatic and marine environments that is considered critical for meeting national and provincial biodiversity targets and thresholds; assists in safeguarding certain areas in the landscape that are required to ensure the persistence and functioning of species, and ecosystems; and preserving habitats that are important for biodiversity.

An ESA is a functional area that is used to ensure the persistence and maintenance of biodiversity, species and environmental processes within a CBA.

Both concepts are used in the development of district biodiversity sector plans which makes recommendations regarding appropriate land uses and provides guidelines regarding land management. The figure below shows that LDM is dominated by Ecological Support Areas, followed by Degraded Areas and few Protected Areas.

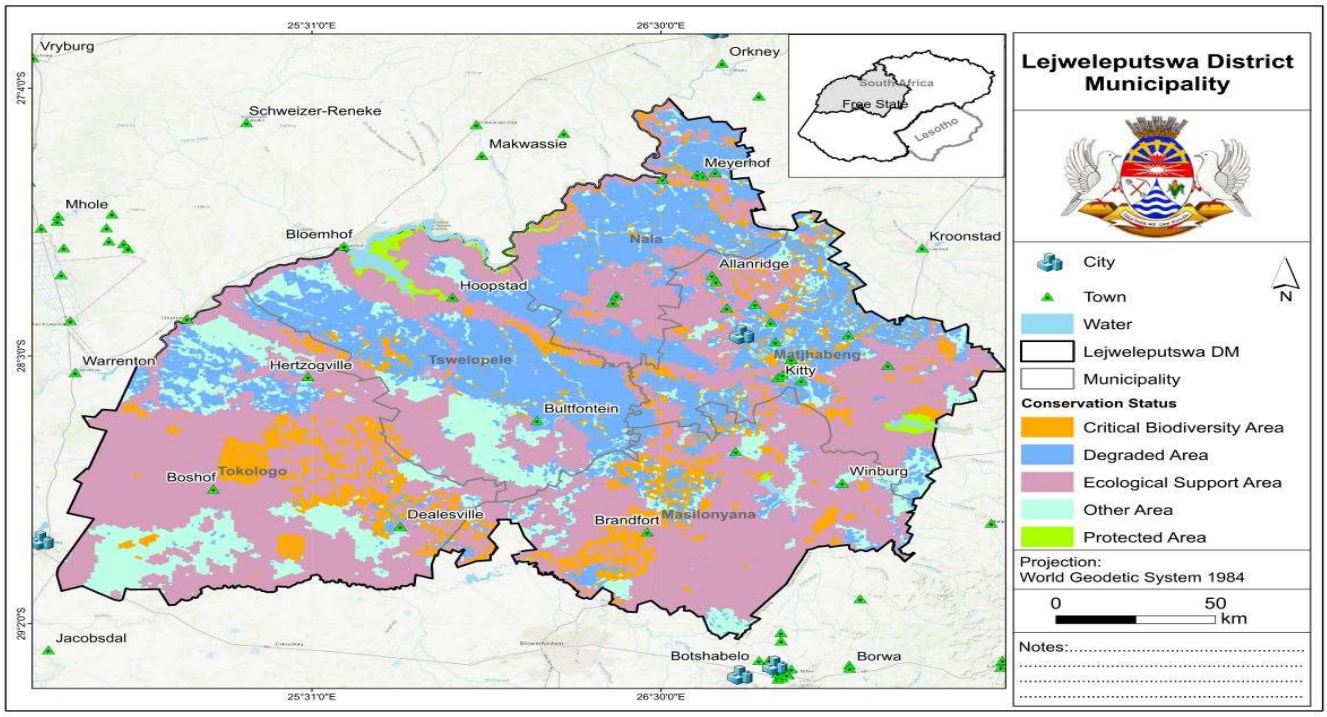


Figure 32: Critical Biodiversity Areas of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

8.4 IMPORTANT BIRD AND BIODIVERSITY AREAS (IBAS)

BirdLife's Important Bird and Biodiversity Area concept has been developed and applied for over 30 years. Considerable effort has been devoted to refining and agreeing a set of simple but robust criteria that can be applied worldwide.

Initially, IBAs were identified only for terrestrial and freshwater environments, but over the past decade, the IBA process and method has been adapted and applied in the marine realm. In 2012, BirdLife published the first Marine IBA "e-atlas", with details of 3,000 IBAs in coastal and territorial waters as well as on the high seas.

Important Bird and Biodiversity Areas (IBAs) are:

- Places of international significance for the conservation of birds and other biodiversity
- Recognised world-wide as practical tools for conservation.
- Distinct areas amenable to practical conservation action.
- Identified using robust, standardised criteria.
- Sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment.

