

FEZILE DABI DISTRICT MUNICIPALITY



DRAFT REVIEW AND UPDATE

INTEGRATED DISASTER MANAGEMENT PLAN



VERSION 4

LEVEL 3

Prepared by:

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In collaboration with:

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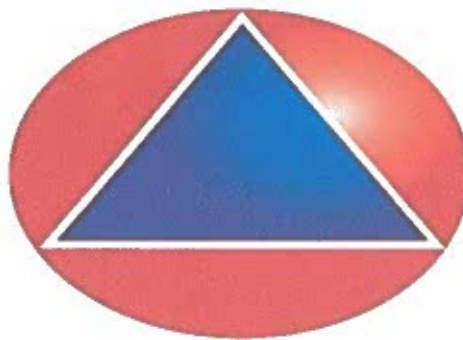
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Acknowledgement to SALGA and PDMC

Fezile Dabi District Municipality (FDDM) would like to extend our sincere gratitude to the South African Local Government Association (SALGA) and the Provincial Disaster Management Centre (PDMC) for their invaluable support in the review and update of the Fezile Dabi District Municipality Disaster Management Plan. Their expertise, guidance, and commitment played a crucial role in ensuring that the plan aligns with national disaster management frameworks, guidelines and the best practices. FDDM acknowledges the assistance provided before and during the development process, including technical advice, capacity-building initiatives, and resource facilitation. Their collaboration significantly enhanced our ability to identify key disaster risks, implement risk reduction strategies, and establish effective response and recovery mechanisms. The dedication of SALGA and PDMC in strengthening disaster resilience within our municipality is highly appreciated. We look forward to a continued partnership and collaboration, in safeguarding our communities and enhancing disaster preparedness and response efforts.

Fezile Dabi District Municipality
Disaster Management Centre



Name: SS THOMAS	Signature: 
Title: MR	Date: 10/05/2025

Foreword

A Disaster Risk Management Plan is developed to provide a structured and coordinated approach to preventing, mitigating, preparing for, responding to, and recovering from disasters. It ensures that municipalities, government agencies, and stakeholders work together to minimize the impact of disasters on communities, infrastructure, and the environment.

The plan helps identify potential risks, such as floods, fires, accidents, and climate-related incidents, and outlines strategies to reduce vulnerabilities. It also establishes clear roles and responsibilities for disaster response and recovery, ensuring efficient resource allocation and timely interventions.

By developing a Disaster Risk Management Plan, municipalities can enhance resilience, improve early warning systems, strengthen emergency response, and protect lives and livelihoods. It aligns with legislative frameworks, such as the Disaster Management Act, ensuring compliance with national policies and promoting sustainable risk reduction practices.

The purpose of developing a Disaster Risk Management Plan is to establish a comprehensive framework for disaster risk reduction, preparedness, response, and recovery within a municipality or region. It aims to protect lives, property, infrastructure, and the environment by ensuring effective coordination among stakeholders before, during, and after disasters. The Disaster Management Plan aligns with national policies and legal frameworks, such as the Disaster Management Act, to ensure compliance and promote resilience within communities.

Key objectives of the plan include:

- Risk Identification and Reduction – Assessing potential hazards such as floods, fires, accidents, and climate change-related incidents to implement proactive mitigation measures.
- Preparedness and Early Warning – Establishing early warning systems, emergency response protocols, and public awareness programs to enhance disaster readiness.
- Effective Response and Coordination – Defining roles and responsibilities of government agencies, emergency services, and stakeholders to ensure a swift and organized disaster response.
- Resource Allocation and Management – Ensuring the availability and efficient use of resources, including personnel, equipment, and funding, during disaster events.
- Post-Disaster Recovery and Rehabilitation – Outlining strategies for rebuilding infrastructure, restoring livelihoods, and supporting affected communities in the aftermath of a disaster.

Mr. T.D. Khasudi
Executive Mayor
Fezile Dabi District Municipality

Statement of Commitment by the Municipal Manager

As the Municipal Manager of Fezile Dabi District Municipality, I reaffirm our unwavering commitment to disaster risk reduction, preparedness, response, and recovery through the implementation of our Disaster Risk Management Plan. This plan serves as a critical tool in safeguarding our communities, infrastructure, and natural environment from the devastating impacts of disasters.

Our municipality faces a range of disaster risks, including floods, fires, accidents, windstorms, drought, chemical spills, and other climate change-related incidents. The increasing frequency and intensity of these hazards demand a proactive and coordinated approach to disaster management. Emerging challenges such as rapid urbanization, resource constraints, and the growing impact of climate change further highlight the urgency of strengthening disaster resilience at all levels.

Through this plan, we aim to enhance early warning systems, improve emergency response capabilities, strengthen stakeholder collaboration, and integrate disaster risk reduction into sustainable development initiatives. We remain committed to working with government agencies, the private sector, non-governmental organizations, and communities to build a safer and more resilient Fezile Dabi District.

We are committed to fulfil the Disaster Management functions as set out in the relevant statutory equipment, including, but not limited to its own Disaster Management Framework and shall always make sure that Disaster Management forms an integral part of the municipality's Integrated Development process. The municipality recognizes the issues of environmental impact and shall endeavour to fulfil the objective of section 24 of the South African Constitution. To contribute towards the 'safer city concept' through a disaster management service geared to prevent, mitigate, confine and manage hazards and disasters in an affordable, effective and efficient manner, in line with the District, Provincial and National disaster management frameworks.

The municipality is striving to have a fully-fledged Disaster Management Services that always ensure a uniform and integrated disaster management services within its area of jurisdiction, as well as ensuring the health and safety of its citizens by putting all pro-active measures in place to prevent, mitigate risks that make its citizens vulnerable to disasters.

In line with the vision of the municipality, Department of Environmental Health and Emergency Services will contribute towards the vision of FDDM through disaster risk management in offering high quality of life for all its citizens through sustainable development, resilient and inclusive economic growth.

I call upon all stakeholders to actively participate in the implementation of this plan and to join hands in ensuring the safety and well-being of our residents. Together, we can reduce disaster risks and create a future where our municipality is better prepared to withstand and recover from any emergency or disaster.

Mr. S. Thomas
Municipal Manager
Fezile Dabi District Municipality

Executive Summary

The Draft review and update of a Disaster Risk Management Plan is an extensive process and is a joint efforts between the district municipality, local municipalities, SALGA and PDMC. Fezile Dabi District Municipality Integrated Disaster Management Plan serves as a strategic framework to enhance disaster preparedness, response, recovery, and mitigation across the district. This plan aligns with the Disaster Management Act, 2002 and the National Disaster Management Framework, ensuring a coordinated and proactive approach to disaster risk management.

Fezile Dabi District Municipality, which comprises Mafube, Moqhaka, Ngwathe, and Metsimaholo Local Municipalities, faces a variety of disaster risks, including floods, fires, road and industrial accidents, windstorms, drought, chemical spills, and other climate change-related incidents. These hazards threaten lives, livelihoods, infrastructure, and the environment, making effective disaster management a necessity.

Key Objectives of the Plan;

- Risk Assessment and Reduction – Identifying disaster-prone areas and implementing proactive measures to mitigate potential impacts.
- Preparedness and Early Warning – Strengthening early warning systems, emergency response planning, and public awareness programs.
- Emergency Response and Coordination – Defining clear roles and responsibilities for all stakeholders, including government agencies, emergency services, non-governmental organizations (NGOs), and local communities.
- Resource Management and Capacity Building – Ensuring adequate resources, personnel, and training for effective disaster management.
- Recovery and Rehabilitation – Establishing long-term strategies for post-disaster rebuilding, economic recovery, and support for affected communities.

Emerging Challenges Addressed;

- The increasing frequency and severity of climate-related disasters.
- Limited resources and infrastructure vulnerabilities.
- Rapid urbanization and its impact on disaster risk.
- The need for improved stakeholder collaboration and coordination.

This plan provides a structured and integrated approach to reducing disaster risks and enhancing resilience across Fezile Dabi District. The municipality is committed to working closely with government entities, private organizations, and communities to ensure effective implementation and continuous improvement of disaster management efforts.

By adopting this plan, Fezile Dabi District Municipality reaffirms its dedication to protecting residents, minimizing disaster-related losses, and fostering a safe and sustainable environment for all.

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Acronyms

FDDM- Fezile Dabi District Municipality

DMC- Disaster Management Centre

PDMC- Provincial Disaster Management Centre

NDMC- National Disaster Management Centre

SALGA- South African Local Government Association

AFF- Agriculture, Forestry and Fisheries

COGTA- Department of Cooperative Governance and Traditional Affairs

Definitions

Development Planning is an integrated, multi-sectoral process through which governmental institutions streamline social, economic and spatial growth.

Capacity is the ability of communities, governments, and organizations to prepare for, respond to, and recover from disasters

Disaster is a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses that exceed the ability of the affected community society to cope, using its own resources.

Incident (minor & Major) is an unexpected event or occurrence that may cause disruption, damage, or pose a potential threat to people, property, or the environment. Unlike a disaster, an incident is usually smaller in scale and can often be managed with local resources before escalating into a larger crisis

Hazard is a potentially damaging physical event, phenomenon or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Risk is the probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.

Mitigation Measures are activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies.

Preparedness is thinking ahead and planning for what needs to be put in place to better prepare people for major events or disasters (KPA 4);

Preventative Measures are measures aimed at stopping a disaster from occurring or preventing an occurrence from becoming a disaster (KPA 3);

Resilience is the capacity of a system, community or society to resist or to change in order that it may obtain an acceptable level in functioning and structure.

Response is the measures taken during or immediately after a disaster in order to bring relief to people and communities affected by the disaster (KPA 4)

Vulnerability refers to a set of conditions resulting from physical, social, economic and environmental factors, which increase the susceptibility of a community to the impact of a hazard.

Risk Reduction is the adage “Prevention is better than cure” has never been more applicable than in the case of disaster management. Risk reduction is the science of reducing the risks to which vulnerable communities are being exposed. The Disaster Management Act consequently requires that municipalities and provinces should seek to mitigate or reduce the risk of disasters occurring in vulnerable communities as a first prize.

Disaster Preparedness is when the risks have been reduced to the extent that communities are not very vulnerable to risks and/or find it acceptable to live with these risks, the Disaster Preparedness.

Source: Living with Risk: A Global Review of Disaster Reduction Initiatives: International Strategy for Disaster Reduction (ISDR) Secretariat, July 2002.

Chapter 1: Introduction & Background

This chapter provides a detailed description of the organ of state in relation to disaster management and must address at least the following items.

- a) Background- purpose of the DRMP
- b) Description/overview of the Fezile Dabi District Municipality including but not limited to geographical profile (including maps), demographic, environmental and socio-economic risk profile
- c) Disaster history and the impact
- d) Critical facilities found in the area
- e) Methodology used to review the plan
- f) Stakeholders consulted

a) Background- purpose of the DRMP

The preventative, risk-reduction and preparedness elements of the Municipal DRM Plan must be implemented and maintained on a continuous basis. The emergency response or re-active elements of the Municipal DRM Plan will be implemented in Fezile Dabi whenever a major incident or disaster occurs or is threatening to occur within the municipal area. The National Disaster Management Act 57 of 2002 requires the district to take the following actions;

- To prepare a Municipal Disaster Risk Management Plan for its area according to the circumstances prevailing in the area and incorporating all municipal entities as well as external role players
- To co-ordinate and align the implementation of its Municipal DRM Plan with those of other organs of state, institutional and any other relevant role-players
- To regularly review and update its Municipal DRM Plan (ref. Disaster Management Act, 57 of 2002 - Section 48).

The Municipal Disaster Risk Management Plan should;

- Form an integral part of the district's IDP so that disaster risk reduction activities can be incorporated into its developmental initiatives
- Anticipate the likely types of disaster that might occur in the district area and their possible effects
- Identify the communities at risk
- Provide for appropriate prevention, risk reduction and mitigation strategies
- Identify and address weaknesses in capacity to deal with possible disasters.
- Facilitate maximum emergency preparedness
- Establish the disaster risk management policy framework and organisation that will be utilized to mitigate any significant emergency or disaster affecting the district
- Establish the operational concepts and procedures associated with day-today operational response to emergencies by municipal Departments and other entities. These SOPs will also form the basis for a more comprehensive disaster response.

- Incorporate all special Hazard / Risk-specific and Departmental DRM Plans and related emergency procedures that are to be used in the event of a disaster. These will provide for;
 - The allocation of responsibilities to the various role players and co-ordination in the carrying out of those responsibilities
 - Prompt disaster response and relief
 - Disaster recovery and rehabilitation focused on risk elimination or mitigation
 - The procurement of essential goods and services
 - The establishment of strategic communication links
 - The dissemination of information.

The Municipal Disaster Risk Management Plan is designed to establish the framework for implementation of the provisions of the Disaster Management Act, 57 of 2002, as well as the related provisions of the Municipal Systems Act, 32 of 2000. The purpose of the Municipal DRM Plan is to outline policy and procedures for both the pro-active disaster prevention and the reactive disaster response and mitigation phases of Disaster Risk Management. It is intended to facilitate multi-agency and multi-jurisdictional co-ordination in both pro-active and re-active related programmes.

b) Overview of Fezile Dabi District Municipality

Fezile Dabi District Municipality formerly known as the Northern Free State District Municipality, is one of five (5) districts in the Free State Province of South Africa. Fezile Dabi District Municipality is a Category C municipality, established in the year 2000. The municipality is located in the north of the Free State Province and is 20 829.1 km². The municipality is the smallest district in the province, making up 16% of its geographical area. The main attraction is the Vredefort Dome, being the third largest meteorite site in the world.

Fezile Dabi District Municipality is surrounded by Sedibeng in Gauteng to the north; Gert Sibande in Mpumalanga to the north-east; Thabo Mofutsanyane to the south-east; Lejweleputswa to the south-west; and Dr Kenneth Kaunda in the North West to the northwest. It consists of four local municipalities namely Moqhaka, Metsimaholo, Ngwathe and Mafube.

Some local contextual statistics to consider:

- The district has a total population of 509 912 (Stats SA, 2022), which is the fourth highest population size after Thabo Mofutsanyane, Mangaung and Lejweleputswa DMs in the Free State province.
- The district hosts 145 539 households, with an average household size of 3.5.
- Young children (0-14 years) make up 25.5% of the total population. The working-age population (15-64 years) accounts for 66.4%, while the elderly (65+ years) constitute 8.1%. The district's dependency ratio is reported as 50.6%.
- Education indicators reveal that 5.0% of individuals aged 20 and above have no formal schooling, while 9.5% have attained higher education qualifications.
- Formal dwellings dominate the housing landscape, representing 89.4% of the housing stock.

- Sanitation and waste management services are accessible, with 88.9% of formal dwellings equipped with flushing toilets connected to sewerage, and 83.3% receiving weekly refuse disposal services. Moreover, 60.6% of households enjoy access to piped water within their dwellings, while 94.3% have electricity for lighting.

In 2019, the manufacturing sector was the largest within Fezile Dabi District Municipality accounting for R14 billion or 27.0% of the total GVA in the district's economy. The sector that contributed the second most to the GVA of the Fezile Dabi District Municipality was the mining sector at 18.2%, followed by the community services sector with 13.1%. The sector that contributed the least to the economy was the construction sector with a contribution of R1.14 billion or 2.2% of the total GVA. The community sector, which includes the government services, is generally a large contributor towards GVA in smaller and more rural local municipalities.

The natural areas in Fezile Dabi District Municipality have been substantially changed by human activities, notably formal agriculture (crop and livestock production) and urbanisation, resulting in major habitat losses throughout the area. However, patches of relatively pristine natural areas remain. Natural grasslands are mostly used for grazing and are by far the most prominent natural habitat in Fezile Dabi. Fragmentation of natural grasslands is becoming a concern. Grassland vegetation has a very high biodiversity value, and the remaining pockets should be conserved as far as possible since very little of the vegetation type is formally conserved in conservation areas. Woodland savanna is most prominent in ravines. The Koppies and ridges of the Vredefort Dome are characterised by steep and rugged topography and are impressive topographical features in the study area which are not suitable for development or for cultivation of agricultural crops. As far as surface hydrology is concerned, several important perennial rivers run through the area such as the Renoster River and the Vaal River.

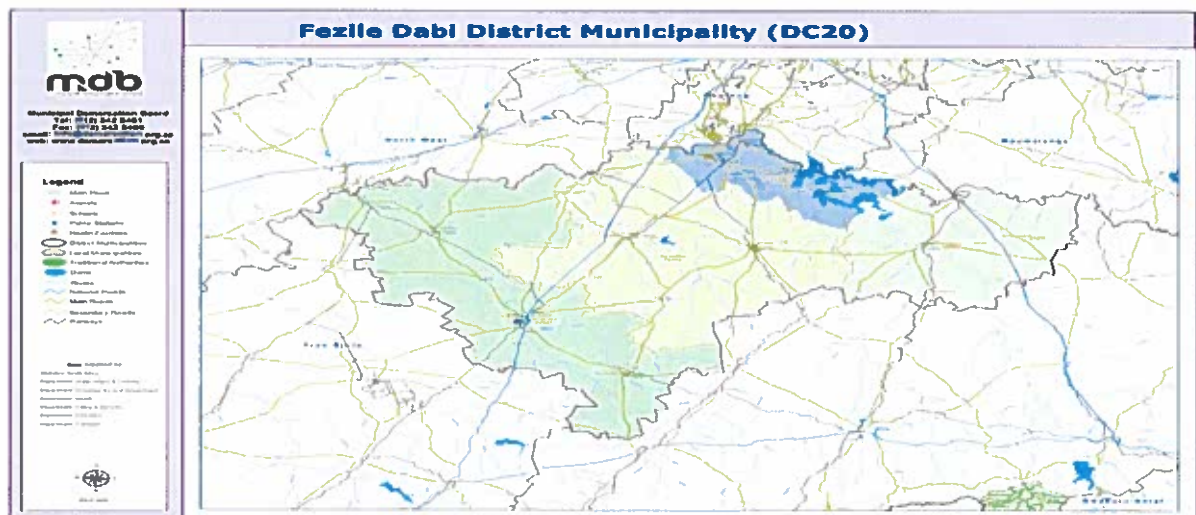


Figure 1: Fezile Dabi District Municipality (Municipal Demarcation Board, 2022), with local municipalities shaded in different colours

Baseline and future climate risk

This section starts with an overview of vulnerability and population change projections, unpacking the components of vulnerability on both the municipal and settlement level as well future population pressures. Thereafter the current and future climate is discussed in terms of

temperature and rainfall across the District, and the current as well as future exposure to drought, heat, wildfire, and flooding are set out. The impact of climate on key resources such as water and agriculture are also discussed for the municipalities in the District. Together this information provides an overview of current and future climate risk across the Fezile Dabi District to inform responsive planning and adaptation.

Vulnerability and population change

There are many factors that influence the vulnerability of our municipalities and settlements, some of which are unpacked in the following section. The current vulnerabilities for the Fezile Dabi District, its local municipalities, and settlements are profiled using a framework which sets out indicators that can be used to profile the multi-dimensional and context-specific inherent vulnerability of settlements and municipalities in South Africa. The framework describes and quantifies, where possible, the inherent vulnerability of people, infrastructure, services, economic activities, and natural resources by setting out context and location-specific indicators that were specifically designed to support vulnerability risk assessments of South African municipalities. Population changes drive vulnerability into the future, and therefore population growth and decline of settlements across the District are projected to 2050. Spatial population projections are integral in determining the potential exposure and vulnerability of a population to hazards.

Municipal vulnerability

Municipal vulnerability is unpacked in terms of four vulnerability indices, each of which are described below and in Table 1, the vulnerability scores are provided for each of the municipalities in Fezile Dabi District.

The **Socio-Economic Vulnerability Index (SEVI)** shows the vulnerability of households living in the municipality with regards to household composition, income composition, education, mobility, health, access to basic services, access to social government services, political instability, and safety and security of households. A high vulnerability score indicates municipalities that house a high number of vulnerable households with regards to their ability to withstand adverse shocks from the external environment.

The **Economic Vulnerability Index (EcVI)** speaks toward the economic resilience of the municipality, and considers economic sector diversification, the size of economy, labour force, the GDP growth/decline pressure experienced in the municipality, as well as the inequality present in the municipality. The higher the economic vulnerability the more susceptible these municipalities are to being adversely affected by external shocks.

The **Physical Vulnerability Index (PVI)** relates to the built environment and the connectedness of the settlements in the local municipality. It is a composite indicator that considers road infrastructure, housing types, the maintenance of the infrastructure, densities, and general accessibility. A high physical vulnerability score highlights areas of remoteness and or areas with structural vulnerabilities.

The **Environmental Vulnerability Index (EnVI)** highlights municipalities where there is a high conflict between preserving the natural environment and accommodating the growth pressures associated with population growth, urbanisation, and economic development. The index considers the human influence on the environment, the amount of ecological infrastructure present that needs protection, the presence of critical water resources, environmental health, and environmental governance. A high vulnerability score highlights municipalities that experience increasing pressure relating to protecting the environment and allowing land use change due to growth pressures.

Each local municipality in the Fezile Dabi District is provided a score out of 10 for each of the vulnerability indices. A score higher than 5 indicates an above national average, and a score lower than 5 indicates a below national average for vulnerability. Scores are provided for both 1996 and 2011, where a lower score in 2011 compared to 1996 indicates an improvement and a higher score indicates worsening vulnerability. Trend data are only available for Socio-Economic Vulnerability and Economic Vulnerability

Table 1: Vulnerability indicators across Fezile Dabi District Municipality for 1996 to 2011

LOCAL MUNICIPALITY	SEV I 1996	SEV 2011	Trend	EcVI 1996	EcVI 2011	Trend	PVI	Trend	EnVI	Trend
Moqhaka	5.5	4.2	↘	5.8	7.2	↗	4.7	N/A	3.5	N/A
Metsimaholo	3.3	2.7	↘	4.4	7.3	↗	5.6	N/A	4.0	N/A
Ngwathe	6.0	5.0	↘	6.0	7.8	↗	5.7	N/A	3.4	N/A
Mafube	6.4	5.6	↘	4.8	5.8	↗	6.7	N/A	4.9	N/A

Socio-economic vulnerability has decreased (improved) across all LMs between 1996 and 2011. The Metsimahlo LM has the lowest socio-economic vulnerability in the province and is ranked 1st out of 19 municipalities. All LMs experienced an increase (decline) in economic vulnerability between 1996 and 2011. Metsimaholo LM had the biggest decline in economic vulnerability and is ranked 14th out of the 19 municipalities in the province. The Ngwathe LM has the highest Economic Vulnerability in the District and scored 16th out of 19 municipalities in the province. Mafube LM has the highest physical vulnerability score in the district and is also ranked 19th out of 19 municipalities in the Free State which indicates areas of remoteness and/or areas with structural vulnerabilities within the LM. Mafube LM has the highest environmental vulnerability in the district and province (19th out of 19) which indicates some conflict in preserving the natural environment and accommodating growth pressures such as population growth, urbanisation and economic development.

Settlement vulnerability

The unique set of indicators outlined below highlight the multi-dimensional vulnerabilities of the settlements within the Fezile Dabi District and its local municipalities, with regards to six composite indicators. This enables the investigation of the relative vulnerabilities of settlements within the district.

A high vulnerability score (closer to 10) indicates a scenario where an undesirable state is present e.g., low access to services, high socio-economic vulnerabilities, poor regional connectivity, environmental pressure or high economic pressures. An indicator of growth pressure, providing a temporal dimension (15-year trend), was added to show which

settlements were experiencing growth pressures on top of the other dimensional vulnerabilities up until 2011.

The **Socio-Economic Vulnerability Index** comprises of three indicators (and eight variables) that show the vulnerability of households occupying a specific settlement with regards to their (1) household composition (household size, age dependency, female/child headed household), (2) income composition (poverty level, unemployment status, and grant dependency of the households), as well as (3) their education (literacy and level of education).

The **Economic Vulnerability Index** comprises of five variables grouped into three indicators that highlight the economic vulnerability of each settlement with regards to (1) its size (GDP per capita and GDP production rates), (2) the active labour force (taking note of unemployed and discouraged work seekers), and (3) the GDP growth rate for the past 15 years.

The **Environmental Vulnerability Index** considers the footprint composition of the settlement taking the ration of built-up versus open spaces into account.

The **Growth-Pressure Vulnerability Index** shows the relative (1996-2011 growth rates) and anticipated pressure on settlements.

The **Regional Economic Connectivity Vulnerability Index** looks at the regional infrastructure of each settlement (measured through a remoteness/accessibility index), as well as the role of the town in terms of its regional economy.

The **Service Access Vulnerability Index** comprises of 10 variables grouped into four indicators, that show the level of services offered and rendered within a settlement and includes the settlement's (1) access to basic services (electricity, water, sanitation, and refuse removal), (2) settlement's access to social and government services (health access, emergency service access, access to schools, and early childhood development), (3) access to higher order education facilities, and (4) access to adequate housing.

A brief description of each local municipality within the district follows below.

Moqhaka Local Municipality

The major settlements in this municipality are Steynsrus, Kroonstad, Rammulotsi and Vierfontein. The settlement facing the greatest growth pressure is Rammulotsi, which also has low access to services, poor regional connectivity and high environmental pressure. Steynsrus has the highest economic vulnerability combined with poor socio-economic vulnerabilities, this is compounded by poor access to services, poor regional connectivity and high environmental pressure. Vierfontein has poor regional connectivity. Kroonstad has the second highest growth pressure in the LM.

Metsimaholo Local Municipality

The major built-up areas in this municipality are Oranjeville, Holly Country, Kragbron, Coalbrook, Deneysville, Middelbult, Uitkoms, Sasolburg, Bertha Shaft Village, Vaal Park, Rietfontein FS, Viljoensdrift 1, Viljoensdrift 2 and Richmond Valley. Sasolburg is facing the greatest growth pressure in the municipality and has high environmental pressure. Deneysville has the highest socio-economic vulnerability as well as very low access to services. Oranjeville has high socio-economic vulnerability combined with poor regional connectivity. Vaalpark has high environmental pressures.

Ngwathe Local Municipality

The major settlements in this municipality are Edenville, Heilbron, Koppies, Vredefort, Vaal de Grace Golf Estate and Parys. Parys and Vaal de Grace Golf Estate has the highest growth pressure. Vaal de Grace Golf Estate also has the highest environmental pressure in the LM. Heilbron has the highest economic vulnerability, combined with low access to services, poor regional connectivity and high socio-economic vulnerabilities. Koppies has the third highest socio-economic vulnerability in the LM. Vredefort has high socio-economic vulnerability along with low access to services.

Mafube Local Municipality

The major settlements in this municipality are Mafahlaneng, Frankfort FS, Cornelia, Qalabotjha. Qualabotjha has the greatest settlement growth pressure as well as high economic pressure. Mafahlaneng has the highest socio-economic vulnerabilities along with high environmental pressure, economic vulnerability and high growth pressure. Frankfort FS has poor regional connectivity and low access to services. Cornelia has high environmental pressures.

Population growth pressure

The core modelling components of the settlement growth model are the demographic model and the population potential gravity model. The demographic model produces the long-term projected population values at the national, provincial, and municipal scale using the Spectrum and Cohort-Component models. The spatially-coarse demographic projections were fed into the population potential gravity model, a gravity model that uses a population potential surface to downscale the national population projections, resulting in 1x1 km resolution projected population grids for 2030 and 2050. The availability of a gridded population dataset for past, current and future populations enable the assessment of expected changes in the spatial concentration, distribution, and movement of people.

Using the innovative settlement footprint data layer created by the CSIR, which delineates built-up areas, settlement-scale population projections were aggregated up from the 1 x 1 km grids of South African projected population for a 2030 and 2050 medium and high growth scenario. These two population growth scenarios (medium and high) are differentiated based on assumptions of their in- and out-migration assumptions. The **medium growth scenario** (Table 2) assumes that the peak of population influx from more distant and neighbouring African countries into South Africa has already taken place. The **high growth scenario** assumes that the peak of migrant influx is yet to happen.

Population per municipality	2011	Medium Growth Scenario	
		2030	2050
Moqhaka	160 528	129 767	103 927
Metsimaholo	149 084	192 547	261 188
Ngwathe	120 518	106 692	96 421
Mafube	57 876	54 310	52 488
Fezile Dabi DM Total	488 006	483 316	514 024

Fezile Dabi District Municipality

- Towns and Cities
- Fezile Dabi District Municipality
- Local Municipalities

Projected 2050 Settlement Population Growth Pressure

- Decreasing growth pressure
- No Change
- Medium growth pressure
- High growth pressure
- Extreme growth pressure

Fezile Dabi District Municipality
Mogale Local Municipality
Mphahlele Local Municipality

Towns and Cities: Butha Buthe, Balfour, Fezile Dabi, Van Manna, Holly County, Oranjeville, Pekaia, Komatipoort, Cornelia, Tweeling, Petrusburg, Reitz, Lindley, Arlington, Steynsrus, Edenville, Kroonstad, Hennenman, Ventersburg, Virginia Mine, Senekal, Paul Roux, Kestell.

Inset Map: Shows the location of Fezile Dabi District Municipality within South Africa, bordered by Northern Cape, Eastern Cape, and Free State.

Date: February 2024
Prepared by: CSIR Smart Planet Unit
Data source: GeoNet, 2023

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Climate

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GreenBook. The regional climate model used is the Conformal-Cubic Atmospheric Model (CCAM), a variable-resolution Global Climate Model (GCM) developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CCAM runs coupled to a dynamic land-surface model CABLE (CSIRO Atmosphere Biosphere Land Exchange model). GCM simulations of the Coupled Model Inter-Comparison Project 5 (CMIP5) and the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), obtained for the emission scenarios described by Representative Concentration Pathways 4.5 and 8.5 (RCP 4.5 and RCP 8.5) were first downscaled to 50 km resolution globally. The simulations span the period 1960–2100. RCP 4.5 is a high mitigation scenario (assuming a reduction in CO₂ emissions into the future), whilst RCP 8.5 is a low mitigation scenario (assuming “business as usual” emissions).

After completion of the 50 km resolution simulations described above, CCAM was integrated in stretched-grid mode over South Africa, at a resolution of 8 x 8 km (approximately 0.08° degrees in latitude and longitude). The model integrations performed at a resolution of 8 km over South Africa offer several advantages over the 50 km resolution simulations:

- a) Convective rainfall is partially resolved in the 8 km simulations, implying that the model is less dependent on statistics to simulate this intricate aspect of the atmospheric dynamics and physics.
- b) Important topographic features such the southern and eastern escarpments are much better resolved in the 8 km resolution simulations, implying that the topographic forcing of temperatures, wind patterns and convective rainfall can be simulated more realistically.

For each of the climate variables discussed below:

- a) The simulated baseline (also termed “current” climatological) state over South Africa calculated for the period 1961–1990 is shown (note that the median of the 6 downscaled GCMs are shown in this case).
- b) The projected changes in the variable are subsequently shown, for the time-slab 2021–2050 relative to the baseline period 1961–1990.
- c) An RCP 8.5 scenario (low mitigation) is shown.

Temperature

The model was used to simulate average annual average temperatures (°C) for the baseline (current) period of 1961–1990, and the projected change for period 2021–2050 under a RCP8.5 mitigation scenario.

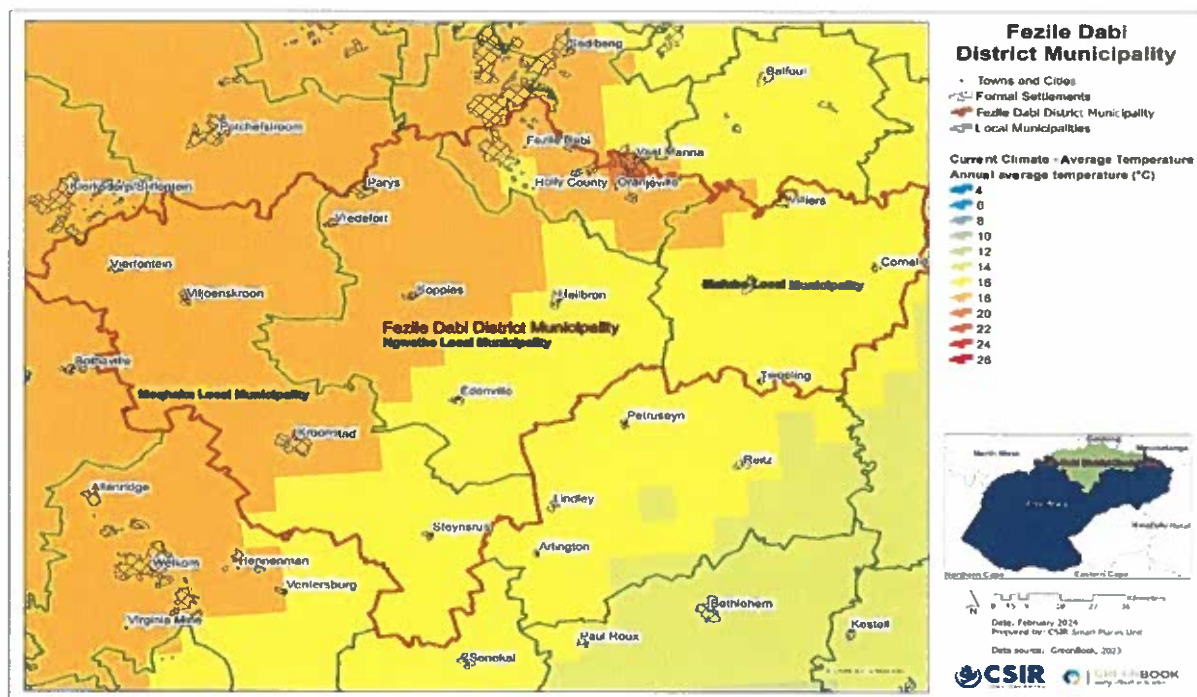


Figure 3: Average annual temperature (°C) for the baseline period 1961-1990 for Fezile Dabi District Municipality

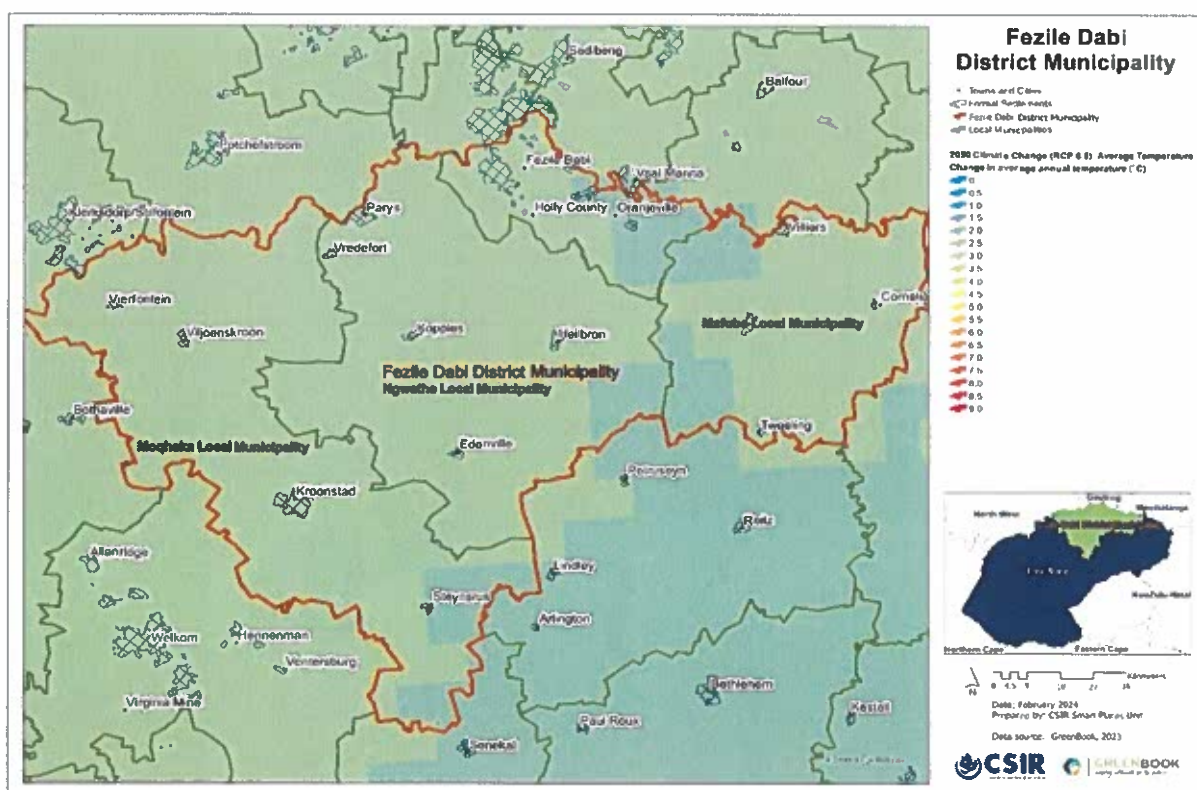


Figure 4: Projected changes in average annual temperature (°C) from the baseline period 1961-1990 to the future period 2021-2050 for Fezile Dabi District Municipality, assuming an RCP 8.5 emissions pathway

The FDDM experiences average annual temperatures ranging between 16°C and 20 °C. Projected change in average temperature for the district is expected to range between 2.45°C to 3.36°C.

Rainfall

The multiple GCMs were used to simulate average annual rainfall (depicted in mm) for the baseline (current) period of 1961–1990, and the projected change from the baseline to the period 2021–2050 under an RCP8.5 emissions scenario.

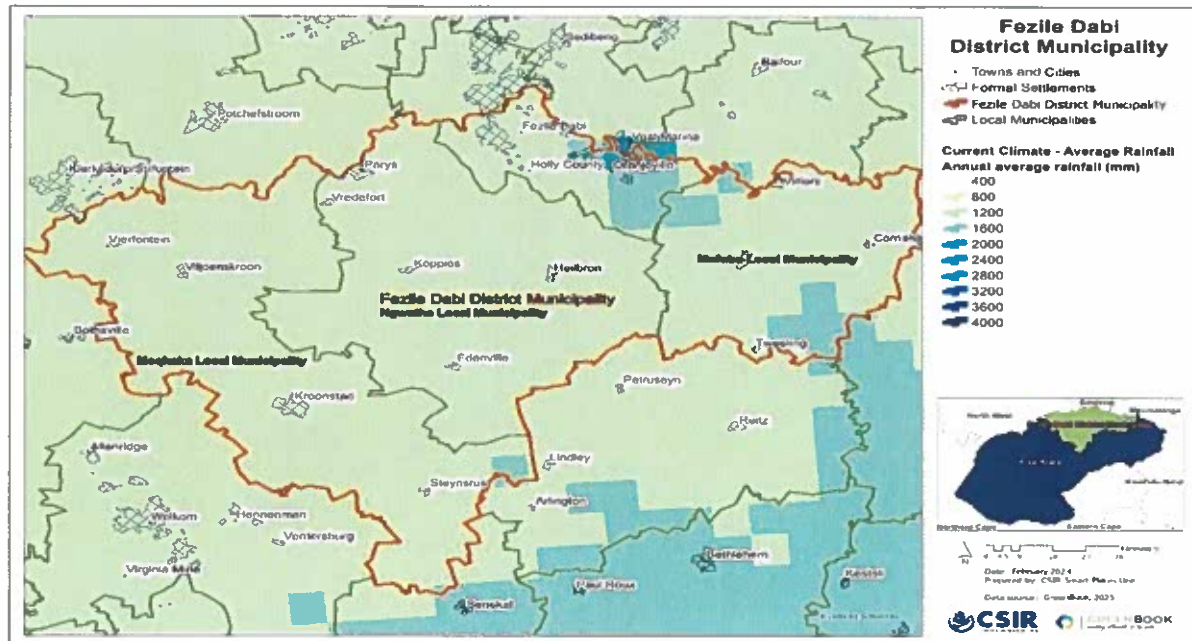


Figure 5: Average annual rainfall (mm) for the baseline period 1961-1990 for Fezile Dabi District Municipality

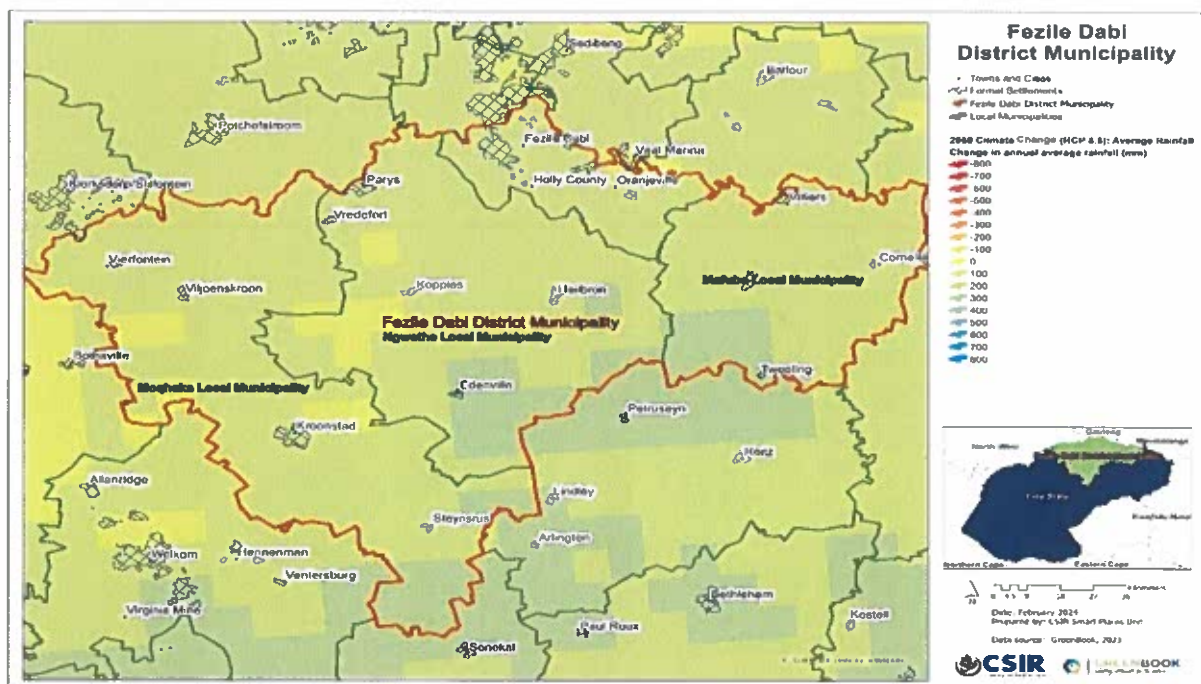


Figure 6: Projected change in average annual rainfall (mm) from the baseline period to the period 2021-2050 for Fezile Dabi District Municipality, assuming an RCP8.5 emission pathway

As displayed in Figure 6 the FDDM currently receives average annual rainfall of between 1200 mm and 1600 mm. The projected future change in average annual rainfall is variable across the district (Figure 7). In Moqhaka LM average annual rainfall is expected to range between 32.34

mm to 227.32 mm, while in Ngwathe LM average annual rainfall is expected to range between 79.11 mm to 218.93 mm. In Metsimaholo LM average annual rainfall is expected to range between 52.52 mm to 172.99 mm, while average annual rainfall is expected to range between 79.11 mm to 218.93 mm in the Mafube LM. The projected range of change in rainfall across the LMs of the district suggests that there is significant uncertainty regarding the magnitude of the change in annual rainfall. The projected changes represent anything from a relatively modest increase to a substantial increase in rainfall. A change in annual rainfall within this wide range could have significant implications for water availability, agriculture, ecosystems, and various socio-economic activities.