According to BirdLife South Africa, there are about four IBAs along the boundary of the Lejweleputswa District Municipality.

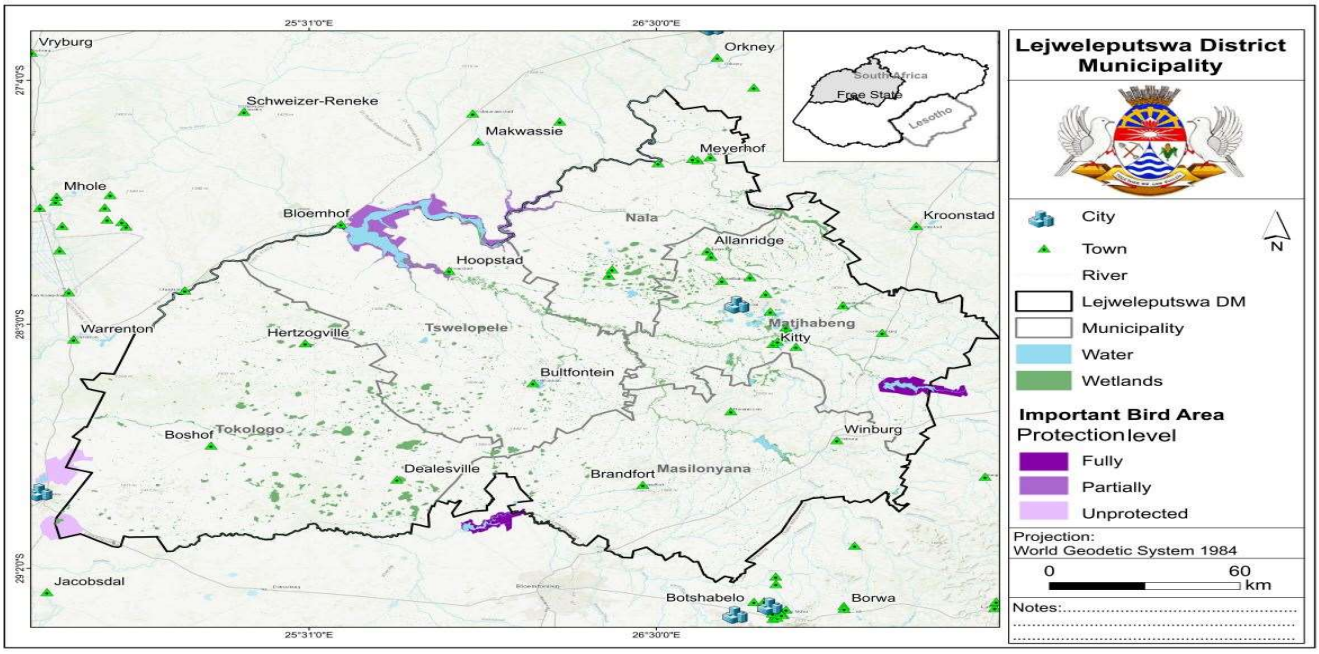


Figure 33: Important Bird Areas of Lejweleputswa District Municipality (Source: Muvuledzi, 2022).

9 OPPORTUNITIES AND CONSTRAINTS

During this phase an analysis of generally agreed impact will be conducted in order to gain an understanding of the common impacts of various commodity enterprises, their management and reporting requirements, siting criteria, environmental attributes that need to be considered as well as their carrying capacity in different environs.

This will include an analysis of the current development trends (opportunities and constraints) and will identify strategic land use patterns influencing the environmental status quo within the study area. It will highlight the key commodities that are of priority in the areas by assessing the District Rural Development Plan (DRDP), Local Economic Development (LED) Strategies, Integrated Development Plan (IDP), development trends (assess and analyse EIA application in the area) and any other plan or strategy applicable in the district area.

This phase will also identify the socio-economic and geographic milieus where main commodities identified by specific plans or strategies may be suitable, based on the mapping of sensitivities and opportunities for such commodities. This will be a thorough consultative and interactive process using best practice techniques, approaches and methodologies.

10 DESIRED STATE OF THE ENVIRONMENT

10.1 APPROCH AND METHOD TO DETERMINE THE DESIRED STATE

The Desired State report will be compiled by comparing the findings of the Status Quo report with a future vision for the areas, via a process of interrogating conflict areas, opportunities, and possible conflict resolution strategies. The Desired State reflects what is required and achievable in respect of the use of natural resources to move to a more sustainable development trajectory. This necessitates an approach that can maximise opportunities and minimise constraints for both conservation/ ecological functioning and development (physical and socio-economic) in the long term.