Climate Hazards

This section showcases information with regards to Fezile Dabi District Municipality's exposure to climate-related hazards.

- Drought

The southern African region (particularly many parts of South Africa) is projected to become generally drier under enhanced anthropogenic forcing, with an associated increase in dry spells and droughts. To characterise the extent, severity, duration, and time evolution of drought over South Africa, the GreenBook uses primarily the Standardised Precipitation Index (SPI), which is recommended by the World Meteorological Organisation (WMO) and is also acknowledged as a universal meteorological drought index by the Lincoln Declaration on Drought. The SPI, with a two-parameter gamma distribution fit with maximum likelihood estimates of the shape and scale parameters, was applied on monthly rainfall accumulations for a 3-, 6-, 12-, 24- and 36-months base period. The SPI severity index is interpreted in the context of negative values indicating droughts and positive values indicating floods. These values range from exceptionally drier (<-2.0) or wetter (>2.0) to near-normal (region bounded within -0.5 and 0.5).

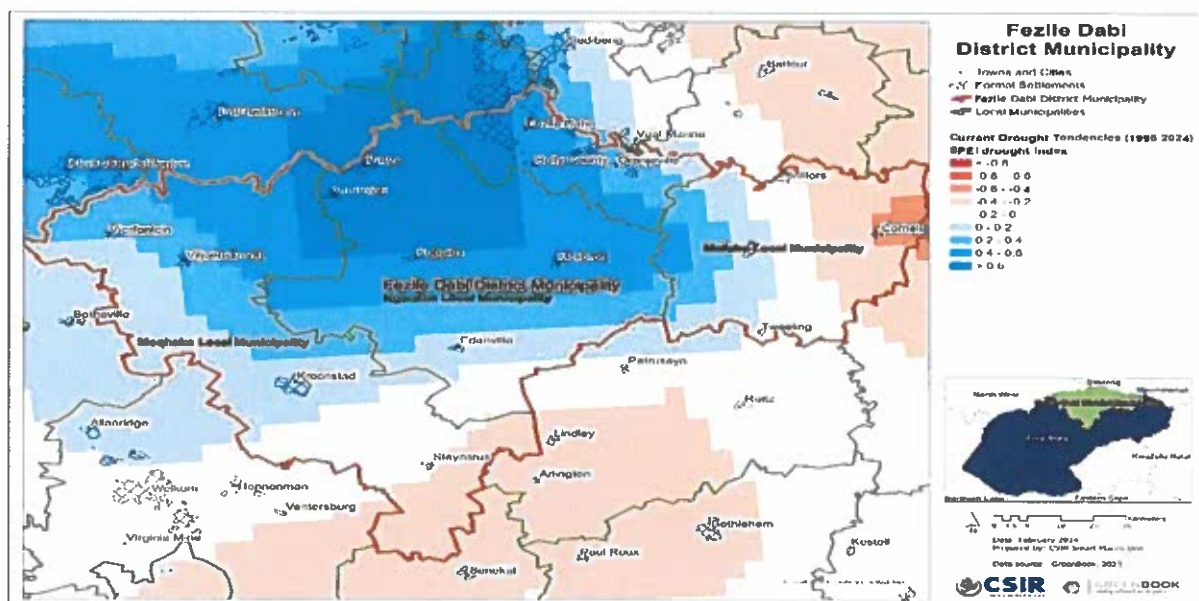


Figure 7: Current drought tendencies from the baseline period (1986–2005) to the current period (1995–2024) across Fezile Dabi District Municipality

Figure 7 depicts the current drought tendencies (i.e., the number of cases exceeding near-normal per decade) for the period 1995–2024, relative to the 1986–2005 baseline period, under an RCP 8.5 “business as usual” emissions scenario (RCP 8.5). A negative value is indicative of an increase in drought tendencies per 10 years (more frequent than the observed baseline) with a positive value indicative of a decrease in drought tendencies.

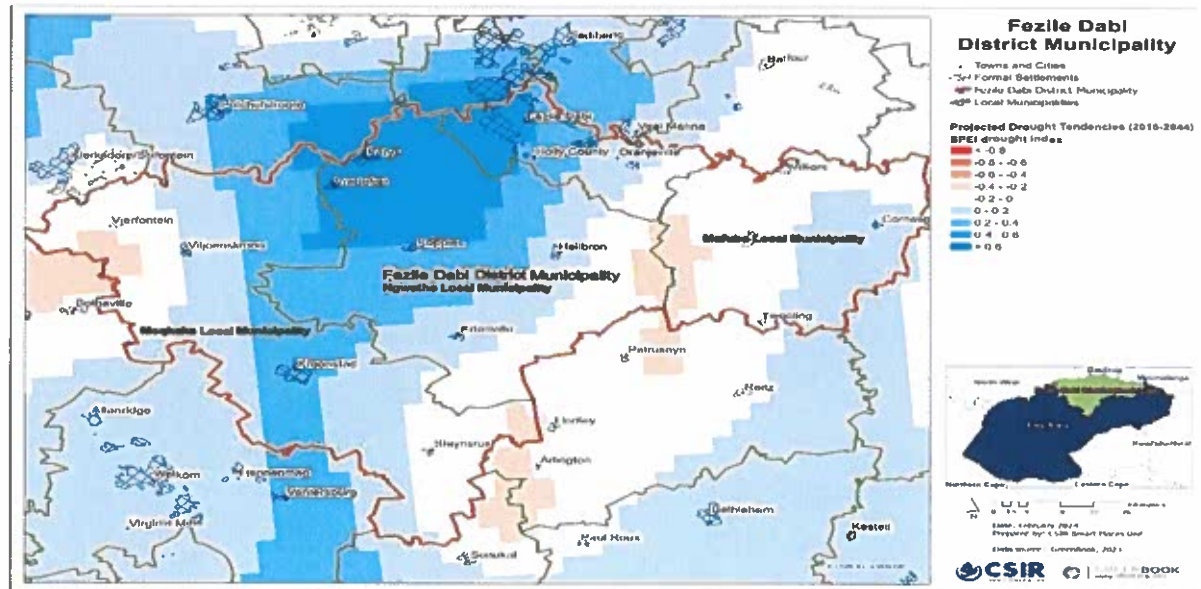


Figure 8: Projected changes in drought tendencies from the baseline period (1986–2005) to the future period 2015–2044 for Fezile Dabi District Municipality

Figure 8 depicts the projected change in drought tendencies (i.e., the number of cases exceeding near-normal per decade) for the period 2015–2044 relative to the 1986–2005 baseline period, under the low mitigation “business as usual” emissions scenario (RCP 8.5). A negative value is indicative of an increase in drought tendencies per 10 years (more frequent than baseline) into the future and a positive value indicative of a decrease. Figure 9 depicts the settlements that are at risk of increases in drought tendencies.

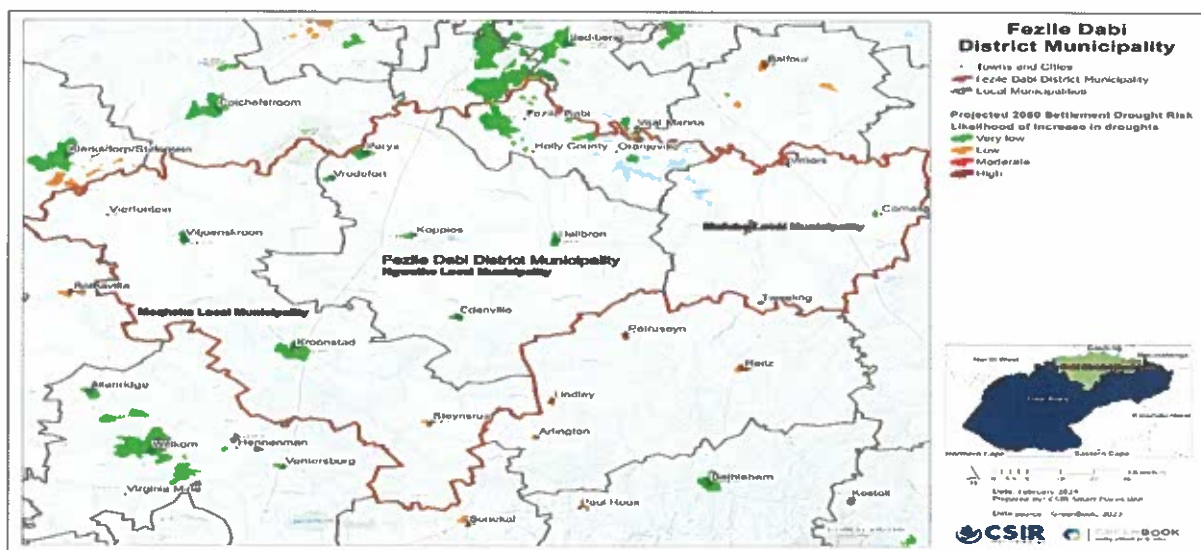


Figure 9: Settlement-level drought risk for Fezile Dabi District Municipality

As displayed in Figure 8 the current drought tendencies for FDDM ranges between 0 to >0.6 across large parts of the district with certain pockets having scores of -0.4 to -0.2. A positive SPI value suggests that there is more precipitation than usual for the given period. The upper most part of the Ngwathe and Metsimaholo LM's containing the settlements of Parys, Vredefort and Fezile Dabi has a score of >0.6 this signifies that the surplus of precipitation is notably above average, indicating a relatively large deviation from typical precipitation levels. This surplus can have various impacts on water resources, agriculture, and ecosystems. The central parts of the LM have scores between 0-0.2 and 0.2 to 0.4 indicating a slight excess of precipitation compared to what is typically expected for the period being evaluated. SPI scores ranging between -0.2 to 0 and -0.4 to -0.2 suggests a mild to moderate deficit in precipitation for this period. Future projections show slight shifts in SPI values with the district still expected to have surplus precipitation over most parts. Mafube and Moqhaka LM is expected to have an increase in the areas with a mild to moderate deficit in precipitation. Settlement level drought risk is very low for most of the settlements in the district, with low drought risk for Vierfontein, Steynsrus, Tweeling and Villiers.

Heat

With the changing climate, it is expected that the impacts of heat will only increase in the future. The heat-absorbing qualities of built-up urban areas make them, and the people living inside them, especially vulnerable to increasingly high temperatures. The combination of the increasing number of very hot days and heatwave days over certain parts of South Africa is likely to significantly increase the risk of extreme heat in several settlements.

The GCMs were used to simulate bias-corrected, annual average number of very hot days, defined as days when the maximum temperature exceeds 35°C per GCM grid point for the baseline (current) period of 1961–1990 (Figure 10), and for the projected changes for period 2021–2050 (Figure 11). The annual heatwave days map under baseline conditions (Figure 12) depicts the number of days (per 8x8 km grid point) where the maximum temperature exceeds the average maximum temperature of the warmest month of the year at that location by at least 5°C for a period of at least three consecutive days. The projected change in the number of days belonging to a heatwave for the period 2021–2050 (Figure 13), assuming a “business as usual” (RCP 8.5) emissions pathway is also shown.



Figure 10: Annual number of very hot days under baseline climatic conditions across Fezile Dabi District Municipality with daily temperature maxima exceeding 35°C



Figure 1: Projected change in annual number of very hot days across Fezile Dabi District Municipality with daily temperature maxima exceeding 35°C, assuming a RCP 8.5 emissions pathway

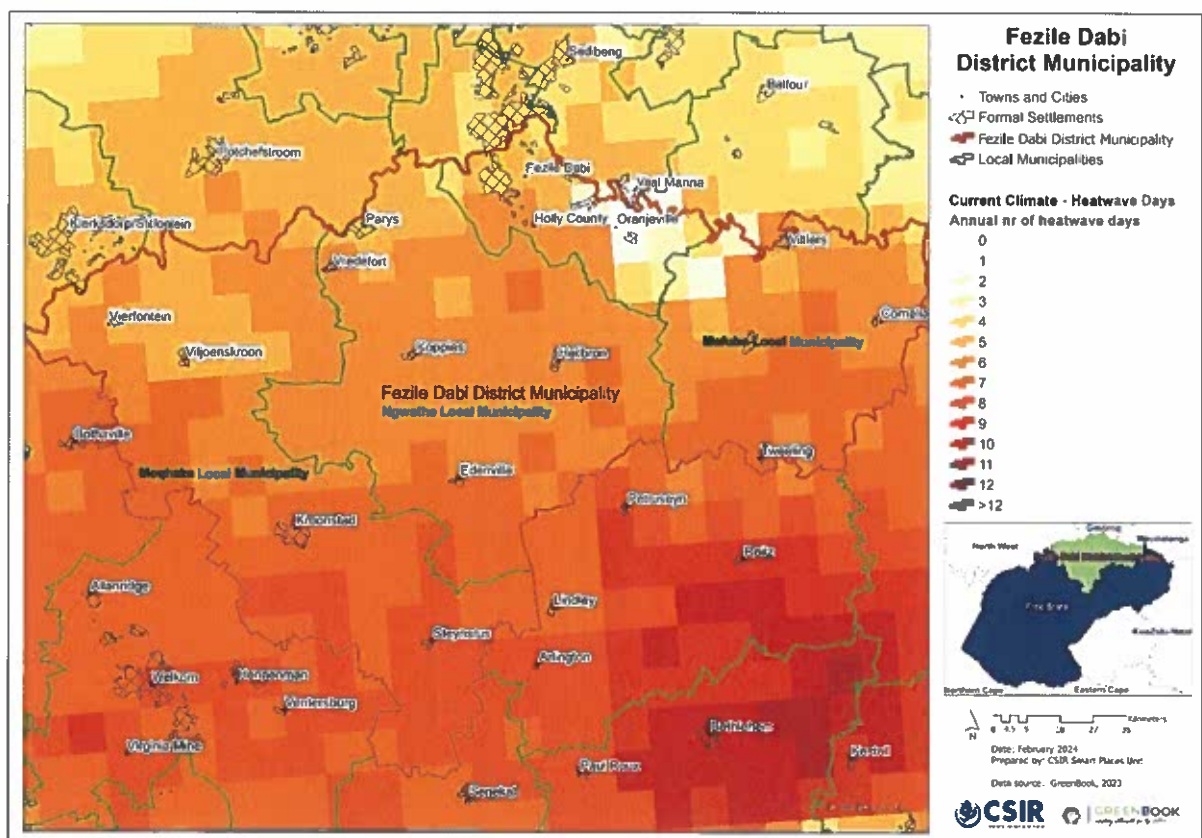


Figure 12: Number of heatwave days under baseline climatic conditions across Fezile Dabi District Municipality

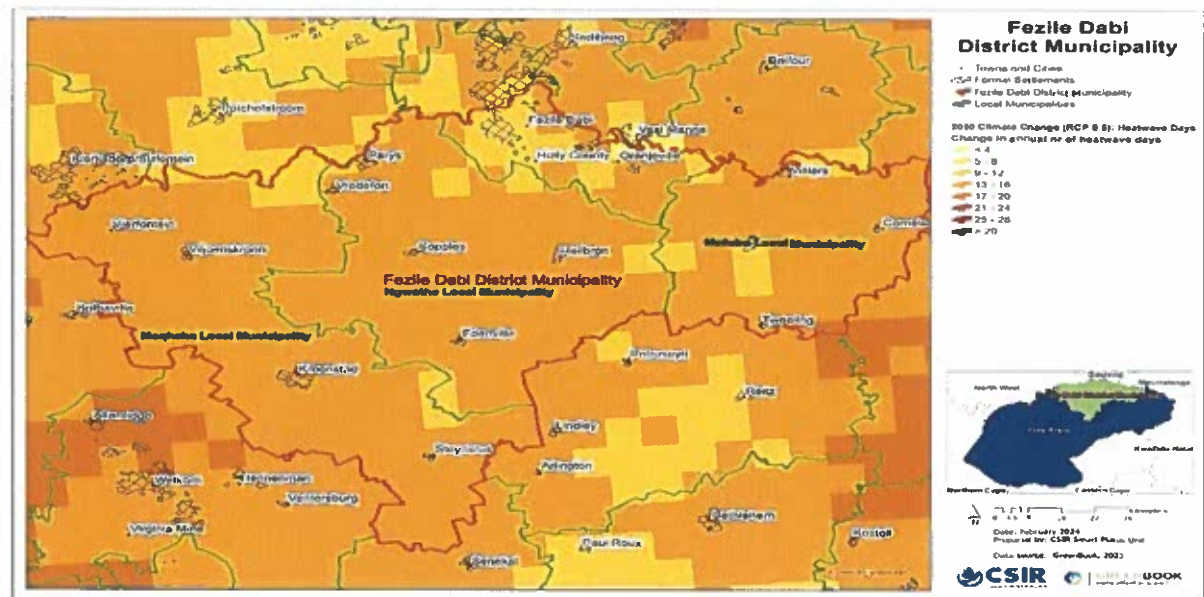


Figure 13: Projected change in annual number of heatwave days across Fezile Dabi District Municipality, assuming an (RCP 8.5) emissions pathway

As displayed in Figure 11 the number of very hot days under current conditions ranges between 0 to 10 days across the district. The projected change in the annual number of very hot days is expected to increase to between 3 to 26 days for Nqwathe LM. Whilst for Metshimaholo LM the number of very hot days per annum will increase to between 0-19 days per annum. Mafube LM is expected to have between 0 to 11 very hot days per year. The Moqhaka LM is expected to have the highest increase in number of very hot days in the district with very hot days expected to range to between 7 to 34 days. The number of heatwave days under current climatic conditions ranges between 0-7 days per year. Future projections show an increase in heatwave days for the district ranging between 9 and 13 days per year.

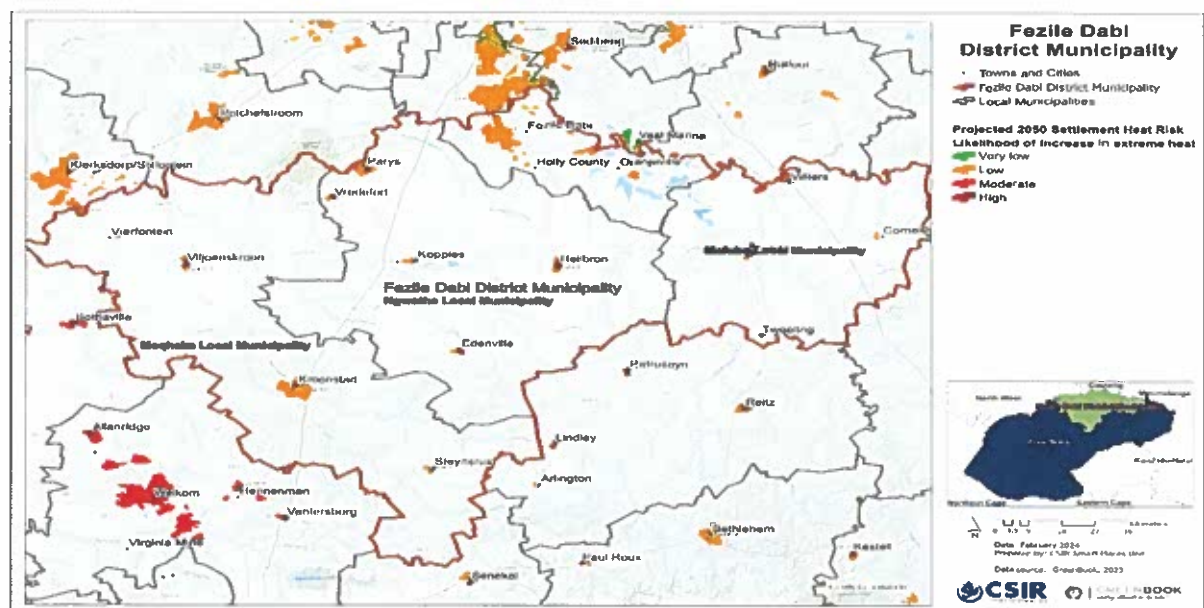
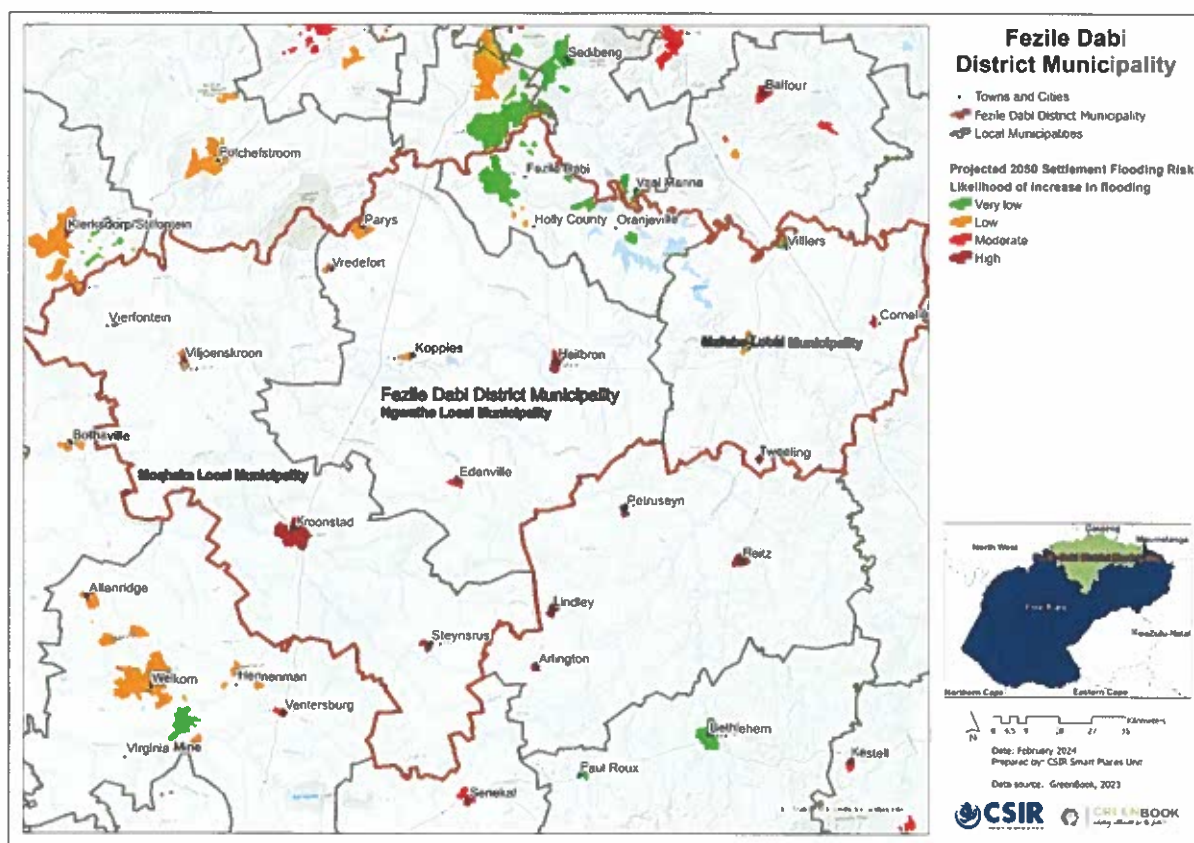


Figure 24: Settlement-level heat risk across Fezile Dabi District Municipality

projected change in the number of extreme rainfall days. Negative values in the range (-0.64) imply a possible reduction in the frequency of extreme rainfall events, while positive values (4.38) suggest a potential increase. The projected number of extreme rainfall days is highly variable across the Ngwathe Metsimaholo LM and ranges between 0 days to 4 days which suggests a potential increase in the frequency of extreme rainfall days compared to current conditions. In Mafube LM the projected change in extreme rainfall days ranges between 0.48 to 5 days, which suggests a significant increase in the frequency of extreme rainfall events.

Figure 17: Projected changes into the future in extreme rainfall days across Fezile Dabi District Municipality

Figure 18 depicts the settlements that are at increased risk of flooding under an RCP 8.5 low mitigation (worst case of greenhouse gas emissions) scenario. Settlements of Kroonstad, Steynsrus, Hellbron, and Cornelia are projected to have a high likelihood of increased flooding, with a low likelihood of flooding for settlements of Viljoenskroon, Vredefort, Parys and Koppies and moderate likelihood for Edenville and Tweeling.



Climate impacts on key resources and sectors

To understand the impact that climate change might have on major resources, this section explores the impact that climate change is likely to have on the resources and economic sectors of the Fezile Dabi District Municipality.

Water resources and supply vulnerability

South Africa is a water-scarce country with an average rainfall of approximately 450 mm per year, with significant annual and seasonal variability. Rainfall also varies from over 1900 mm in the east of the country and in the mountainous areas, to almost zero in the west and northwest of the country. Conversion of rainfall to runoff is also low with an average mean annual runoff (MAR) of only 40 mm, one seventh of the global average of 260 mm per year. Runoff is even more highly variable than precipitation, both in space and time. Furthermore, demand for water is not evenly distributed, with most of the major water demand centres located far from the available water resources. This has resulted in a need to store water and to transfer water around the country to meet current and future demands.

Water availability is directly impacted by the climate and climate change. It is not just changes in precipitation that need to be considered, but also increasing temperatures that will lead to increased evaporation which could further reduce runoff and increase water losses from dams. Increasing temperatures will also impact on water demand, particularly for irrigation, but also from urban and industrial users. This could also contribute to reduced water security if existing

systems are not able to meet these increasing demands. Increasing air temperatures will also increase water temperatures and hence increase pollution and water quality risks.

To obtain a high-level first order assessment of the relative climate change risks for water supply to different towns and cities across South Africa, a general risk equation was developed to determine the current and future surface water supply vulnerability that combines both climate change and development risks (i.e., due to an increase in population and demand). The current vulnerability of individual towns was calculated based on the estimated current demand and supply as recorded across the country by the Department of Water and Sanitation's (DWS) All Towns study of 2011 (Cole, 2017). The future vulnerability was calculated by adjusting the water demand for each town proportional to the increase in population growth for both a high and medium growth scenario. The level of exposure was determined as a factor of the potential for increasing evaporation to result in increasing demands, and for changes in precipitation to impact directly on the sustainable yield from groundwater, and the potential for impacts on surface water supply. These were then multiplied by the proportion of supply from surface and groundwater for each town. Exposure to climate change risk for surface water supply was calculated in two ways. The first was by assuming surface supply was directly related to changes in streamflow in the catchment in which the local municipality was located (E1) and alternatively (E2) taking into account the potential benefits offered by being connected to a regional water supply system by using the result from a national study of climate change impacts on regional water supply derived from a high level national configuration of the water resources yield model (WRYM) that calculated the overall impacts on urban, industrial and agriculture water supply to each of the original 19 (now 9) Water Management Areas (WMAs) in South Africa.

In South Africa, groundwater plays a key strategic role in supporting economic development and sustaining water security in several rural and urban settlements that are either entirely or partially dependent on groundwater supply. Groundwater is, however, a natural resource, the availability and distribution of which are highly influenced by climate variability and change. An analysis of the impact of climate change on potential groundwater recharge was conducted for the period 2031 to 2050. The Villholth GRiMMS (Groundwater Drought Risk Mapping and Management System) formulation (Villholth et al., 2013), which implemented a composite mapping analysis technique to produce an explicit groundwater recharge drought risk map, was adapted to formulate a series of potential groundwater recharge maps for the far-future across South Africa. Finally, the future period 2031 to 2050 was compared with the historical period 1961 to 1990.

Figure 19 indicates the catchment(s) related to the district. The quandary catchments serving the district include the Vaal Primary Catchment.

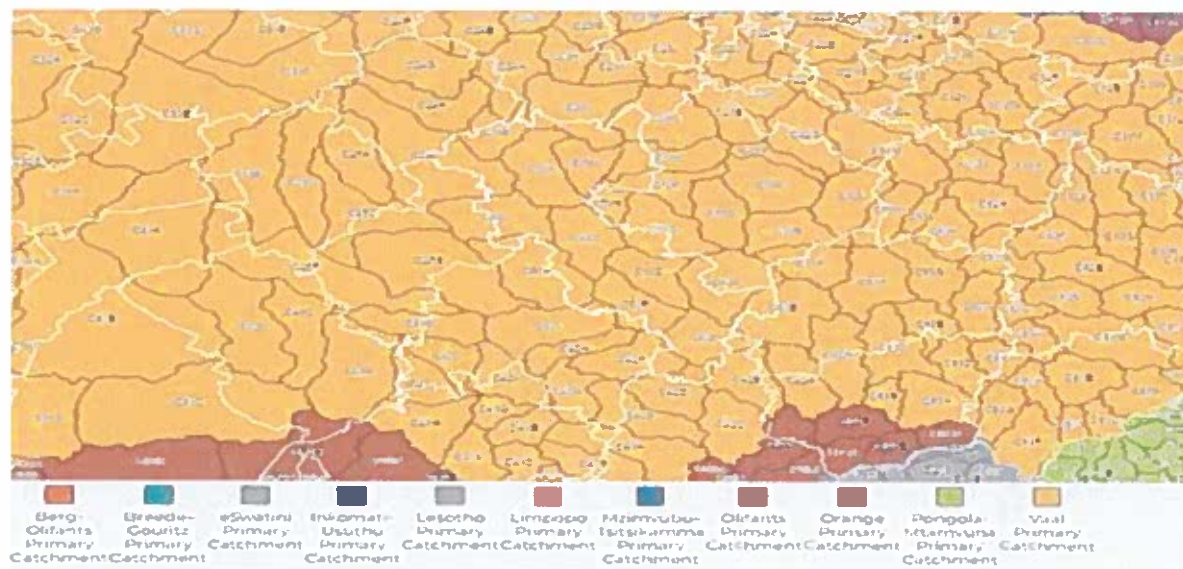


Figure19: Quandary catchments found in Fezile Dabi District Municipality

Figure 20 indicates where settlements get their main water supply from, be it groundwater, surface water or a combination of both sources. Settlements that rely on groundwater, either entirely or partially, are deemed to be groundwater dependent. In the Fezile Dabi District, most towns are surface water dependent, except for Kroonstad and Steynsrus in Mophaka LM and Cornelia in Mafube LM using a combination of surface and groundwater sources and Edenville in Ngwathe LM making use of groundwater sources.

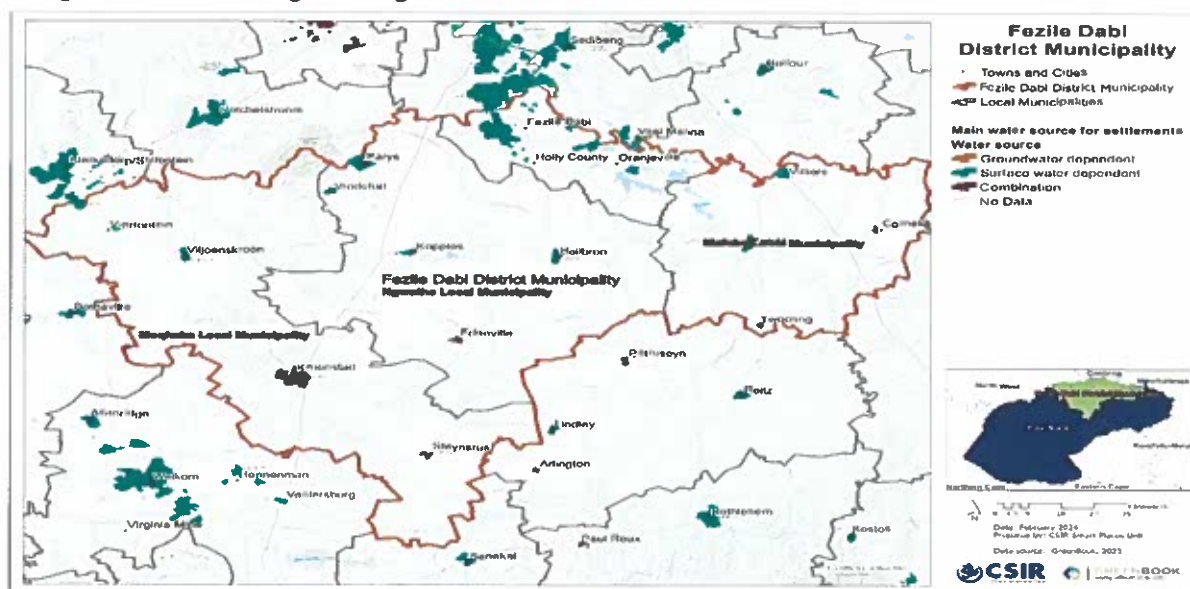


Figure 4: Main water sources for settlements in the Fezile Dabi District Municipality

Figure 20 indicates the occurrence and distribution of groundwater resources across the District Municipality, showing distinctive recharge potential zones, Figure 21 showing groundwater recharge potential, while Figure 22 indicates the projected change in groundwater potential. Figure 23 indicates which groundwater dependent settlements that may be most at risk of

groundwater depletion based on decreasing groundwater aquifer recharge potential and significant increases in population growth pressure into the future.

Groundwater recharge potential is high for most parts of the district, with moderate recharge potential in the areas surrounding Vierfontein and Viljoenskroon in Moqhaka LM. The projected change in groundwater recharge potential for most of the FDDM indicates a significant increase in recharge potential across the district, except for the area surrounding Vierfontien and Viljoenskroon settlements in Moqhaka LM which will vary between “no-change” to slight decrease in recharge with pockets of increased groundwater recharge.

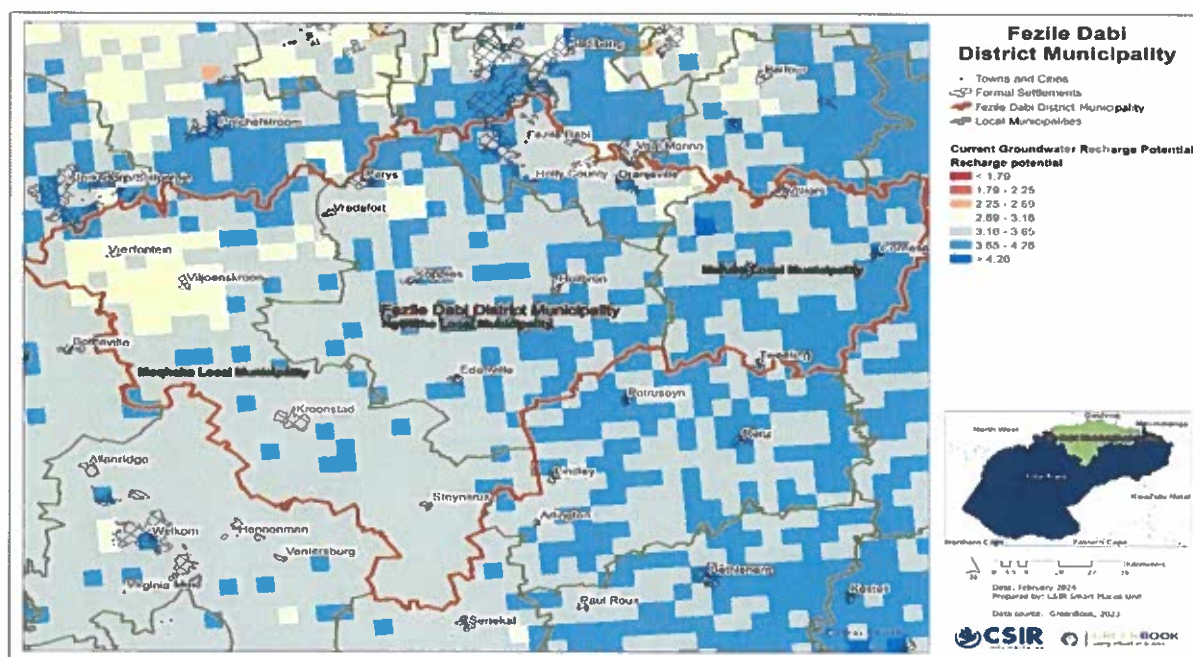


Figure 21: Groundwater recharge potential across Fezile Dabi District Municipality under current (baseline) climatic conditions

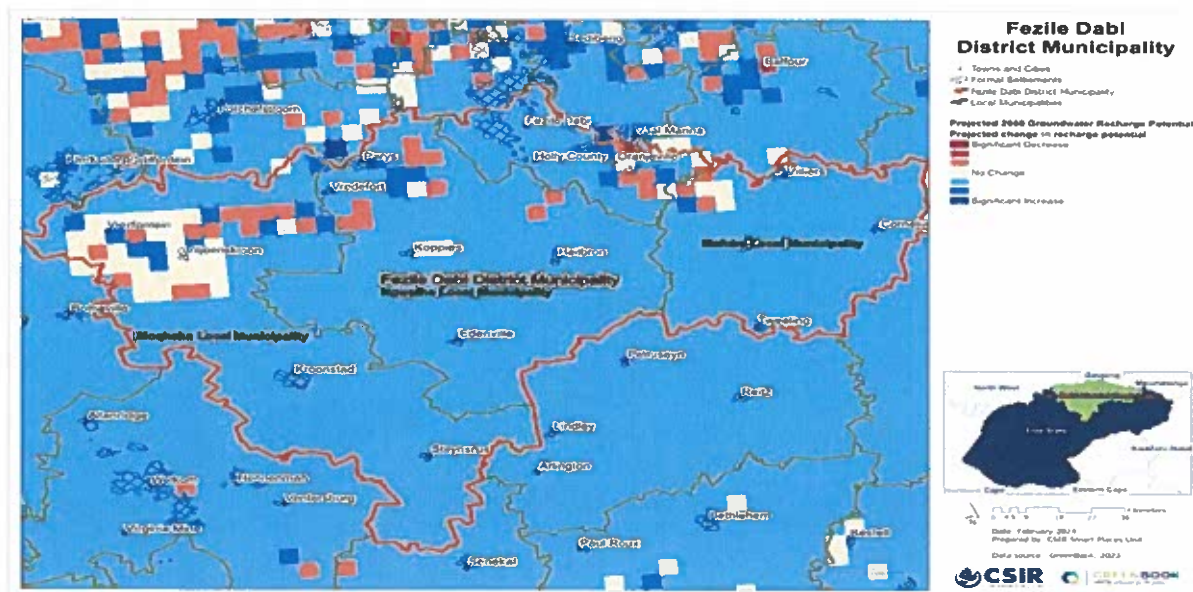


Figure 5: Projected changes in groundwater recharge potential from baseline climatic conditions to the future across Fezile Dabi District Municipality

The settlements which are groundwater dependent in the Fezile Dabi District have a very low groundwater depletion risk (See Figure 23).