As such, the Desired State report will:

- firstly, summarise the key issues in the District;
- secondly outline the sensitivity analysis of environmental features; and
- finally identify preliminary environmental management zones.

The Desired State report will provide an overview of the outcomes noted in the Status Quo phase of the project, and an important aspect will be the inputs of all stakeholders, which is critical to determine the overall Desired State of the District. The inputs from the stakeholder engagement process will be incorporated into subsequent revisions of the report.

10.2 STEPS IN THE PROCESS AS PER THE EMF REGULATIONS

The approach and method are in line with the prescriptions of the EMF Regulations (2010) specifically Chapters 5.5 – 5.10. The Regulations refer to the following steps to determine the Desired State:

- Identifying development pressures and trends;
- Environmental sensitivity analysis;
- Feature Status and weighting;
- Identifying Constraint Zones; and
- Management Zones

The **development pressures and trends** were identified in the Status Quo assessment phase and will be summarised in the Key Issues chapter of the Desired state report which will be structured according to different features (baseline information) that were described in the Status Quo Assessment, namely: water resources, biodiversity, heritage, socio-economic, etc. as highlighting in the constraints and opportunities report. Desired State **objectives** will then be specified per feature based on existing information and will be supplemented by stakeholder contributions. These objectives will be grouped according to the feature and then further categorised according to the following dimensions: spatial, climate change, institutional systems and development planning, environmental quality, and job creation and poverty alleviation.

The purpose of the **environmental sensitivity analysis** is to consolidate key elements that will be identified for each feature. This stage is mostly visual, as it relies heavily on GIS and maps that are produced from the various layers of data available. By illustrating all opportunities and constraints visually, convergences and conflicts between each feature will easily be highlighted. By identifying these features and the respective areas of spatial and management overlap, more sustainable planning and decision making can be practised through an informed process. In essence, the environmental sensitivity analysis provides an overview of the inherent environmental sensitivity in the DM.

The first step is to determine the **datasets** that are the input data to the sensitivity analysis. These cover a wide range of inputs including conservation planning, ecological, water resources, land capability, heritage, etc. A **weighting or value will be** allocated to each of these **features** where the specific feature weighting determines the level of environmental sensitivity with a range of **low, medium, high and very high** (as per the EMF Regulations, 2010) where:

- ***Low:*** *the inherent feature status and sensitivity is already significantly degraded. Any significant environmental development change will not influence the current status;*
- ***Medium:*** *the inherent feature status and sensitivity will not be influenced by any significant environment-development change;*
- ***High:*** *environment-development change will influence the current status of the feature, either negatively or positively; and*

- ***Very high:*** *environment-development change will significantly influence the feature, either negatively or positively.*

In certain cases, different weightings are assigned to different classes or attributes within one particular dataset to indicate areas of differing sensitivity or importance, e.g. in a dataset which contains an attribute assigned to each spatial area/ component that assigns a range of values from high to low, a different weighting can be assigned to each attribute class.

The weighting of different features is followed by an overlay exercise that can indicate where sensitivities align or come into conflict. It therefore requires guidance on which sensitivity maps need to be generated. It is usually possible to combine features that reinforce a broad idea, such as 'biodiversity conservation' – which already provide some guidance on 'environmental convergence'. In the same way, conflicts between natural features, built environment and sensitivities can be mapped. As such, **constraint zones** can be determined showing where opportunities and constraints exist i.e. where certain land uses and activities are compatible or not.

As a result, the following maps have been developed:

- Environmental Sensitivity
- Opportunities for Development
- Opportunities for Agricultural Development / Agricultural Suitability
- Areas not suitable for human habitation due to Risk and Development Constraints
- Preliminary Environmental Management Zones

The determination of the **environmental management zones** uses both the desired state assessment and a sensitivity assessment to define development zones in the DM. The assessment also determines special control zones that defined unique areas that required different approaches to management than the broadly defined primary zones.

11 DEVELOPMENTAL PRESSURES AND CHALLENGES

From the literature review conducted, the following table summarises strategic challenges and status quo faced by the Lejweleputswa District Municipality. Despite these challenges, there are still however some challenges facing the district and its local municipalities that are developmental and operational in nature.

Table 15: The focal strategic areas and situational status quo for Lejweleputswa District Municipality.