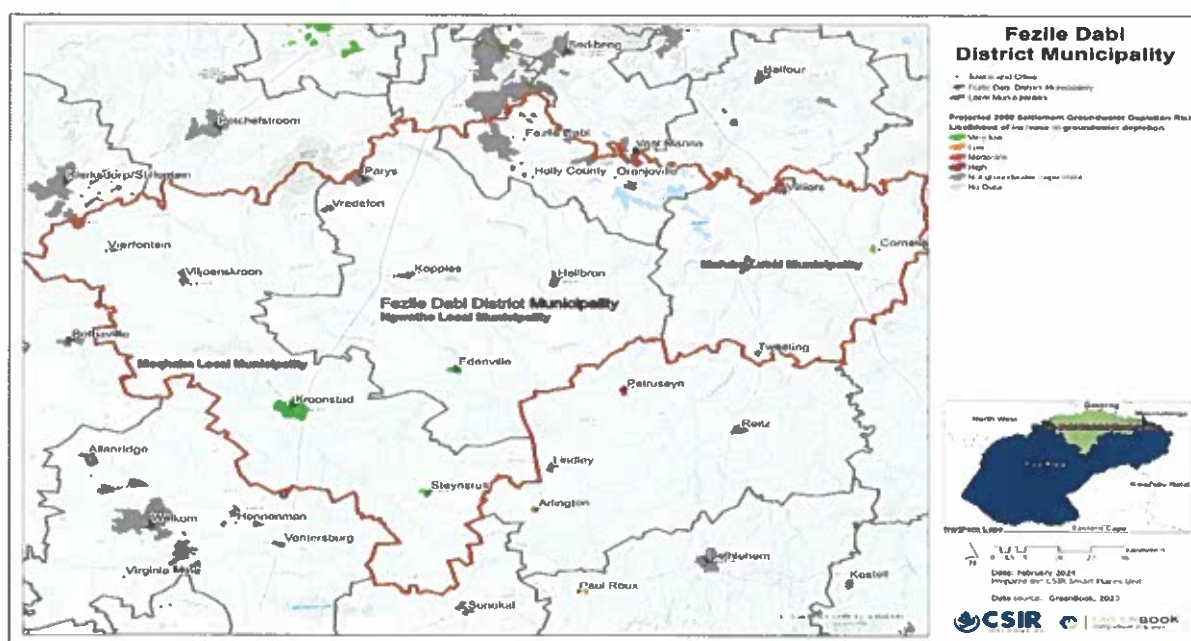


Figure 23: Groundwater depletion risk at settlement level across Fezile Dabi District Municipality

Table 3 provides an overview of current water supply vulnerability (i.e., demand versus supply) for the local municipalities in the Fezile Dabi District based on the data compiled for the Department of Water and Sanitation's (DWS) All Town's Study (Cole, 2017). A water supply vulnerability score above 1 indicates that demand is more than supply, while a score below 1 indicates that supply is meeting demand.

Table 3: Current water supply and vulnerability across Fezile Dabi District Municipality

Local Municipality	Water Demand per Capita (l/p/d)	Water Supply per Capita (l/p/d)	Current Water Supply Vulnerability
Moqhaka	306.06	207.36	1.48
Metsimaholo	496.18	496.18	1
Ngwathe	213.39	434.88	0.49
Mafube	157.45	0	0

Current and future water supply vulnerability estimations are based on: 1) a local water supply perspective incorporating changes to population growth coupled with exposure to climate risk and 2) a regional water supply perspective, based on impacts of regional water supply assuming supply is part of the integrated regional and national bulk water supply network. The water supply vulnerability estimations do not consider the current state of water supply and reticulation infrastructure. The current context and conditions within each of the local municipalities need to be considered when interpreting the information provided in this report. See the GreenBook Municipal Risk Profile Tool for more information on surface water, change

in precipitation, runoff, and evaporation. Water supply vulnerability per local municipality is discussed below.

Moqhaka

Moqhaka LM's water demand is currently higher than supply giving it a high-water supply vulnerability. Water supply vulnerability is however projected to decrease significantly into the future, this is due to a projected increase in rainfall, and decreased population growth.

Metsimaholo

Metsimaholo LM's water supply currently meets demand. Water supply vulnerability is projected to increase significantly in the future for most future scenarios, this is due to increase in mean annual evaporation and projected population growth of 46%.

Ngwathe

Ngwathe LM's water supply currently matches its demand. In future the water supply vulnerability is projected to increase for most scenarios and can be attributed to increased evapotranspiration and increased population growth.

Mafube

Mafube LM has a water supply need of 157.45 litres per day which cannot be met by the LM. As a Water Supply Authority Mafube LM has a blue drop score of 4.25% and a Blue Drop Risk Rating score of 98.9% placing it in the critical risk category (Blue Drop Report, 2023). The minimum blue drop target for Water Supply Systems is 31% which is an indication of the dire state of management and drinking water quality in the LM.

Agriculture and food production is arguably the sector most vulnerable to climate impacts in South Africa. Many settlements in South Africa owe their existence to the primary sector of the country. Agriculture, forestry, and fisheries (AFF) form the bulk of the primary sector and act as catalysts for the economic development of secondary and tertiary sectors. Where these sectors are the primary economic activity in an area, they contribute to the local economy, employment, food security, and livelihoods. They also indirectly benefit from services such as health care, education, and basic infrastructure. In such regions, social and economic stability are linked with the profitability of the agricultural sector.

Climate change, through increased temperature and changing rainfall patterns, can have fundamental impacts on agriculture if the climatic thresholds of the commodities being farmed are breached. However, the nature and extent of these impacts depends on the type of commodity being farmed and the relative geographic location of the farmer with regard to the industries served, and also on the resources available to the farmer. The same climate impact can have different impacts on different commodities and farms. Overall, climate change could make it more difficult to grow crops, raise animals, and catch fish in the same ways and same places as has been done in the past.

c) History of disasters/incidents in Fezile Dabi District Municipality

• Floods

Fezile Dabi District Municipality, located in the northern part of the Free State Province, has experienced significant flood events in recent years, notably 2010, 2011, 2015, 2016, 2018, 2021, 2024 and 2025. The district is prone to floods due to various reasons ranging from lack of infrastructure, lack of maintenance to infrastructure, informal settlement and so on.

December 2010 - January 2011 Floods: During this period, heavy rainfall led to widespread flooding across the district. The National Disaster Management Centre declared Fezile Dabi a disaster area in early 2011 due to the severity of the floods. All towns were notably affected but the following were badly affected;

- **Parys:** Numerous homes were inundated, resulting in displacement of residents.
- **Edenville:** A tornado accompanied by floods destroyed houses, leading to significant property and livestock losses. The local graveyard was also severely impacted.
- **Heilbron:** Blocked storm water channels caused flooding, particularly around the Phiritona Bridge, affecting both formal and informal settlements.
- **Koppies:** The water treatment plant was submerged, disrupting water supply due to damaged pumps. Residential areas near the railway line experienced flooding, leaving many homeless.
- **Sasolburg:** numerous homes, roads, farms and other buildings were affected
- **Deneysville:** numerous homes, roads, farms and other buildings were affected
- **Kroonstad:** numerous homes, roads, farms and other buildings were affected
- **Steynsrus:** numerous homes, roads, farms and other buildings were affected

In response, the Fezile Dabi District Municipality conducted flood assessments and coordinated relief efforts, including distributing blankets to affected individuals. Plans were developed to repair and upgrade infrastructure to mitigate future flood risks.

Projected Future Flood Risks: Studies indicate that towns such as Kroonstad, Steynsrus, Heilbron, and Cornelia are projected to face a higher likelihood of increased flooding in the future. This underscores the importance of proactive water management and infrastructure resilience to address potential extreme rainfall events.

These events highlight the critical need for comprehensive disaster preparedness and adaptive planning to safeguard communities within the Fezile Dabi District Municipality from future flooding incidents.

• Drought

Drought can typically be defined as being meteorological, agricultural or hydrological depending on what has been affected. Drought occurs when there is a deficiency in rainfall or other forms of precipitation for an extended period of time. This affects run-off, soil moisture levels, dam levels, food production and ultimately the ability to supply portable water and to maintain the natural ecology of a particular area. Fezile Dabi District Municipality has

experienced several notable drought periods in recent decades. Significant droughts were recorded in the years 2003, 2005, 2015, and 2018, severely affecting the region. For instance, maize production saw significant declines, with the lowest yields recorded in 2014 and 2015, producing approximately 223,600 and 119,050 tons respectively. Similarly, sorghum production experienced its lowest outputs in 2015, 2016, and 2019, with yields around 24,150, 24,640, and 23,600 tons respectively.

The district comprises four local municipalities: Moqhaka, Ngwathe, Metsimaholo, and Mafube. During these drought events, towns within these municipalities, including Kroonstad, Steynsrus, and others, faced challenges such as water shortages, impacting agriculture and local communities. The 2015 drought, in particular, had a widespread impact, with the northern areas of the Free State, encompassing Fezile Dabi District, being severely affected. These recurring droughts have underscored the importance of implementing effective water management and climate adaptation strategies to mitigate future impacts on the district's towns and rural areas.

The district encompasses several key towns, including Kroonstad, Parys, Sasolburg, and Frankfort. While specific records detailing the impact of each drought on these individual towns are limited, it is evident that the entire district faced challenges such as water shortages and reduced agricultural productivity during these periods. The recurring nature of these droughts highlights the necessity for effective water management and the implementation of climate adaptation strategies to mitigate future impacts on both urban and rural communities within the district.

Windstorms

A windstorm is a weather event characterized by strong and damaging winds, often without significant precipitation (rain or snow). Windstorms can vary in intensity and cause destruction to buildings, trees, power lines, and infrastructure. Some common types of windstorms include hurricanes, tornadoes, derechos, and cyclonic storms. Windstorms occur due to differences in atmospheric pressure. Wind is essentially air moving from high-pressure areas to low-pressure areas. The greater the difference in pressure, the stronger the winds. Fezile Dabi District Municipality has experienced significant windstorms in recent years, impacting various towns within the district. Windstorm is one of the common hazard in the district and many towns and townships are prone.

Effects of Windstorms

- Property damage (roofs blown off, windows shattered, trees uprooted)
- Power outages (due to downed power lines)
- Dust storms (if wind picks up loose soil, especially in dry areas)
- Flying debris (causing injuries or damage)
- Transportation disruptions (air, road, and sea travel affected)

How to Stay Safe during a Windstorm

- Secure loose outdoor objects (trash bins, furniture, etc.).

- Stay indoors and away from windows.
- If driving, slow down and be cautious of debris.
- In extreme cases (like tornadoes), seek shelter in a basement or interior room.

November 20, 2013 – Tweeling (Mafahlaneng): On this date, a severe windstorm struck the community of Tweeling, particularly affecting the Mafahlaneng area. The storm caused substantial damage to local infrastructure and homes, leading to the displacement of residents and necessitating emergency response efforts.

Deneysville Windstorm: Deneysville, a town within the Metsimaholo Local Municipality, also experienced a notable windstorm. While specific details about the date and impact are limited, assessments were conducted to evaluate the damage and coordinate relief measures for the affected population.

Kroonstad windstorms- Kroonstad in Moqhaka Local Municipality is prone to windstorm incidents. Kroonstad, located in the Free State province of South Africa, the region experiences a windier period lasting approximately 4.7 months, from August 5 to December 27, with average wind speeds exceeding 8.1 miles per hour. The windiest month is typically October. Kroonstad is prone to windstorms due to several geographical and climatic factors:

- Flat Terrain – The Free State is largely flat and open, which means there are few natural barriers (such as mountains) to break strong winds. This allows wind to travel across the landscape with little resistance, increasing the likelihood of windstorms.
- Highveld Climate – Kroonstad is in the Highveld region, which experiences a continental climate with extreme seasonal variations. The area is prone to sudden atmospheric pressure changes that can generate strong winds.
- Thunderstorms and Cold Fronts – The region frequently experiences severe thunderstorms, especially in summer. These storms can produce strong downdrafts and gusty winds. Additionally, cold fronts moving from the southwest can bring sudden and intense winds.
- Drought and Dry Conditions – During dry seasons, strong winds are more common because there is less moisture to dampen wind activity. This can lead to dust storms and an increase in wind intensity.
- Weather Patterns from the South Atlantic – Weather systems originating over the South Atlantic Ocean can push strong winds across South Africa, including the Free State.

These factors combine to make Kroonstad particularly susceptible to windstorms, especially during seasonal transitions.

Fires

While specific major fire events in these urban areas are not detailed in the provided sources, the inherent risks necessitate proactive fire prevention and response strategies to safeguard the communities. Overall, the combination of environmental factors and socio-economic

conditions in Fezile Dabi District Municipality underscores the importance of comprehensive fire management plans to mitigate the impact of both wildfires and urban fires on its towns and rural areas. Fezile Dabi District Municipality has experienced several significant fire incidents over the years, impacting various towns within the district.

Fire Incidents (2004–2007): Between 2004 and 2007, the district witnessed multiple fire events, with the total burned area recorded as follows:

- **2004:** 219 km²
- **2005:** 365 km²
- **2006:** 243 km²
- **2007:** 213 km²

These fires predominantly affected rural and agricultural areas, leading to significant environmental and economic consequences. Specific towns impacted during these years are not detailed in the available records.

Urban Fire Risks: The district's urban centres, including towns like Sasolburg, Kroonstad, Parys, and Heilbron, face heightened fire risks due to several socio-economic factors:

- **Urbanization:** Rapid urban growth has led to the development of informal settlements, where dwellings are often constructed with highly combustible materials and situated in close proximity, increasing the potential for fire spread.
- **Infrastructure Challenges:** Limited access to adequate fire-fighting resources and infrastructure in these densely populated areas exacerbates the vulnerability to fire incidents.

Chemical Spillage and HAZMAT incidents

Fezile Dabi District Municipality has experienced several hazardous material (HAZMAT) incidents and chemical spillages, primarily due to its extensive industrial activities and major transportation routes. The region's industrial activities and transportation networks necessitate ongoing vigilance and robust emergency response measures to protect both the environment and public health.

Transportation-Related Incidents: The district is traversed by significant highways, including the N1 and N3, which are major conduits for transporting hazardous materials. Communities situated along these routes have been particularly vulnerable to HAZMAT incidents resulting from vehicular accidents involving chemical spills. While specific dates and details of these incidents are not extensively documented, the Fezile Dabi District Municipality's disaster management officials have acknowledged a focus on addressing HAZMAT situations affecting these areas.

Industrial Incidents: The municipality hosts several industrial operations, notably in towns like Sasolburg. In the Zamdela area of Sasolburg, concerns have been raised regarding community awareness of chemical hazards, indicating a history of industrial-related HAZMAT incidents.

Specific details about these incidents are limited, but efforts have been made to enhance public awareness and preparedness.

Chemical spillages

A chemical spillage occurs when hazardous chemicals are accidentally released into the environment. This can happen in industrial areas, laboratories, transportation routes, or storage facilities. Chemical spills pose serious risks to human health, wildlife, and the environment if not managed properly. Fezile Dabi District Municipality has experienced chemical spillages, primarily due to industrial activities and transportation routes. The main concerns include:

- **Transportation-Related Spills:**
 - The N1 and N3 highways, which pass through the district, are key routes for transporting chemicals.
 - Accidents involving trucks carrying hazardous materials have resulted in chemical spillages, affecting nearby towns.
- **Industrial Incidents (Sasolburg - Zamdela):**
 - Sasolburg, a major industrial hub, has reported chemical spills from manufacturing plants.
 - Residents in Zamdela have raised concerns about exposure to industrial chemicals, leading to health and environmental risks.
- **Environmental Pollution:**
 - Oil spills, dust emissions, and ash contamination have been reported in certain areas.
 - These pollutants pose risks to public health, water sources, and ecosystems.

Response Measures

- The Fezile Dabi District Municipality's Environmental Health and Emergency Services Team monitors chemical safety and pollution.
- Disaster management strategies have been implemented to prevent, control, and mitigate future HAZMAT incidents.

How to Respond to a Chemical Spillage

- **Evacuate the Area** - ensure people move away from the spill to avoid exposure.
- **Contain the Spill** - use barriers or absorbent materials to prevent spreading.
- **Wear Protective Gear** – wear gloves, masks, and protective clothing reduce health risks.
- **Inform Authorities** - report the incident to emergency response teams.
- **Clean up & Disposal** - specialized teams use neutralizing agents or absorbents to clean the spill safely.

Environmental assessments have highlighted issues such as oil spillages, fugitive dust emissions, and ash dust accumulation in certain areas of the district. These environmental hazards, while not always classified as immediate HAZMAT incidents, pose significant risks to both the environment and public health.

In response to these challenges, the Fezile Dabi District Municipality has established an Environmental Health and Emergency Services department. This department is tasked with managing municipal health services, environmental management, disaster management, and fire and rescue services. Their responsibilities include monitoring environmental pollution, ensuring chemical safety, and implementing disaster management strategies to address and mitigate the impact of HAZMAT incidents and chemical spillages within the district.

Heatwaves

Heatwaves have been experienced in Fezile Dabi District Municipality where various towns within its jurisdiction have been affected notably. While specific historical records of heatwave events are there but limited, the region is known to be susceptible to extreme heat conditions. Fezile Dabi District Municipality has acknowledged the challenges posed by climate change, including increased frequency of heatwaves, which present significant concerns for disaster risk management. While detailed historical data on specific heatwave events in Fezile Dabi District Municipality is limited, the region's susceptibility to extreme heat underscores the importance of proactive measures to mitigate the adverse effects of heatwaves on its communities.

Efforts are underway to enhance resilience against climate change impacts, such as implementing heat mitigation strategies in government buildings across the Free State Province.

Historical Heatwave Events:

- January 2020: Parys experienced a series of days with maximum temperatures exceeding 32°C. This town has experienced elevated temperatures during summer months, leading to heat-related challenges for residents and local agriculture
- January 2020: Frankfort experienced a series of days with maximum temperatures exceeding 30°C. Frankfort: Similarly, Frankfort has faced periods of high temperatures, impacting both the community and farming activities.

These elevated temperatures posed significant challenges to residents, particularly the elderly and those with pre-existing health conditions.

Pollution

Fezile Dabi District Municipality faces significant pollution challenges, primarily due to its industrial activities and energy production facilities. While specific emission data in tons is not readily available from the provided sources, several key contributors to pollution in the region have been identified:

- **Industrial Emissions- Sasolburg Industrial Complex:** This area hosts numerous industries, including petrochemical plants, which are significant sources of air pollutants such as sulphur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter (PM).
- **Energy Production- Lethabo Power Station:** Located near Sasolburg, this coal-fired power plant contributes to the emission of pollutants, including SO₂, NO_x, and PM.

- **Waste Management- Landfill Sites:** Facilities such as the Heilbron Landfill Site have been identified as sources of air pollution, emitting gases like methane (CH₄) and contributing to odour issues.
- **Mining Activities- Sand Mining Operations:** Activities in areas like Viljoenskroon contribute to dust emissions, affecting air quality and posing health risks to nearby communities.

Efforts are ongoing to monitor and mitigate pollution within the municipality. The Environmental Management Department conducts regular site visits to identify and assess pollution sources, ensuring compliance with environmental regulations.

While precise quantitative data on emissions is not available in the referenced documents, the identified sources highlight the need for continued environmental monitoring and implementation of pollution reduction strategies in Fezile Dabi District Municipality.

Epidemics

Fezile Dabi District Municipality has experienced notable epidemic events affecting several of its towns. These incidents underscore the importance of robust public health infrastructure and proactive measures to prevent and manage epidemic outbreaks within the Fezile Dabi District Municipality.

Cholera Outbreaks:

May 2023: An outbreak of cholera was reported, with confirmed cases in the towns of Vrededorst and Parys. The Free State Department of Health identified six confirmed cholera cases and numerous other diarrhoeal infections in these areas. Multidisciplinary health teams were deployed to manage and contain the spread of the disease.

COVID-19 in 2020- this declared epidemic caused a havoc in the world and many lives were lost, even FDDM lost some people.

The district has faced challenges related to waterborne diseases, including cholera, due to inadequate wastewater treatment infrastructure. Towns such as those within the Ngwathe and Mafube local municipalities have been identified as high-risk areas for such outbreaks.

Climate Change

The methodological approach to understanding the impact of climate and climate change on AFF, consisted of four components. Firstly, the most important areas in terms of Gross Value Added (GVA) and employment for the AFF sector relative to the other sectors of the South African economy were determined. Secondly, an analysis of climate change scenarios was done using historical climate variables, as well as multi-model projections of future climates to help identify specific climate-related risk factors for agriculture within specific regions. Thirdly, crop suitability modelling was done to indicate how the area suitable for crop production under the present climate conditions might shift or expand under the scenarios of future climate change, in addition to using the Temperature Humidity Index (THI) to assess heat stress in livestock. Finally, the climate change analysis was used in conjunction with the

crop modelling outputs to assess the potential impacts of climate change over a specific area, or for a specific crop, to give more detail on how predicted climate changes translate into location/crop specific impacts. This was developed at a local municipal level and guided by the outcome of the agricultural industry sector screening and climate scenario analysis.

The AFF sector contributes 12% to the local GVA of the district (IDP, 2020). This is significantly higher than the agricultural sector's national average contribution of 2.5 % to GVA. Fezile Dabi District Municipality has a strong agriculture base and is known as the grain/maize basket of South Africa. The district has 327 592 ha of high potential agricultural land (15.4% of all agricultural land in the province) and 59% of agricultural land has low potential. The Villiers area is predominantly agriculture-orientated, where products such as maize, sunflower, wheat, grain, sorghum, meat and dairy are produced. In the Greater Tweeling area agricultural activities include sheep and cattle farming, maize, and sunflower seed production.

Below, the main agricultural commodities for each local municipality within the district is discussed in terms of what the impact of climate change might be on those commodities under an RCP 8.5 low-mitigation “business as usual” greenhouse gas emissions scenario.