Development Opportunity	**Status Quo**	**Focus Initiatives**
Economic growth	Lack of projects funding	• Attract investors for economic development.
	Lack of participation by business sector	• Create conducive environment for economic sustainability
	Non-availability of LED strategy	• Development and implementation of LED within the next phase of development
	No budget for LED from municipality	• Allocate funds for LED within the municipal operational budget.
	Poor agricultural support service	Co-ordinate and build positive network with sector department and utilise the solar plant programs for economic initiative

		• Report, monitor & evaluate implementation of municipal LED strategy
Improved Service Delivery	Shortage of yellow fleet Proper control of available fleet. Shortage of staff in different unit.	• Prioritise Operation and maintenance plan for service delivery. • Plan properly and fast track service delivery initiatives. • Further capacitate supervisors to effectively promotes municipal objectives and programs.
	One supervisor per town appointed,	• Update and develop the organisational structure with a clear focus on service delivery.
	The current structure to incorporate planning	• Budget process to enhance maintenance and Repairs of assets.
Good Governance	Inequalities and disparity in implementation and application of policies.	• Review the municipal structure • Review & Align job descriptions to set municipal objectives.
	Lack of delegations of powers and functions below levels of Directors. Absence of standards to support application of policies and guidelines. Incomplete detailed organisational structure	• Develop set of internal controls and procedure manual. • Develop delegations for management to operate effectively and efficiently. • Review and update organisational structure in accordance with municipal objectives. • Develop and implement standards to support policies and guidelines.
	Poor communication and information sharing. Lack of departmental operational plans.	• Improve internal communication and external communication with stakeholders. • Development of departmental operational plan for improved performance and achievement of SDBIP.
Integrated Human Settlements	One personnel operate in the unit. Human settlement not fully operational.	Full implementation of the approved organisational structure. • Ensure functionality of the organogram.
	40% of sites not transferred to tenants. Housing records not updated by the municipality.	Embark on transferring sites to rightful owners for tenure rights and land ownership. • Updating of housing records for improved billing.
	Fragmented and poor spatial planning patterns.	• Review Spatial development framework. • Align planning and SDF.
	• Lack of sufficient and or effective community participation and engagement	• Review the public participation strategy. • Finalise the infrastructure Master Plan.

Social and Community Development	• Lack of recreational facilities in township areas	• develop comprehensive Infrastructure Plan for sports facilities.

Other key areas (Status Quo) for the Lejweleputswa District Municipality per local municipalities are identified below which should be prioritised in terms of individual IDP's targets as development pressures. These should be read together with the key findings highlighted in the Lejweleputswa District Municipality's Literature Review for the EMF development project.

Masilonyane Local Municipality:

- It is fundamentally a rural area with no major urban centres.
- Its rural nature could disadvantage it in terms of attracting more companies to establish branches in the areas of the municipality.

Tokologo Local Municipality:

- The municipality has a huge challenge regarding water sources and general availability of water throughout the year.

Tswelopele Local Municipality:

- No major businesses are located here.
- Spatial location is a prohibiting factor and thus may result in outmigration of potential skills in the area.

Matjhabeng Local Municipality:

- The revenue generation is very low as a result of high unemployment due to mining closures.

Nala Local Municipality:

- It is not a tourist destination and therefore cannot attract visitors in numbers.

12 REFERENCES

Free State Province, 2012. Draft Provincial Growth and Developmental Strategy. Free State Vision 2030. Department of the Premier, Free State Province. Online: http://www.premier.fs.gov.za/files/growth-development/2012/Chapter%201%20-%203%20FSGDS%202012.pdf

Free State COGTA, 2007. Free State Spatial Development Framework (FSSDF), Final Draft. Department of Local Government and Housing, Free State Province. Online: http://www.cogta.fs.gov.za/wp-content/uploads/2012/01/Spatial-Development-Framework-2007.pdf

Cooperative Governance and Traditional Affairs. (2020). Lejweleputswa District Municipality Profile and Analysis District Development Model. Cooperative Governance and Traditional Affairs.Online: https://www.cogta.gov.za/ddm/wp-content/uploads/2020/11/Lejweleputswa-DM-October-2020.pdf

M.M Campbell, J.J Steyn, P.J Potgieter and G.M Steenkamp, 2007. The viability of a Corridor Development along the R30 route between Welkom and Bloemfontein. Research Publication No.32. Department of Urban and Regional Planning, University of Free State, Bloemfontein. Online:https://www.researchgate.net/publication/301350100_The_viability_of_a_Corridor_Development_along_the_R30_Route_between_Welkom_and_Bloemfontein_in_terms_of_the_Provincial_Spatial_Development_Framework_of_the_Free_State

N Diederichs, M Van Niekerk and T Wolf, 2015. Integrated Environmental Management Plan. Tswelopele Local Municipality, Bultfontein, Free State Province. Online: https://www.tswelopele.gov.za/index.php/documents/category/96-policies?download=332:integrated-environmental-management-plan

Lejweleputswa District Municipality. (2021). Integrated Development Plan 2021-2022. Lejweleputswa District Municipality. Online: http://www.mylejweleputswa.co.za/document/IDP/Final%20Draft%20IDP%202021-%202022%20(REFINED)%204%20June%202021%202.pdf

A Brand & E Drewes, 2020. Structuring South Africa's national economic space: A regional corridor network model approach. Town and Regional Planning, no.77, pp. 120-136. Online: https://journals.ufs.ac.za/index.php/trp/article/view/5098/4048

Lejweleputswa District Municipality. (2012). IDP Review for 2016-2017. Lejweleputswa District Municipality. Online: http://www.lejweleputswa.fs.gov.za/wp-content/uploads/2012/11/FINAL-IDP-2016-2017-002-2.pdf [Accessed 8 March 2022].

Lejweleputswa District Municipality. (2021a). Integrated Development Plan 2021-2022. Lejweleputswa District Municipality. Online: http://www.mylejweleputswa.co.za/document/IDP/Final%20Draft%20IDP%202021-%202022%20(REFINED)%204%20June%202021%202.pdf [Accessed 10 March 2022]

Lejweleputswa District Municipality. (2021b). District Development Model Draft 2. Lejweleputswa District Municipality. Online: http://www.mylejweleputswa.co.za/document/model/LDM%20DDM%20Draft%202%20_%2017%20Aug%202021.pdf [Accessed 10 March 2022]

Stats SA. (2018). Free State Provincial Profile 20216 Community Survey. Stats SA. Pretoria. Online: http://cs2016.statssa.gov.za/wp-content/uploads/2018/07/FreeState.pdf [Accessed 8 March 2022].

Fourie, H. 2017. Palaeontological Impact Assessment: Desktop Study for the proposed Prospecting Right application of Diamond Alluvial, Diamond General and Diamond Kimberlite near Kimberley on a Portion of the farm Rooifontein 1722 (previously known as a Portion of the Farm Dutoitspan 119)

Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Unpublished Paleontological report.

Mccarthy, T and Rubidge, B. 2005. The Story of Earth Life: A southern African perspective on a 4.6-billionyear journey. Struik. Pp 333.

Snyman, C. P., 1996. Geologie vir Suid-Afrika. Departement Geologie, Universiteit van Pretoria, Pretoria, Volume 1, Pp. 513

Baran, E. and Jonck, F., 2002, 1: 500 000 Hydrogeological Map, Kroonstad 2726. Department of Water Affairs, Pretoria, South Africa,

Botha, J. F., Verwey, J. P., Van der Voort, I., Vivier, J. J. P., and Buys, J., 1998, Karoo Aquifers, their Geology, Geometry and Physical Properties. Report to the Water Research Commission by Institute for Groundwater Studies, University of the Free State. WRC Report No. 487/1/98. Water Research Commission, Pretoria, South Africa.

Department of water and Sanitation, 2020, Briefing the Department of Water and Sanitation's Free State District Implementation Plan. Presented to the Portfolio Committee on the Department of Water and Sanitation's Free State District Implementation Plan for 2020/21, by Acting Director General, 25 August 2020.

Department of Water Affairs, South Africa, September 2011. Classification of Significant Water Resources (River, Wetlands, Groundwater and Lakes) in the Upper, Middle and Lower Vaal Water Management Areas (WMA) 8, 9, 10: Status Quo Report, Report No: Report No. RDM/WMA8,9,10/00/CON/CLA/0211.

Department of Water Affairs and Forestry, 2005, Groundwater Resource Assessment: Task 1BC Groundwater Quantification, Methodology for Groundwater Quantification (Project No. 2003-150). Methodology Report. Department of Water Affairs and Forestry, Pretoria, South Africa.

Department of Water Affairs and Forestry, 2005, Groundwater Resource Assessment: Subsystem 3A-Recharge. Methodology Report (3aC). Project No. 2003-150. Department of Water Affairs and Forestry, Pretoria, South Africa.

Department of Water Affairs and Forestry (2004), Internal Strategic Perspective : Vaal River System : Overarching, Report No. P RSA C000/00/0103.