Moqhaka

In the Moqhaka LM, the AFF sector contributes 5% to the local GVA, which is a contribution of 0.6% to the national GVA for the AFF sector. Of the total employment, 19.89% is within the AFF sector. The main agricultural commodities are maize for grain, wheat and beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events. Increase in temperature with increase in rainfall will lead to a potential increase in maize and wheat production in the near future. Heat stress can however negatively impact maize production towards 2050. Yield and crop suitability of wheat will also decline over time as temperatures start to exceed critical crop thresholds. Hot and moist conditions can cause increase spread of disease and parasites. Heat stress can also lead to reduced growth and reproduction performance for beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events.

Metsimaholo

In the Metsimaholo LM, the AFF sector contributes 0.86% to the local GVA, which is a contribution of 0.17% to the national GVA for the AFF sector. Of the total employment, 4.57% is within the AFF sector. The main agricultural commodities are beef cattle and maize for grain. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events. Hot and moist conditions can cause increased spread of disease and parasites. Heat stress can also lead to reduced growth and reproduction performance for beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events. The increase in temperature combined with increase in rainfall will lead to a potential increase in maize production in the near future. Heat stress can however negatively impact on maize production towards 2050.

Ngwathe

In the Ngwathe LM, the AFF sector contributes 7.05% to the local GVA, which is a contribution of 0.44% to the national GVA for the AFF sector. Of the total employment, 20.89% is within the AFF sector. The main agricultural commodities are maize for grain, chickens and beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events. The increase in temperature combined with increase in rainfall will lead to a potential increase in maize production in the near future. Heat stress can however negatively impact maize production towards 2050. Increase in temperature will lead to increased production costs (and increased investment will be required in ventilation and cooling) to maintain optimal seasonal temperatures and reduce the risk of heat stress for chickens. Heat stress on birds will reduce body weight gain, reproduction efficiency and egg quality. Hot and moist conditions can cause increase spread of disease and parasites. Heat stress can also lead to reduced growth and reproduction performance for beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events.

Mafube

In the Mafube LM, the AFF sector contributes 7.19% to the local GVA, which is a contribution of 0.19% to the national GVA for the AFF sector. Of the total employment, 20.38% is within the AFF sector. The main agricultural activities are centred on maize for grain and beef cattle. Climate projections show a generally hotter and wetter climate, with more extreme rainfall events. The increase in temperature combined with increase in rainfall will lead to a potential increase in maize production in the near future. Heat stress can however negatively impact on maize production towards 2050. Hot and moist conditions can cause increase spread of disease and parasites. Heat stress can also lead to reduced growth and reproduction performance for beef cattle.

These events underscore the importance of disaster preparedness and effective response strategies within the Fezile Dabi District Municipality to mitigate the adverse effects of such natural hazards on its communities.

The greatest climate risks faced across the Fezile Dabi District are increased temperatures, a considerable degree of uncertainty and variability regarding future precipitation patterns as well as significant increases in extreme rainfall. Changes in annual rainfall could have significant consequences for water availability, agriculture, ecosystems, and various socio-economic activities. Whereas an increase in extreme rainfall events can have significant implications for water management, infrastructure resilience, and disaster preparedness. The settlements of Kroonstad, Steynsrus, Hellbron, and Cornelia are projected to have a high likelihood of increased flooding in future. Extreme rainfall may also lead to additional challenges such as erosion, and strain on drainage systems.

The projected wildfire risk for 2050 is high for certain settlements in the district. This underscores the importance of adaptive planning and resilience-building measures to mitigate potential risks and capitalize on opportunities associated with changing precipitation patterns.

Fezile Dabi District Municipality is currently experiencing issues of water scarcity and quality which will only be exacerbated with future climate change impacts.

In response to these climate risks and impacts, the following adaptation goals are recommended:

- To ensure water security for human consumption and irrigation under a changing climate: Initiatives that will increase the resilience include invest in infrastructure such as reservoirs and water storage tanks to capture and store water during wet periods for use during dry periods. Promote rainwater harvesting systems for individual households and communities to improve local water resilience. Encourage the adoption of water-efficient technologies such as drip irrigation and low-flow fixtures in agriculture and households. Invest in water treatment facilities to improve water quality and safety. Ensure water supply systems are resilient to floods and droughts, including measures such as elevating facilities and protecting them from water contamination. Coordinate water management across sectors, such as agriculture, industry, and municipalities, to optimise water use and allocation. Establish monitoring systems for water quality and quantity to track changes and identify potential risks. Encourage collaboration among local governments, water utilities, and community groups to address water challenges collectively.
- To reduce the quantity of storm water runoff from developed areas and to slow its flow, thereby improving the quality of water and the health of downstream water sources by identifying suitable areas for managing water runoff: Drainage systems in the district should be retrofitted/adapted to handle larger volumes of water and prevent flooding. Construct or enhance storm water retention and detention systems, such as retention basins, rain gardens, and permeable pavements. Maintain and clear drainage channels and rivers regularly to ensure unobstructed water flow. Enhance storm water management infrastructure to prevent flooding and water pollution.
- To ensure that space is set aside for recreation, ecological support and storm water management, and to guide decision making across all sectors: Green infrastructure should be planned for, such as parks and wetlands, to absorb excess water and reduce urban flooding. Restore wetlands and riparian buffers to absorb and manage flood waters. Reforest areas to stabilize soil, improve water infiltration, and reduce runoff. Promote conservation agriculture practices to retain water in soils and minimize erosion. Protect existing natural areas such as forests, wetlands, and riparian zones, which provide habitat for wildlife and help manage storm water. Restore degraded ecosystems to improve their capacity for storm water management and ecological support. Design spaces that serve multiple purposes, such as parks with walking trails, native plant gardens, and storm water management features.

- To increase the adaptive capacity of human settlements to climate change and extreme events: To reduce the vulnerability of human settlements to climate-related hazards and extreme events, it is essential to increase their capacity to adapt to such impacts and events. Considering the uncertainty and variability in precipitation patterns predicted for Fezile Dabi District it would be important to develop efficient water storage and conservation systems to manage variability in precipitation and extreme rainfall. To implement water reuse and recycling programs to maximize water resources. Engage local communities in flood risk planning and adaptation efforts to tailor strategies to specific needs. Provide training on emergency response and flood and fire preparedness and safety measures for community members, including how to secure property and navigate floods and fires safely. Promote awareness campaigns on flood and fire risks and preparedness actions. Develop and deploy early warning systems to alert communities to imminent flood risks and wildfires. Establish evacuation plans and designate safe shelters for populations affected by flood or wildfires.
- To increase resilience of the agricultural sector to more extreme events such as heat waves and storms as well as indirect risks such as pests and diseases: To increase resilience of the agricultural sector a combination of proactive planning, adaptation strategies and technological innovation is required. Crop and livestock diversification should be encouraged to reduce dependence on a single variety or breed, which can be more susceptible to extreme events and diseases. Promote the use of polycultures and intercropping, which can enhance resilience and improve soil health. Promote the use of drought-tolerant, heat-resistant, and pest-resistant crop varieties. Incorporate trees and shrubs into agricultural landscapes to provide shade, reduce heat stress, and protect soil and water resources. Use silvo-pasture systems that integrate trees with livestock grazing to improve ecosystem services and reduce vulnerability. Provide farmers with access to real-time weather data and forecasts to help them plan agricultural activities and respond to extreme events. Promote integrated pest management to control pests and disease while minimising the use of chemical pesticides. Encourage collaboration among farmers, researchers and policymakers to share best practices and innovative solutions.

These goals should be pursued with the understanding that the District's climate risks are likely to increase due to climate change. Hence, any actions taken need to remain adaptable to the evolving risks over time. Furthermore, while these recommended goals are not exhaustive, they can be enhanced by strategies tailored to the specific needs of FDDM. The key to success lies in integrating these goals and the principles behind them into all aspects of municipal decision-making and operations, as well as in actively engaging communities in these initiatives.

d) Critical facilities found in the area

In disaster management, a critical facility refers to any infrastructure or service that is essential for the functioning of a community, especially during and after a disaster. These facilities must remain operational or be quickly restored to minimize the impact of disasters and support response and recovery efforts.

Examples of Critical Facilities:

- Emergency Services – Fire stations, police stations, ambulance services, and emergency operation centres.
- Healthcare Facilities – Hospitals, clinics, and emergency medical centres.
- Utilities and Infrastructure – Power plants, water treatment facilities, telecommunication networks, and fuel supply stations.
- Transportation and Logistics – Airports, seaports, roads, railways, and bridges.
- Shelter and Relief Centres – Evacuation centres, temporary shelters, and food distribution hubs.
- Government and Communication Centres – Municipal buildings, data centres, and media broadcasting stations.
- Hazardous Material Facilities – Sites storing chemicals, fuel depots, and nuclear power plants that could pose secondary risks during disasters.

Why Critical Facilities Matter in Disaster Management:

- Ensure public safety by providing essential services.
- Support emergency response through coordination centres and first responders.
- Enable faster recovery by maintaining utilities and transportation.
- Reduce economic and social disruption by keeping key functions running.
- Proper planning, resilience building, and protection of critical facilities are essential to minimize disaster risks and ensure a swift response when disasters strike.

e) Methodology used for the Review Process

PDMC during the previous IDP Assessment Response indicated the need for the FDDM Plan to be reviewed and took the Disaster Management Plan to Monitoring & Evaluation Unit where the disaster management plans are scrutinized in the aim of aligning according to the Disaster Management Guidelines. There was also a follow up visit to FDDM by PDMC together with SALGA in building up a working relations and support to FDDM and its local municipalities. Disaster Management planning within Fezile Dabi District Municipality is a very well established and has progressed continuously and systematically.

Subsequently, SALGA assisted ten district municipality with risk profiling in 2024. The profiling project was scientific and featured consultation with the host municipality (FDDM). The end product of the profiling was a Green-Book and the Climate Change Adaptation Strategy which will also assist in climate change issues.

Therefore, FDDM will use the updated Scientific Risk Profile of FDDM and other legal documents, comments local municipalities, stakeholders during IDP stakeholder consultation, IDP Steering Committee, the public during public participation, SALGA, PDMC, FDDM internal structures (Management, Portfolio and MAYCO) and ultimately FDDM Council- so that the final document is submitted to Council.

This Review Disaster Risk Management Plan (DMP) aims to outline strategies for disaster preparedness, response, mitigation, and recovery. The primary risks identified in the district include floods, fires, accidents, windstorms, drought, chemical spillages, and other climate change-related incidents. The purpose of the review the plan is to incorporate the comments of PDMC and NDMC after the assessment of the current plan. This review looked at previous disaster management plans and reviews thereof. This review's main focus is updating the district's disaster risk profile through an assessment process and prioritisation of disaster risk. Disaster risk reduction projects proposed in the disaster management plans and the review thereof will be assessed to see if any progress was made and if it is still applicable because of the new disaster risk profile.

This reviewed plan will be included in the IDP as a sector plan to ensure that the disaster management strategies form part of the municipal strategy and that funding can be made available to effectively implement the disaster risk management plan. This is very important because the only way disaster risk reduction can take place is through the IDP.

f) Stakeholders that were consulted

- Local municipalities (Moqhaka, Metsimaholo, Ngwathe and Mafube)
- IDP structures (internal and external)
- PDMC
- SALGA
- Community

During these sessions, the contents of the Draft Disaster Risk Management Plan were discussed and all participants were asked for inputs and comments. The comments received will be reviewed and incorporated into a final document.

Chapter 2: Constitutional, Legislative and Policy Framework

This chapter provides particulars of the policy and legal obligation(s) applicable in terms of the Disaster Management Act, the respective organ of states' legal mandate and an examination of which risks could be adequately dealt with within that legislation. The National Disaster Management Act 57 of 2002 (DMA) places a legal obligation on all organs of state and other institutional role-players involved in disaster management to develop, regularly review, update, coordinate, share and implement disaster management plans (DMPs). Section 15 of the DMA assigns various powers and duties to National Disaster Management Centre (NDMC) which, amongst others, includes not only advisory and consultative functions, but also, in Section 22, the power to give guidance and advice to stakeholders with regards to disaster management.

This plan aligns with the following key legislative and policy frameworks:

- National Disaster Management Act, 2002 (Act No. 57 of 2002)
- National Disaster Management Framework, 2005
- Municipal Systems Act, 2000
- The Constitution of the Republic of South Africa, 1996 (disaster risk reduction and municipal responsibilities)
- National Environmental Management Act, 1998

The Constitution of the Republic of South Africa 1996

The Constitution redefined local government as a sphere of government that is distinctive from, yet interdependent and inter-related with provincial and national government. Importantly, the Constitution conferred developmental duties to local government.

Public Finance Management Act No. 1 of 1999 (as amended by the Public Finance Management Amendment Act No. 29 of 1999)

To regulate financial management in the national and provincial governments; to ensure that all revenue, expenditure, assets and liabilities of those governments are managed efficiently and effectively; to provide for the responsibility of persons entrusted with financial management in those governments; and provide for matters connected therewith.

Municipal Systems Act of 2000

The Act introduces changes towards the manner in which municipalities are organized internally, the way they plan and utilize resources, monitor and measure their performance, delegate authority, deliver services and manage their finances and revenue. Critically, the Act formalizes a range of alternative service delivery mechanisms that could be used to complement traditional service delivery mechanisms / arrangements used by municipalities.

Municipal Demarcation Act of 1998

The Municipal Demarcation Act of 1998 provided for the re-demarcation of municipal boundaries and this resulted in the rationalization of 843 municipal entities into 284 larger and possible economically viable entities.

Municipal Structures Act No. 117 of 1998 as amended in 1999 and 2000

The Act defined new institutional arrangements and systems for local government. Importantly, the Act laid a foundation for local government performance management and ward committee systems.

White Paper on Local Government of 1998

The White Paper on Local Government is a broad policy framework that proposes wholesale changes in the areas of political, administrative structures of local government, electoral systems, demarcations, finances, services, infrastructure development, planning and so forth. The White Paper maps out a vision of developmental local government that is committed to working actively with citizens to identify sustainable ways of meeting their social, economic and material needs and thereby improve their quality of life. Developmental local government envisages the transformation of municipal administrations into rationalized, representative, less bureaucratic, people-centred, efficient, transparent, accountable and responsive entities.

The Fund Raising Act No. 107 of 1978

It provides for the declaration of a disaster by the President in order to provide relief to the Victims of disasters.

National Disaster Management Act 57 of 2002

Streamlines and unifies disaster management and promotes a risk reduction approach particularly at provincial and municipal levels. It eliminates the confusion around disaster declaration and addresses current legislative gaps.

National Disaster Management Framework of 2005

The framework provides guidelines for the development of the provincial and municipal disaster management frameworks. This also provides the key performance areas and enablers required for the implementation of the National Disaster Management Act.

Fire Brigade Act No. 99 of 1987

This Act forms an important element of disaster management in terms of norms and standards in the prevention of fires or any hazards leading to risks and or disasters.

National Veld and Forest Fires Act No. 101 of 1998

It emphasizes the formation of Fire Protection Associations for the purpose of predicting, preventing, managing and extinguishing veld fires.

The National Environmental Management Act of 1999

Provides for environmental management strategies so as to prevent and mitigate environmental disasters.

Other legal documents

FDDM IDP document

The custodian of the disaster management plan

The Head of the Fezile Dabi District Municipality Disaster Management Centre is responsible for its regular review and updating. The Head of the Centre is also responsible for ensuring that a copy of the plan as well as any amendments to the plan is submitted to the:

- Provincial Disaster Management Centre (PDMC)
- Local Municipalities' Disaster Management Centres.
- Sector departments and other stakeholders.

Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework for Disaster Risk Reduction 2015-2030 aims to achieve a substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years. The Framework was adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan, on March 18, 2015. The Framework outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster reduction for resilience
- Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

The Sendai Framework targets are:

- Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rates in the decade 2020–2030 compared to the period 2005–2015
- Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;9
- Reduce direct disaster economic loss in relation to the global gross domestic product (GDP) by 2030
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030
- Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020

- Substantially enhance international cooperation with developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

Sustainable Development Goals, 2019

The 2030 Agenda for Sustainable Development Goals (United Nations, 2019) were adopted by the member states of the United Nations in 2015. The idea behind this adoption is for member states to work towards a world that enjoys peace and success and also that this continues into the future. In order to achieve this, 17 Sustainable Development Goals were agreed to.

Figure 24: Sustainable Development Goals



Goal 1. *End poverty in all its forms everywhere*

This goal is aimed at eliminating extreme poverty deemed to be people living on less than \$1.25 per day by 2030. The goal further aims to reducing poverty of men, women and children, of all ages and across all nationalities, by at least half. It also looks at providing “social protection systems and measures for all”.

Goal 2. *End hunger, achieve food security and improved nutrition and promote sustainable agriculture*

The target by 2030 is to end hunger and ensure that all people have access to sufficient food. This would go hand in glove with increasing agricultural activity by 50% and ensuring that the income of small-scale farmers is increased. The aim is further to ensure that there is sustainable food production across all systems and that this positively impacts on climate change adaptation.

Goal 3. *Ensure healthy lives and promote well-being for all at all ages*

The target is to reduce the global maternal mortality rate and to end preventable deaths in newly born babies as well as in children under 5 years of age. The targets also aim at ending “AIDS (Acquired immunodeficiency syndrome), tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.”

Goal 4. *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*

The targets are all related to primary and secondary education being made available to all people including women, persons with disabilities, indigenous people, and “children in vulnerable situations” and for increasing skills levels so that gainful employment is made possible. All this needs to be done by also improving the number of qualified teachers.

Goal 5. *Achieve gender equality and empower all women and girls*

The targets associated with this goal include the ending of discrimination against women and girls, the ending of all violence against them, and ensuring that women have equal opportunity and rights across all sectors of society as well as leadership roles.

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

The targets aim to achieve, by 2030, access to safe, affordable drinking water while providing equitable sanitation and hygiene while also giving attention to the needs of women and girls. The targets also consider the water-related eco-systems and the protection of mountains, forests, wetlands and the like.

Goal 7. *Ensure access to affordable, reliable, sustainable and modern energy for all*

The targets, by 2030, aim to ensure that there are energy services that all people can access and that much of it is obtained through renewable energy processes.

Goal 8. *Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*

The 2030 aim is to increase economic growth, to increase economic productivity by doing things differently including by means of diversification and innovation and to achieve a position where all men and women and the youth have jobs in either the formal or informal sectors.

Goal 9. *Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*

The targets for 2030 include the development of quality, sustainable and resilient infrastructure for economic development to occur and for it to be sustained. This goal also targets the achievement of maintainable and robust infrastructure development in developing countries.

Goal 10. *Reduce inequality within and among countries*

The targets here are related to the achievement of equality, across all sectors, as it relates to social, economic and political inclusion.

Goal 11. *Make cities and human settlements inclusive, safe, resilient and sustainable*

The targets for 2030 include that access to adequate, safe, affordable housing and basic services is achieved and that slums and upgraded so that human dignity prevails.

Goal 12. *Ensure sustainable consumption and production patterns*

The targets include the achievement of sustainable management and the use of natural resources. This would improve the health of the environment as well as of humans.

Goal 13. *Take urgent action to combat climate change and its impacts*

The targets are related to climate change and to increasing climate change adaptation and thereby reducing climate-related hazards and reducing natural disasters. “Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.”

Goal 14. *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*

The targets here aim to reduce marine pollution. This includes marine debris like single-use plastic found in the oceans and inside the bodies of fish and other marine and water using animals. It also includes ending overfishing and the incorrect use of all water sources while increasing the sustainable use of water resources.

Goal 15. *Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*

The targets here relate to adherence to international agreements in respect of conservation, restoration and the “sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands”. The targets also consider reversing desertification and restoring land that has been degraded, through natural and other means like droughts and floods.

Goal 16. *Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*

The target aims to meaningfully reduce violence and violent deaths in all forms. It also looks at ending violence against children, including exploitation, trafficking and abuse. The targets include reducing funding of weapons, reducing corruption and developing institutions which are accountable.

Goal 17. *Strengthen the means of implementation and revitalize the global partnership for sustainable development*

These targets relate to finance, technology, capacity-building, trade and systemic issues. They deal, in part, with developing nations strengthening their systems for tax collection, servicing international commitments and attaining long-term debt sustainability. On the technology front, the targets aim to achieve “cooperation on and access to science, technology and innovation.” The target also aims to improve international assistance for capacity-building in

developing countries so that their sustainable development goals can be achieved. The systemic issues to be addressed and achieved include sustainable development through the consistency of policy implementation, being involved in multi-stakeholder partnerships and in so doing sharing knowledge, goals, technology and financial resources, increasing the use and availability of data which is separated by issues of gender, age, geography or any other cause. (United Nations, 2019)

Chapter 3: Institutional Capacity for disaster risk management (KPA1)

3.1 Institutional Arrangements

The Status of Disaster Management Services in FDDM

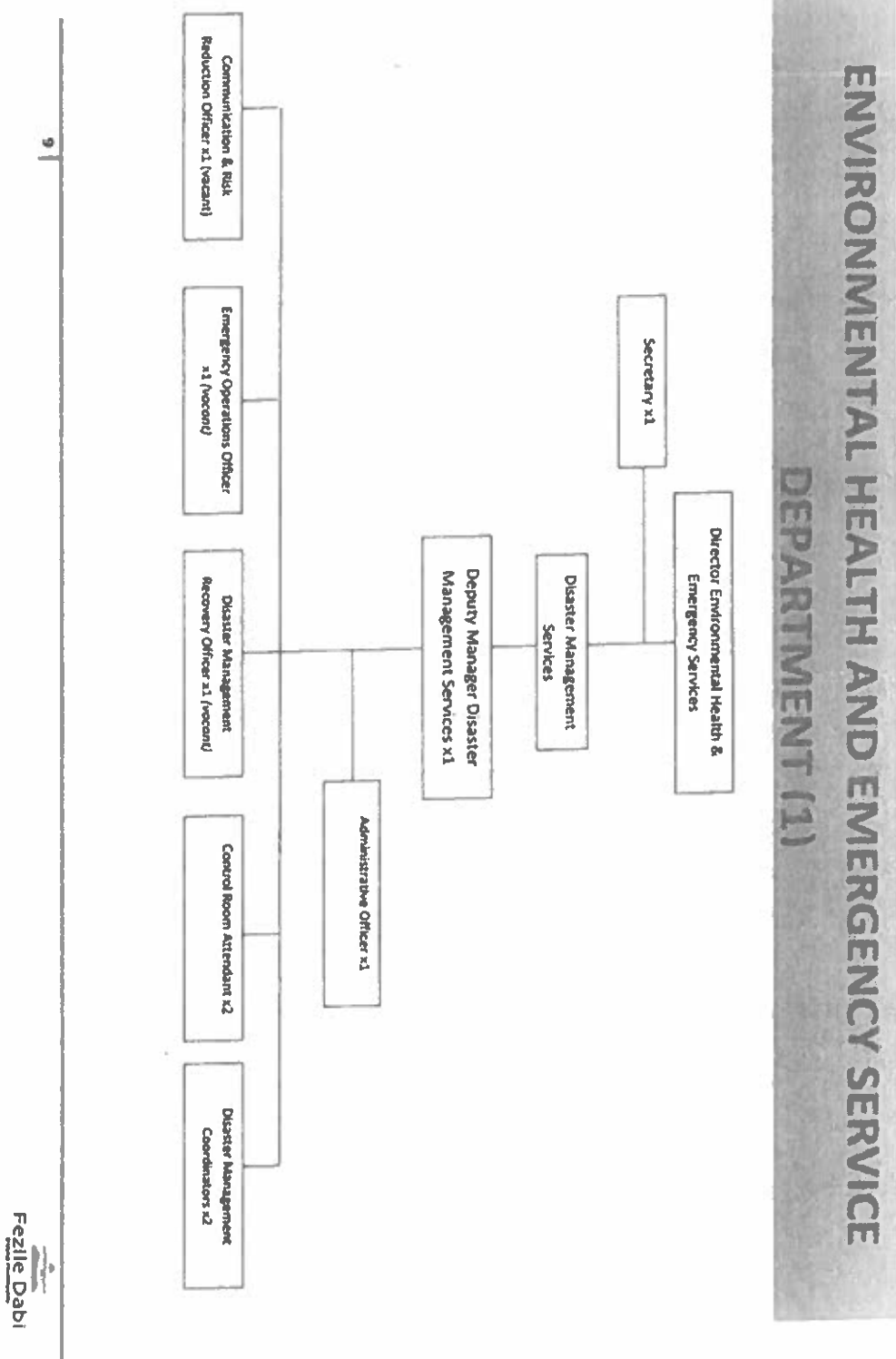
FDDM has the following in place:

- A disaster management plan (this document)
- FDDM Disaster Management Advisory Forum
- Inter-departmental Committee
- District Disaster Management Centre (needs upgrade)
- A Database of stakeholders
- An integrated Disaster Management information system (needs upgrade)
- JOC when necessary
- Hazard specific committees (Priority Committees like Road Incident Management System, Safety Committees, and National Key Points meeting)

3.2 An Overview of the Arrangements for Integrated Institutional Capacity for Disaster Management in the Municipality

The disaster management function and FDDM Disaster Management Centre in the municipality resort under the Community Services. The organogram (Figure 25) below indicates the Department of Environmental and Emergency Services that is responsible for the function of disaster management services within the municipality.

Figure 25: FDDM Structure of Disaster Management Services, 2013



3.3 District Municipal Disaster Management Centre

The District Municipal Disaster Management Centre (DMC) is located at John Vorster Road in Sasolburg. The Disaster Management Services Unit falls under Department of Environmental Health & Emergency Services. The purpose of the Disaster Management Centre is to promote integrated, coordinated and Multi-disciplinary Disaster Management and Fire Services. The Disaster Management Centre for the District Municipality is not yet operating in 24-hour control room but convenes JOC at any time possible.

The District Municipality assists its four Local Municipalities annually to perform the functions of disaster management on an agency basis. The District Municipality is implementing specific projects such disaster risk reduction, risk reduction and risk assessment. The funds are budgeted annually for Disaster Management. To optimally perform all statutory responsibilities and to execute all directives of the Districts Disaster Management Framework, the District Municipal Disaster Management Centre must be adequately resourced in terms of personnel and infrastructure. The NDMC provides guidance in this regard, by setting out the minimum standards required for setting up a Disaster Management Centre (The National Disaster Management Centre, 2008).

The Head of the Municipal Disaster Management Centre

In terms of section 45(1) of the Act, the municipal council must appoint a suitably qualified person as head of the municipal Disaster Management Centre. The appointment is subject to the applicable provisions of the Local Government: Municipal Systems Act No. 32 of 2000 (known as the Systems Act). The Head of the Centre should be appointed/situated at senior management level.

The head of FDDM Disaster Management Centre is responsible for the functioning of the Disaster Management Centre and the exertion of its powers and the performance of its duties. In this regard, the head takes all the decisions of the centre, except decisions taken by another person as a result of a delegation by the Head of the Centre. The head performs the functions of office in accordance with section 44 of the Act.

The Head of the Centre performs the functions of office

- In accordance with the National Disaster Management Framework and the key responsibilities prescribed in the National Disaster Management Framework
- In accordance with the Disaster Management Policy Framework of the Free State Province
- subject to the municipal council's IDP and other directions of the council
- In accordance with the administrative instructions of the Municipal Manager

Delegation or assignment of the powers of the Head of the Centre

The Head of the Centre may, in writing, delegate any of the powers or assign any of the duties entrusted to the municipal centre in terms of the Act to a member of staff of the Municipal

Disaster Management Centre. The District Municipal Manager must give effect to such delegation or assignment of powers. Such delegation is, however, subject to limitations or conditions that the Head of the Centre may impose. Such delegation or assignment does not divest the head of the Municipal Disaster Management Centre of the responsibility concerning the exercise of the delegated power or the performance of the assigned duty.

The Head of The Municipal Disaster Management Centre may confirm, vary or revoke any decision taken in consequence of a delegation or assignment, but no such variation or revocation of a decision may detract from any rights that may have accrued as a result of such a decision.

Capacity Requirements

Section 43 of the Disaster Management Act of 2002, as amended, requires that;

- (1) Each metropolitan and each district municipality must establish in its administration a disaster management centre for its municipal area.
- (2) A district municipality—
 - (a) Must establish its disaster management centre after consultation with the local municipalities within its area; and
 - (b) May operate such centres in partnership with those local municipalities.
- (3) A local municipality must establish capacity for the development and coordination of a disaster management plan and the implementation of a disaster management function for the municipality which forms part of the disaster management plan as approved by the relevant municipal disaster management centre.
- (4) A local municipality may establish a disaster management centre in consultation with the relevant district municipality in accordance with the terms set out in a service level agreement between the two parties, in alignment with national norms and standards.”

3.4 The strengths, weaknesses, opportunities and threats (SWOT) analysis for disaster management in Fezile Dabi District Municipality are illustrated in the table below.

Table 4: FDDM SWOT Analysis

SWOT Analysis	
STRENGTHS	THREATS
• Good working relationships between the District, Local Municipalities, PDMC (Provincial Disaster Management Centre) and SALGA • Support to comply with legislative requirements for Disaster Management. • Support locals with risk reduction and climate change projects	• Limited of resources • Roles and responsibility conflict within the local municipalities
WEAKNESSES	OPPORTUNITIES

• Minimal opportunities are created for personal and institutional growth. • The focus is on response and not on prevention • Communication in the district is not good • The Disaster Management Centres is not well established • Organisational placement of disaster management function • Minimal funding	• Create for personal and institutional growth • Increase focus on prevention and mitigation • Communication needs to be revised and updated • Increase equipment and resources • Filling of vacancies with Disaster Management QUALIFIED personnel
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3.5 Joint Operations Centre (JOC)

The Joint Operations Centre establishes a platform to manage multi-disciplinary /multi-dimensional responses to a major emergency/disaster. The aim is to provide an appropriate operational environment within which all agencies can function and make decisions in a cooperative manner. This allows for strategic decision-makers to stay informed of developments, manage deployments and resources on a prioritised basis. This in turn allows for the recognition of changing dynamics of a multi-faceted incident and allows for a seamless shift in control/coordination of the associated response activities from one agency to another depending on the most important remedial focus at any given time.

The Head of the Centre must establish mechanisms to ensure integration and joint standards of practice in the execution of disaster management policy throughout the District linked with neighbouring municipalities. The District Disaster Management Centre will constantly liaise with the local and neighbouring municipalities in disaster risk reduction and planning efforts.

3.6 FDDM Disaster Management Advisory Forums (DMAF)

3.6.1 Purpose

Section 44(1) (b) of the Disaster Management Act No. 57 of 2002 (Act) calls for an integrated and coordinated approach to disaster management in municipal areas. To make provision for the integration and coordination of disaster management activities and to give effect to the principle of co-operative governance in the FDDM the municipal council has established a Disaster Management Advisory Forum (DMAF) that sits quarterly a year. Section 51 of the Act makes provision for the establishment of such a forum.

3.6.2 Legislative Requirements

Management and administration

The Disaster Management Advisory Forum is chaired by the Head of the Centre. The Disaster Management Centre provides the secretariat for the forum and ensures that accurate records of the activities of the forum are maintained.

3.6.3 Composition of the Disaster Management Advisory Forum (DMAF)

The forum must comprise all the relevant stakeholders and role players in disaster management in the municipality, including non-governmental and community-based organisations, individuals or groups with special technical expertise, representatives of the local municipalities in the district and representatives of neighbouring district municipalities. A detailed terms of reference for the functioning of the DMAF was signed and approved. This stipulated items such as frequency of meetings, membership and other matters related to the functioning of the Advisory Forum.

3.6.4 Current Status of the forum

The Disaster Management Advisory Forum is active and meets at least once every quarter. The members of the forum consist of representatives from:

- Fezile Dabi District Municipality Disaster Management Centre
- Fezile Dabi District Municipality Interdepartmental Committee
- Local Municipalities Disaster Management Centres (Moqhaka, Metsimaholo, Mafube & Ngwathe)
- Free State Provincial Disaster Management Centre
- Local Municipalities Fire & Rescue Services (Moqhaka, Metsimaholo, Mafube & Ngwathe)
- South African Weather Services
- FS UMBRELLA Fire Protection Association (FPA)
- Red Cross Society
- Emergency Medical Services
- Department of Rural Development and Land Reform (DRDAR)
- South African Police Services (SAPS)
- South African National Defence Force (SANDF)
- Department of Health
- Department of Human Settlements
- Department of Social Development
- SASSA
- Department of Home Affairs
- Department of Public Works
- Department of Education
- Neighbouring Municipalities

3.6.5 Volunteer Unit

FDDM does not have a disaster management volunteer unit but make use of the local municipalities' units which exists in compliance with the National Regulations. The management, requirements and processes relating to volunteers are in accordance with the Act, its regulations and the National Disaster Management Framework. Different categories of volunteer units, as envisaged by the National Disaster Management Framework, will be established. The National Regulations pertaining to volunteers is utilised as the basis for the

management of the unit. FDDM has assisted in training of these volunteers from the different municipalities.

3.6.6 Technical Task Teams /Technical Advisory Committee

When an event is not a disaster, but Disaster Management still plays a significant role it is advisable to consider the establishment of a Technical Task Team to resolve that specific event. This in effect encourages multi-disciplinary responses to multi-faceted events. A Technical Task Team may also be appointed by the municipal Disaster Management Centre prior to commissioning any disaster management projects for the municipality as and when required. The purpose of the Technical Task Team is to provide scientific and technical advice, to monitor the progress of disaster management projects and to assist with the validation and/or interpretation of the findings.

In addition, any municipal department and/or municipal entity in the municipality or a department intending to commission disaster management projects for its functional area may appoint a technical advisory committee to provide scientific and technical advice, to monitor the progress of the disaster management project and to assist with the validation and/or interpretation of the findings.

A technical advisory committee must function and meet as required in accordance with predetermined terms of reference, which must be documented and submitted to the Fezile Dabi District Advisory Forum for approval before being formally adopted by a technical advisory committee. The relevant departments and municipal entities in the municipality must, in consultation with the Fezile Dabi District Advisory Forum to determine the intervals at which disaster management implementation for their functional areas should be reviewed. It is advisable that all proposed disaster management projects planned by departments and municipal entities in the municipality be submitted to the Fezile Dabi District Advisory Forum. In order to ensure that projects are integrated across departments and also accessed from a sustainable development viewpoint.

3.6.7 Ward Structures

The existing ward structures and ward-committee meetings are utilised for implementing disaster risk reduction at the ground level. Disaster management must be an agenda point of ward committee meetings.

3.6.8 Assignment of Responsibilities

Working together with various structures FDDM is able to perform main responsibilities of disaster management at different structures at the Municipal level, with regard to disaster management efforts.

Specific Roles and Responsibilities for Municipal Departments and Organs of State

The following general responsibilities pertain to all municipal departments of the FDDM and each of its local Municipalities. These general responsibilities are the minimum requirements

in order to give effect to the Disaster Management Plan. It should however be noted that these lists are not exhaustive and serve as a guide for departments to take their own initiatives.

The district's main stakeholders in disaster management and their primary responsibilities are summarised in the table below:

Table 5: Primary responsibilities of stakeholders

STAKEHOLDER	PRIMARY ROLES AND RESPONSIBILITIES
The Municipal Council	The Municipal Council declares a state of disaster and receives and considers reports with regard to disaster risk management.
The Municipality's Municipal Manager	The Municipal Manager is overall responsible for governance in the Municipality, including effective disaster risk management.
The Municipality's Disaster Management Function	The Disaster Management Functions are overall disaster risk management and coordination, as per section 44 of the Disaster Management Act. Each Municipal Organ of State (which implies each Municipality Department and each Municipal Entity), will complete its own disaster management plan, to be incorporated into the Municipality's Municipal Disaster Management Plan.
Fire, Protection and Emergency Management Services	Assist with disaster risk reduction, implementation and co-operation.
The Disaster Management Volunteers	The formal, trained volunteer unit assists Disaster Management in their functions
The residents and communities affected	Assist with disaster risk reduction and cooperation.
The Ward Councillors	The Ward Councillors assist with community liaison.
The Community Leaders	The Community Leaders assist with community liaison.
Fire Protection Associations	Disaster risk reduction, response and co-operation
Non-Governmental Organisations (NGOs) and Community Based Organisations (CBO's)	The NGOs and CBO's assists with disaster risk reduction and cooperation. Note: The nearest Red Cross Branch
Private sector and industry	Assist with disaster risk reduction and cooperation.
Health Care	Assisting with prevention/mitigation, response and recovery actions. Treating and transporting of patients.
FDDM Corporate Support Services and Financial Services	Assisting with administration, legal advice and funding.

Communication & Public Participation and Community Services	Assisting the disaster management function with communication and awareness.
Environmental Health & Emergency Services, and Infrastructure & Technical Services	Assisting with prevention/mitigation, response and recovery actions.
The South African Police Service	Assisting with prevention/mitigation and response actions. Public safety and crime prevention
South African Weather Service	Forecasting and issuing of severe weather warnings, including heavy rain, flash flooding, severe thunder, strong winds and conditions where severe veld fires are possible.
National Disaster Management Centre	National guidance and policy and institutional support to Province and Municipality on disaster risk management
Provincial Disaster Management Centre	Provincial guidance, policy and institutional support to Municipality on disaster risk management
Department of Forestry, Fisheries and Environment (DFFE)	Draft disaster management plans, relevant to the DFFE Implement drought and forest fire and fishery-related disaster risk management and report on disaster risk management and disaster risk reduction activities
Department of Social Development	Draft disaster management plans, involving the Department of Social Development Manage disaster relief Annual reports generated by the national Department of Social Development and its provincial counterparts must include an account of the number of households receiving social relief assistance.
Department of Local Economic, Tourism and Environmental Affairs	Draft disaster management plans, involving the Department of Environmental Affairs. Environmental management and impact assessments. Assisting with prevention/mitigation, response and recovery actions.
The Department of Foreign Affairs	The lead national department is responsible for promoting and facilitating South Africa's role in international cooperation in disaster risk management. It must, in liaison with the National Disaster Management Centre and the relevant organs of state, forge links with national agencies that render relief assistance internationally, as well as with international agencies, organisations and institutions involved in disaster risk management

Department of Cooperative Governance, Human Settlement and Traditional Affairs	Assisting with prevention/mitigation, response and recovery actions. Provision of emergency shelter.
Department of Health	Managing provincial hospitals and ambulance services and emergency medical care
Department of Education	Disaster Management education and awareness. Facilities could serve as an emergency shelter or housing
Department of Justice	A key area for the Department of Justice and Constitutional Development will be to deal with all criminal cases in a fast and efficient way, especially where foreigners are involved.
Department of Home Affairs	Immigration Response

3.6.9 Cross Border Arrangements

FDDM shares borders with various districts and provinces therefore Disaster Management Centre constantly liaise with those neighbouring municipalities in disaster risk reduction and planning efforts. The Memorandum of Understanding was signed by these municipalities but was not specific for Disaster Risk Management therefore it is necessary to unlock those MOUs.

The following principles will be applicable to all stakeholders in disaster management in FDDM;

- Detailed disaster management planning, prevention, mitigation, response and recovery-related actions will be executed by all relevant institutions and stakeholders/role players in FDDM though applying the principles and requirements as foreseen by the Act, the National Disaster Management Framework, Provincial Disaster Management Framework, and this Plan.
- Mutual Aid Agreements will be signed between relevant stakeholders.
- The principles of co-operation, effective communication and information management, reporting and alignment (joint standards of practice) of planning and implementation on disaster management will at all times be adhered to by all institutions, stakeholders and role players.
- Disaster management information and communication will be systematically coordinated and aligned throughout the FDDM to ensure effective information management on a common platform.
- Training, capacity building and research on disaster management will continually be executed at all levels of government, FDDM will strive to complement this process whenever possible.
- The involvement and co-operation of non-governmental role players and historical information, to be inter alia gathered through indigenous knowledge, is of paramount importance. Traditional leaders will be properly consulted and informed regarding disaster management initiatives in their areas.
- The local disaster management function will execute detailed research; obtain all required technical advice and inputs required and guide and monitor disaster

management implementation, co-operation, communication and information dissemination in FDDM.

Chapter 4: Disaster Risk Assessment

(KPA 2)

Disaster Risk Assessment (DRA) is the process of identifying, analysing, and evaluating potential hazards, vulnerabilities, and exposure to determine the likelihood and impact of disasters on people, infrastructure, and the environment. It helps in developing strategies to reduce risks and enhance preparedness, response, and recovery efforts. Regular disaster risk assessments help communities and governments build resilience and reduce the impact of future disasters. Key Components of Disaster Risk Assessment:

1. Hazard Identification – Understanding the types of natural or human-made hazards (e.g., floods, earthquakes, fires, or industrial accidents) that could occur in a specific area.
2. Vulnerability Analysis – Assessing weaknesses in communities, infrastructure, and systems that could increase the impact of a disaster. This includes social, economic, and physical vulnerabilities.
3. Exposure Assessment – Determining which people, assets, and critical infrastructure are at risk from identified hazards.
4. Risk Analysis – Estimating the potential frequency, severity, and consequences of disasters by combining hazard, vulnerability, and exposure data.
5. Risk Evaluation – Comparing identified risks against acceptable levels of risk to prioritize disaster prevention and mitigation measures.