Classification of Significant Water Resources (River, Wetlands, Groundwater and Lakes) in the Upper, Middle and Lower Vaal Water Management Areas (WMA) 8,9,10, Management Classes of the Vaal River Catchment Report, Report No: RDM/WMA8,9,10/00/CON/CLA/0212.

Department of Water and Sanitation (DWS). 2014. Determination of Resource Quality Objectives in the Lower Vaal Water Management Area (WMA10): Resource Quality Objectives and Numerical Limits Report. Report No.: RDM/WMA10/00/CON/RQO/0214. Chief Directorate: Water Ecosystems. Study No.: WP10535. Prepared by the Institute of Natural Resources (INR) NPC. INR Technical Report No.: INR 494/14.(vi). Pietermaritzburg, South Africa.

Directorate Resource Directed Measures Compliance. Department of Water and Sanitation (2014) Determination of Resource Quality Objectives in The Middle Vaal Water Management Area (WMA09): Resource Quality Objectives and Numerical Limits Report. Report No: RDM/WMA09/00/CON/RQO/0214

du Plessis, A. (2019). Current Water Quality Risk Areas for Vaal, Pongola-Mtamvuna and Orange WMAs. In: Water as an Inescapable Risk. Springer Water. Springer, Cham. https://doi.org/10.1007/978-3-030-03186-2_10

Lejweleputswa District Municipality (2021) District Development Model, Draft 2.

Lejweleputswa District Municipality, Final Integrated Development Plan, 2020-2021.

Lejweleputswa District Municipality. (2021). District Development Model Draft 2. Lejweleputswa District Municipality.

Musekiwa C., and Majola K., 2013, Groundwater Vulnerability Map for South Africa, Council for Geoscience, Bellville and Department of Water Affairs, Pretoria. South African Journal of Geomatics, Vol. 2, No. 2, April 2013. Online:http://www.mylejweleputswa.co.za/document/model/LDM%20DDM%20Draft%202%20_%2017%20Aug%202021.pdf

Moseki, C. M., and Meyer, P. S., 2003, 1: 500 000 Hydrogeological Map, Kimberley 2722. Department of Water Affairs, Pretoria, South Africa.

Vegter, J. R., 2001, Groundwater development in South Africa and an introduction to the hydrogeology of groundwater regions. Report no. TT 134/00. Pretoria: Water Research Commission.

13 Appendices

agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

13.1 MINUTES FOR EMF PROJECT STEERING COMMITTEE INCEPTION MEETING

Circulation	OR Tambo PSC
Venue	Heimat Accommodation & Conferencing, 261 State Way at Welkom, Lejweleputswa District Municipality, Free State

Date	2022.03.17
Time	10h00 – 13h00

Chair	Mr Zongezile Bango
Co-Chair	Mr Magezi Mhlanga
Compiled by	Pfananani Ramulifho, Retha Weir

NO	ITEM	DISCUSSION
1.	Open and Welcome	Mr Bango introduced the project and team.
2.	Attendance and apologies	Attendance and apologies were recorded on the attendance register. Mr Bango introduced Mr Magezi Mhlanga and other online guests and confirmed that the attendance included the following entities: • DALRRD; • Lejweleputswa District Municipality; • Local Municipalities; • DEDEAD; • Development Agency; • Department of Transport (DOT); • DFFE; and • Service Provider (Muvuledzi Consulting). The following people attended online; Antoinette Bootsma - Muvuledzi Consulting Retha Weirs - Muvuledzi Consulting Elijah Ramulifho - Muvuledzi Consulting Kamogelo Mamabole - DALRRD Shumani Ndou - DALRRD Biopele Solly Mokale Sonny Boy Malemela

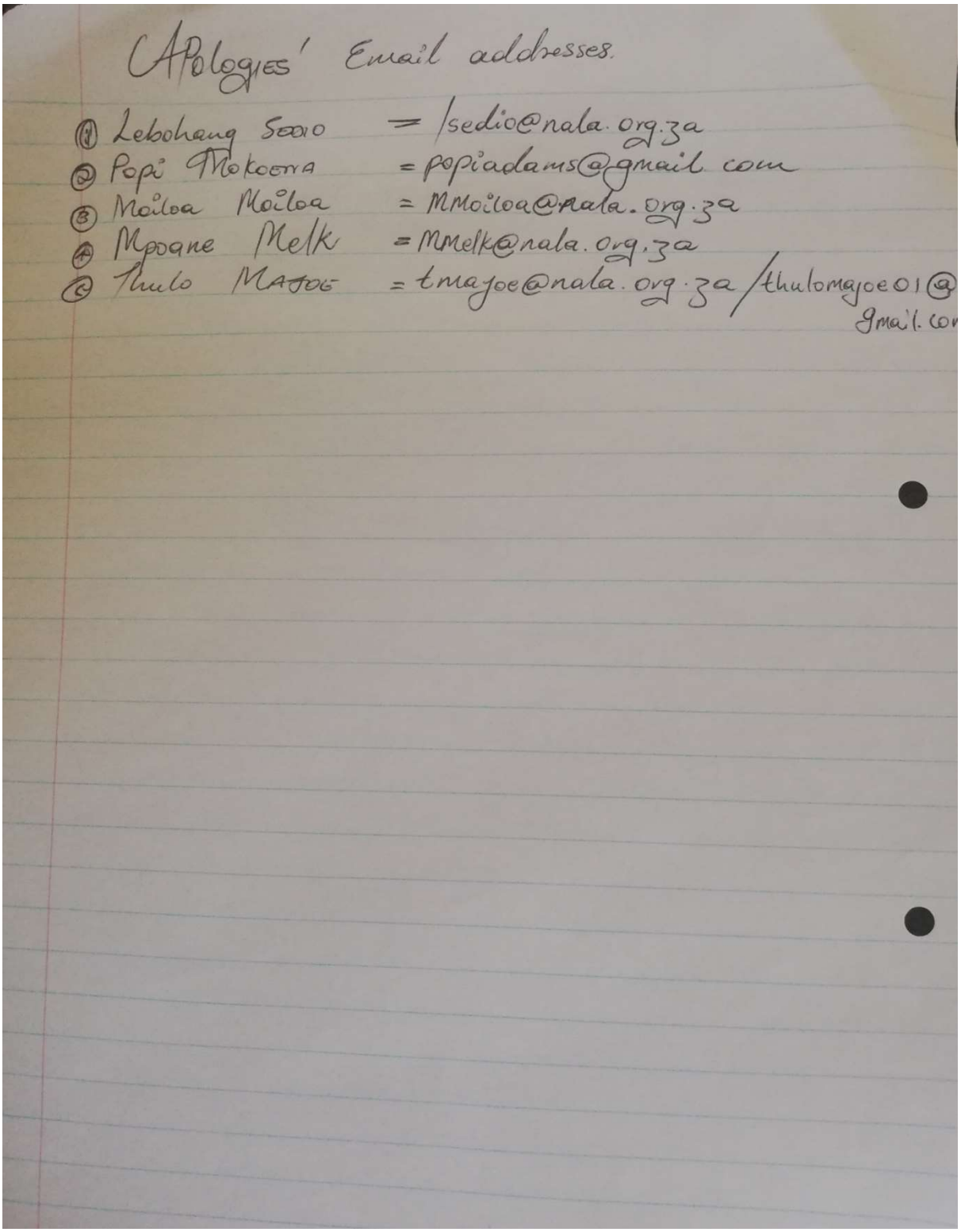
		Rebekka Magkai
3.	Adoption of the agenda	The agenda was adopted without amendments.
4.	Purpose of the meeting	The purpose of the meeting was to introduce the project to targeted stakeholders and to form the Project Steering Committee for the Lejweleputswa DM EMF process.
5.	Presentation	Mr Magezi Mhlanga presented an overview of the purpose of the project and described how the development of an EMF with exclusion standards could support spatial planning and land use management. He described the Exclusion Standards and an alternative tool to obtain Environmental Authorisation while ensuring that the legal requirements as set out in NEMA are upheld. Dr Pfananani Ramulifho presented the TOR and progress of the project to the meeting. The body of the presentation set out the Terms of Reference, the structure and timelines of the project. Issues identified during the Literature Review phase were summarised and opportunity was given for discussion. Please see attached slides.
6.	Issues discussed	The following points were contributed: • Teboho - Is the project only focusing on agricultural fields. ➢ Mr Mhlanga - responded that the department wanted to do a SEA for commodities but decided to rather do an EMF and to do it district wide and not for commodities. The EMF will be reviewed every 5 years and redone every 10 years. • Solomon - will an EMF be developed for the local municipalities as well? ➢ Mr Mhlanga - explained that the district EMF will cover the local municipalities and if there is already an EMF for a local municipality in the district, this will be repealed. The FFE regulations work on a regional and not a local level but can also have geographical boundaries. • Tebello - will anyone be able to find information of the areas on the maps on the system? ➢ Mr Mhlanga explained that anyone will be able to query the system, by clicking on the area they want to query and to zoom in to find if it is sensitive and if so why.

		• Molehe - asked if they did not have an EMF for a local municipality, can they then have a local environmental management plan? • The concept of concurrence was explained by Mr Mhlanga, pointing out that the local municipality do not have a function of environmental management and will have to get permission from the district municipality to develop an EMP. • Elijah Ramulifho - extended an call for information to be provided to the team with regard to environmental management studies and documents which might not be available online, which should be included in the literature review and status quo reports. • Tehobo -requested that since the end product will be an online product that the local municipality will need training sessions on how to access and use the system. • Solomon - senior managers must be involved in the development of the project since they need to implement it or it will not be implemented. • Mr Mhlanga indicated that the Department already started with a process to have workshops with project managers on the project and how to use the tool. Once the product is finalised further training sessions will be held to train the trainers and to ensure everyone knows how to use the tool. Manager emails should be forwarded to the Department in order to contact them.
7.	Management structures	Management structures required to run the project. Must include: • Core PMT • Extended PMT • National Expert Reference Group • PSC • Focus groups Focus groups to be informed by the Status Quo and will include: • Agriculture • Biodiversity • Tourism • Mining • Water sector Specialist studies and gap analysis will determine if others are required.
8.	Way forward	Mr Bango summarises: 1. An EMF is needed 2. There should be a workshop for all managers that are actively involved with Environmental Management. 3. The district should invite DALRRD to provide a presentation at the district forum meeting. 4. Muvuledzi Consulting should establish a database of stakeholders. 5. There was a request from the service provider for more information and reports relevant to this study, which were not yet included in the literature review.

		6. Written comments will be allowed for 14 days after the meeting. 7. For the next meeting, invites and draft documents will be circulated 14 days before the meeting to afford everyone time to comment on the documents during the meeting.
9.	Closer	Mr Bango closed the meeting and thanked everyone for their attendance.

Approved by: …….

Date:……


Apologies' Email addresses.
(1) Lebohang Sedio = lsedio@nala.org.za
(2) Popi Mokoena = popiadams@gmail.com
(3) Moiloa Moiloa = MMoiloa@nala.org.za
(4) Mpoane Melk = MMelk@nala.org.za
(5) Thulo Majoe = tmajoe@nala.org.za / thulomajoe01@
gmail.com

13.2 Lejweleputswa District Municipality Project Steering Committee Meeting Attendance Register.

agriculture, land reform & rural development
Department: Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

forestry, fisheries & the environment
Department: Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

muvuledzi CONSULTING (Pty) Ltd

ATTENDANCE REGISTER FOR THE PROJECT STEERING COMMITEE MEETING REGARDING STRATEGIC ASSESSMENT OF THE ENVIRONMENT FOR COMPILATION OF ENVIRONMENTAL MANAGEMENT FRAMEWORKS FOR OR THAMBO DISTRICT MUNICIPALITY

VENUE: Heimat Accommodation & Conferencing, 261 State Way at Welkom, Lejweleputswa District Municipality
DATE: 17 March 2022
TIME: 10h00 - 13h00

Name & Surname	Contact Number	Email	Organisation	Signature
Zongezile Bango	0714884461	Zongezile.Bango@dalrrd.gov.za	DALRRD	
Seboleto Mofokeng	0835853757	SeMofokeng@dffe.gov.za	DFFE	
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Mokhe Mahlanyane	0793652382	mahlanyane@tswelopele.org	Tswelopele LM	
Moeti Telaslo	0786193567	moetit@tswelopele.org	Tswelopele LM	
Sibne Musebelo	0922854555	musebelos@gmail.com	LEJWELEPUTSWA	
Nomakoe Mahlaku	0718976753	[illegible]	DALRRD	
Orapeleng Mauke	0847418971	orapeleng@lejwe.co.za	LDM	
Pfananani Ramul	0680955498	Pfananani.ramulifho@gmail.com	Muvuledzi	

agriculture, land reform & rural development
Department: Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

Name & Surname	Contact Number	Email	Organisation	Signature
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Solomon Tsoai	073 988 4415	sstsoai@gmail.com	NALA	
Tebello Raphuthing	0635664007	traphuting@environment.gov.za	YCOP (DFFE)	
Magezi Mhlanga	0795151167	Magezi.Mhlanga@dalrrd.gov.za	DALRRD	
Freddie Zinty	0879868044	[illegible]@lejwe.co.za	Steynsrus	
Seboleto Mofokeng	0535858757	seMofokeng@dffe.gov.za	DFFE (LGS)	LEJWELEPUTSWA