Purpose of Disaster Risk Assessment:

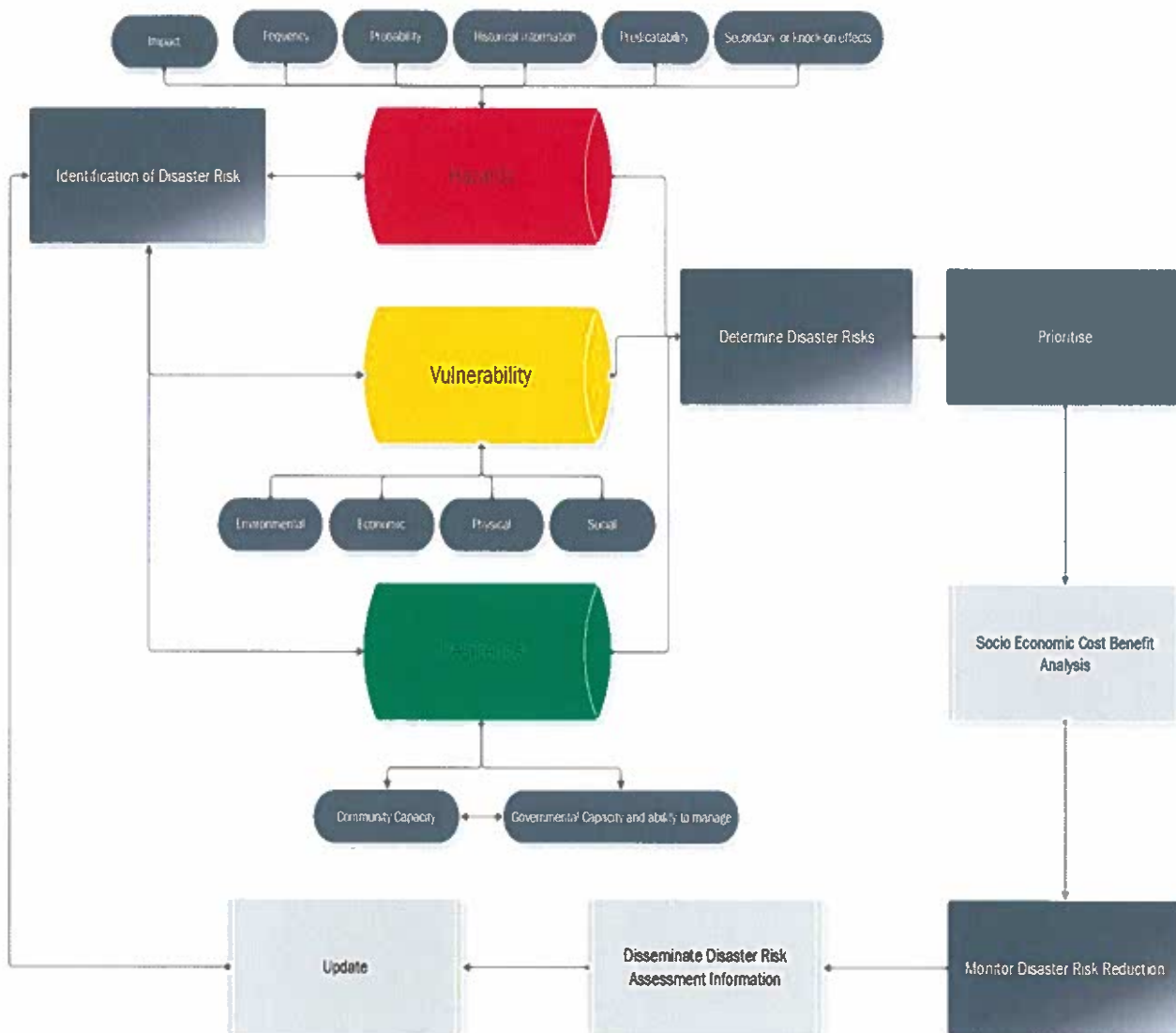
- Enhances disaster preparedness and response planning.
- Helps in making informed decisions for land-use planning and infrastructure development.
- Reduces economic losses and protects lives and livelihoods.
- Supports policy-making and resource allocation for disaster risk reduction (DRR).

FDDM has recently been assisted with a scientific risk profiling by SALGA in 2024 with an aim of the profile to review the Disaster Risk Management Plan. In the assessment, the following Key Disaster Risks Identified;

- Floods – Primarily affecting low-lying areas and settlements along rivers.
- Fires – Wildfires and structural fires posing threats to communities and infrastructure.
- Accidents – High traffic volumes leading to road and industrial accidents.
- Windstorms – Extreme weather events causing property damage and infrastructure disruptions.
- Drought – Water shortages impacting agriculture and livelihoods.
- Chemical Spillages – Industrial and transportation-related hazardous material incidents.
- Climate Change-Related Incidents – Increasing severity and frequency of extreme weather conditions.

Disaster risk assessments in FDDM is executed as prescribed by the National Disaster Management Framework, summarised below;

Figure 26: Basic Stages of Disaster Risk Assessment



The Risk assessment includes a **Hazard identification**, **risk profiling assessment** and a **risk prioritisation** for the District, involving the following action steps:

- **Step 1 ~ Information collection:** Information regarding hazards must be collected.
- **Step 2 ~ Hazard Assessment:** Once the basic data for an area, such as the forecast, has been collected, the **potential hazards** for the area must be assessed. The various hazards are generally grouped into a range of categories, called a **Hazard Classification**.
- **Step 3 ~ Risk Profiling Assessment:** The Risk Profiling Assessment will take this a step further, to identify which communities or societies are vulnerable to what hazards (or risks).

- **Step 4 ~ Risk Prioritisation:** The Risk Profiling Assessment normally produces so many risks that must be addressed that the sheer volume of work tends to be overwhelming. Consequently, it is recommended that you prioritise the risks to be addressed.

Hazard Quantification- hazards are quantified in terms of:

Probability: The probability of a hazard occurring will be assessed and classified in three categories, namely;

Likely~ hazards in this category will have a very high probability of occurring (rating = 3)

Normal~ hazards in this category will have a normal probability of occurring (rating = 2)

Unlikely ~ hazards in this category will have an unlikely probability of occurring (rating = 1)

Severity: The severity of the hazard, should it occur, will be assessed and the hazards will be classified into the following three categories;

Extreme~ hazards in this category will hold extreme consequences to a community. (Rating = 3)

Moderate ~ hazards in this category will hold moderate consequences to a community. (Rating = 2)

Insignificant ~ hazards in this category will hold Insignificant consequences to a community. (Rating =1)

$$\text{Total Hazard Rating} = \text{Probability} \times \text{Severity}$$

Table 27 Hazard quantification

		Severity		
		Low	Medium	High
Probability	High	Medium risk	High risk	High risk
	Medium	Low risk	Medium risk	High risk
	Low	Low risk	Low risk	Medium risk

■ Low risk
 ■ Medium risk
 ■ High risk

Coping Capacity Quantification

This analysis focuses on determining the degree to which a community can intervene and manage the negative consequences of a hazard event. The following topics were covered to determine the degree to which a community can intervene and manage the negative consequences of a hazard event:

- **Awareness:** The over-all awareness of people living in a potential impact area of a hazard to that hazard is one of the factors that determine the risk manageability of a community. Rate the awareness of people in the primary impact area of a hazard to that particular hazard on a three-point scale (good = 3; modest = 2; poor = 1).
- **Legislative Framework:** The legislative framework that governs a particular hazard event is one of the factors that determine the risk manageability of a community. Rate the legislative framework of a hazard occurrence on a three-point scale.
- **Early Warning Systems:** Rate the early warning system for a hazard event on a three-point scale.
- **Government Response:** Rate the response of your municipality and the provincial government to a hazard event on a three-point scale.
- **Government Resources:** Rate the resources available to your municipality and the provincial government for a hazard event on a three point scale.
- **Existing Risk Reduction Measures:** Rate the existing risk reduction measures of the municipality and the provincial government to a hazard event on a three-point scale
- **Public Participation Measures:** Rate the existing public participation measures of the municipality and the provincial government to a hazard event on a three-point scale.
- **Municipal Management Capabilities:** Rate the over-all management capability of the municipality for a hazard event on a three-point scale. A simple mathematical model (formula given below) can be utilised to quantify the degree to which a community can intervene and manage the negative consequences of a hazard event:
- **Coping Capacity Score ≥ 18 :** Should the risk manageability score of a particular hazard event impacting on a community be higher than 18 that community has a very *high* level of manageability and it is unlikely that the hazard event will impact negatively on the community.
- **$8 < \text{Coping Capacity Score} < 18$:** If the risk manageability score of a particular hazard event impacting on a community is between 8 and 18, that community has a *modest* level of manageability and it is likely that the hazard event will impact negatively on the community.
- **Coping Capacity Score ≤ 8 :** Risk manageability scores of a particular hazard event impacting on a community lower than 8 accounts for a community with a *poor* level of manageability and it is highly likely that the hazard event will impact negatively on the community.

Vulnerability Quantification

The ISDR defines vulnerability as the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Vulnerability is an intrinsic predisposition to be affected by or to be susceptible to damage due to the impact of a hazard. To enable risk quantification the Vulnerabilities of the area should be calculated. The model assesses environmental, economic, societal and critical facilities (political and legal vulnerabilities may also be assessed). The following scoring is used:

1= not vulnerable

2= moderately vulnerable

3=extremely vulnerable

These scores are captured during the consultative process by analysing each hazard and assigning a score for each vulnerability component associated with the hazard. A total vulnerability score (VT), which is the sum of the Environmental (VENV), economical (VEC), societal (VS) and critical facility (VCF) vulnerabilities can then be calculated for each hazard. These scores are then finalised using information gathered through the desktop analysis.

$$VT = VENV + VEC + VS + VCF (+VL + VP)$$

10 ≥ Vulnerability score ≥ 12: Should the vulnerability score of a particular hazard event impacting on a community be higher than or equal to 10, that community is extremely vulnerable to that hazard.

7 ≥ Vulnerability score ≥ 9: Should the vulnerability score of a particular hazard event impacting on a community be between or equal to 7 and 9, the community is moderately vulnerable.

Vulnerability score < 9: Should the vulnerability score of a particular hazard event impacting on a community be less than 7, the vulnerability is considered to be low.

Relative Risk Priorities

To ensure that all the parameters (Hazard Score; Vulnerability Score; Coping Capacity Score) required for calculating risk were equally weighted, all their respective scores were reclassified and rated from 1 to 3.

Calculate Relative Risk Priorities: The following simple mathematical model was used to calculate the relative priorities of the risks to which the communities in each region are exposed:

$$\text{Relative Risk Priority Score} = \text{Hazard rating} \times \text{Vulnerability rating} / \text{Capacity to Cope Score}$$

Extremely High Risks (Relative Risk Priority ≥ 7): Should the relative risk priority of a particular hazard event impacting on a community be higher than or equal to 7, that community faces a potentially destructive risk with a high probability of occurrence, for which they are

unprepared. This combination equates to an extremely high risk and is a disaster in the making. For these extremely high risks you must prepare urgent risk reduction interventions.

High Risks ($4.5 \leq \text{Relative Risk Priority} < 7$): If the relative risk priority of a particular hazard event impacting on a community is between 4.5 and 7, the risks to which these communities are exposed are potentially destructive, but the community is modestly prepared for the hazard event occurrence. This combination equates to a high risk and you must prepare a combination of risk reduction interventions and preparedness plans for these risks.

Tolerable Risks ($2 \leq \text{Relative Risk Priority} < 4.5$): Relative risk priorities of a particular hazard event impacting on a community between 2 and lower than 4.5 translate into an acceptable risk for a largely prepared community. This combination equates to a tolerable risk and you must prepare preparedness plans for these risks

Low Risks ($\text{Relative Risk Priority} < 2$): Relative risk priorities of a particular hazard event impacting on a community lower than 2 translate into a very small risk for a largely prepared community. This combination equates to a low risk and any hazard preparedness plans are sufficient for these risks

Information collection

This phase requires that all available data and information relating possible disasters in the area are collected. This should be a continuous process, and should include taking note of (and later planning for) major events that may occur in the area, such a major political gathering, elections, a major sports event or an outbreak of a non-endemic disease. Information is mainly collected through a desktop research process.

Some of the data used in hazard assessment include:

- Indigenous knowledge
- River data from DWS (Catchment Management Agencies)
- Road data
- Demarcation data from Demarcation Board
- Cadastral data from Surveyor General
- The Environmental Potential Atlas- The environmental character maps depict geology, land types, soils, vegetation, and hydrology. The socio-economic factors consist of land cover, cadastral aspects and infrastructure, land use and culture.
- Town and settlement data
- Secondary information from various reports and other relevant sources.

The methodology used to identify hazards, map it, show and calculate vulnerability, calculate risk and prioritise hazards and create hazard and risk profile are as follows:

- Use indigenous knowledge captured during workshops to informed hazard identification and map it;

- Conduct hazard analysis using GIS techniques to identify and map hazards- For example during workshops roads were identified on which hazmat are transported. These roads were identified in available GIS data and mapped.

Hazard Identification

The following steps were taken to assess potential hazards for Fezile Dabi District:

- Conduct workshops and interviews to collect relevant data and information;
- Analyse secondary sources of data to identify possible hazards;
- Transfer identified data and information regarding hazards to a GIS database;
- Use GIS techniques to do hazard assessment;
- Compile district maps to visualise the identified hazards and
- Create a GIS database of identified hazards.

The following tables represent information that was gathered from the mentioned workshops and previous reports regarding disaster risk assessments that were done for the district and its local municipalities. Table 6 shows the hazards identified in Metsimaholo Local Municipality. It includes the hazard category, hazard and the possible affected area in the municipality.

Table 6: Hazards identified in Metsimaholo Local Municipality

Hazard Category	Hazard	Affected Area
Hydro-meteorological	Severe storms	Whole Area
	Floods	Iraq phase 5, Amelia
	Drought	Whole Area
Biological	Mist	R59, Escort road, R57
	Veld fires/wild fires	Whole Municipality, Rural areas, R57, R59, R82, Denysville
	Epidemics	Whole area
Geological	Subsidence, sink holes	R59 to Parys
Technological	Road accidents	All roads
	Fire structural (formal settlement)	Whole area
	Fire structural (informal settlement)	Informal settlements area
	Structural collapse (failure)	Whole area
	HAZMAT (fire/spill/leak/explosion)	Sasolburg
	HAZMAT (spill) road	All roads
	Dangerous electrical connections	Whole area
	Dam failure/transfer tunnel failure	Orangeville
	Sewerage and drainage	Informal Settlements, Harrygwala, Refengkgotso, Zamdela, Metsimaholo

	Hospitals and clinics (staffing)	Hospitals and clinics
	Solid waste disposal and refuse removal services	Whole area
	Storm water	Whole area
Environmental	Surface Water pollution /eutrophication	Water sources
	Air pollution/ Smoke	Whole municipality
	Land degradation	Location & town
	Asbestosis	Zamdela
Other	Civil unrest	Whole municipality

Table 7 shows the hazards identified in Moqhaka Local Municipality. It includes the hazard category, hazard and the possible affected area in the municipality

Table 7: Hazards identified in Moqhaka Local Municipality

Hazard Category	Hazard
Hydro-meteorological	Severe storms
	Floods
	Drought
Biological	Veld fires/wildfires
	Human epidemic disease
	Animal epidemic disease
Geological	Subsidence
Technological	Road incidents
	Pipeline
	Fire structural (formal settlement)
	Fire structural (informal settlement)
	Structural collapse (failure)
	HAZMAT (fire/spill/leak/explosion)
	HAZMAT (spill) road
	Dangerous electrical connections
	Dam failure/transfer tunnel failure
	Sewerage and drainage
Environmental	Surface water pollution
	Air pollution
	Land degradation

Table 8 shows the hazards identified in Ngwathe Local Municipality. It includes the hazard category, hazard and the possible affected area in the municipality

Table 8: Hazards identified in Ngwathe Local Municipality

Hazard Category	Hazard
Hydro-meteorological	Floods
	Drought
	Storms
Environmental	Land degradation

	Surface water pollution
	Air pollution
Biological	Veld fires/wild fires
	Epidemics
Geological	Sinkholes
Technological	HAZMAT (spill) road
	HAZMAT fire/spill/leak/explosions
	Pipelines
	Fire structural (formal settlement)
	Fire structural (informal settlement)
	Road incidents
	Dangerous electrical connections
	Dam failure/transfer tunnel failure
	Sewerage and drainage
Other	Civil unrest

Table 9 shows the hazards identified in Mafube Local Municipality. It includes the hazard category, hazard and the possible affected area in the municipality

Table 9: Hazards identified in Mafube Local Municipality

Hazard Category	Hazard
Hydro-meteorological	Floods
	Drought
	Storms
Environmental	Land degradation
	Surface water pollution
	Air pollution
Biological	Veld fires/wild fires
	Epidemics
Geological	Sinkholes
Technological	HAZMAT (spill) road
	HAZMAT fire/spill/leak/explosions
	Pipelines
	Fire structural (formal settlement)
	Fire structural (informal settlement)
	Road incidents
	Dangerous electrical connections
	Dam failure/transfer tunnel failure
	Sewerage and drainage
Other	Civil unrest

Risk Profiling Assessment

As discussed in sections above, the hazard, vulnerability and capacity to cope were assessed. The identified hazards were scored regarding probability and severity, vulnerability were scored regarding societal, economic, environment and critical facilities indicators. Capacity to

cope were scored with indicators amongst others early warning and existing risk reduction measures.

Description and mapping of Hazards

Natural Hazards

Hydro-meteorological hazards

Hydro-meteorological hazards is a wide variety of meteorological, hydrological and climate phenomena that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. This type of hazard refers to drought, thunderstorms, hailstorms, tornados, sand storms, and coastal storm surges, floods including flash floods, drought, heat waves and cold spells.

Floods

A flood is defined as the temporary inundation of normally dry land areas resulting from the overflowing of the natural or artificial confines of a river or other body of water, including groundwater (Lemeko M, 2011). Flooding occurs due to various contributing factors which form part of a complicated and integrated system. The following factors contribute to flooding events: Rapid urbanisation; Flow restrictions; inappropriate canalisation, inappropriate revetments; deteriorating water quality, uncontrolled floodplain in-filling; and Inappropriate land use.

A flood is a normal event for any river or stream that could occur over a period of time varying from several times a year to once in a few hundred years. Floods are caused when excess water from heavy rainfall, snowmelt or storm surge accumulates and overflows the river or stream's normal path onto its banks and adjacent floodplains. Several factors determine the severity of floods, including rainfall intensity and duration. A large amount of rainfall in a short time span can cause flash flooding. A small amount of rain can also cause flooding if the soil is saturated from a previous wet period, or if the rain is concentrated in areas where the surface is impermeable such as developed areas where most of the surface is covered with concrete, tar and other building materials (FEMA, 1999).

Severe Storms (hail and snow)

Severe storms are atmospheric disturbances usually characterized by a strong winds, frequently combined with rain, snow, sleet, hail, ice, and thunder and lightning. This includes unusual weather disturbances such as tornadoes, hurricanes, flash flooding or waterspouts⁵. The resulting hazards affect social and economic infrastructure and livelihoods, as well as impacting the natural environment and sensitive ecosystems.

Biological hazards

Biological hazards are naturally occurring substances such as bacteria and moulds or animals such as insects that are able to cause illness in humans and animals, although, as per the National Disaster Management Framework (Act 57 of 2002), veld fires have also been classified as biological hazards.

Animal diseases

Foot and Mouth Disease

Foot and Mouth Disease (FMD) is a highly contagious virus that affects cloven-hooved animals, such as cattle, pigs, sheep and antelope and the disease does not affect humans.

African swine fever (ASF)

African Swine Fever (ASF) should not be confused with swine flu. It's endemic to Sub-Saharan Africa and affects only pigs and cannot be transferred to humans. ASF is a serious viral disease of pigs and is highly contagious, and can spread very rapidly in pig populations by direct or indirect transmission or within a tick vector. This virus can persist for long periods in pig products and the environment.

Rabies (animals)

This sudden spread of rabies in dog populations can be attributed to a rapid spatial and numerical extension of human settlements and associated dog demographics. The increase in the spread and the speed of rabies in dog populations shows that rabies continues to pose a definite public health threat in South Africa.

Human diseases

The municipality experiences an easy proliferation of contagious diseases such as HIV/Aids, COVID 19 and cholera. Human endemic diseases are the impairment of the normal state of a human being that interrupts or modifies its vital functions, affecting a disproportionately large number of people.

Veld fire risk

A veld, forest of mountain fire, is where 'veld' means the open countryside beyond the urban limit or homestead boundary. Veld fires are defined as a fire of any size that occurred in fynbos or other natural veld, plantations, crops, or invasive vegetation outside a built-up area⁷. The Department of Forestry has classified each metropole and local municipality according to classes of veld fire risk, as a national framework for the implementation of the National Veld and Forest Fire Acts. The risk assessment follows the international standard, as adapted for South Africa. The classification is therefore preliminary, but is intended to serve as a working guide until further research improves the assessment in due course.

The risk classification is based upon available ecological information on the prevailing natural vegetation and readily available reports on the incidence, behaviour and consequence of veld fires. For each kind of vegetation the likelihood of veld fires occurring in that vegetation, and the consequences that arise in modern times when such veld fires occur was established. This combination of likelihood and consequence allows the risk to be rated. Then, using geographical information, a risk class is assigned to each metropolis, municipality, or district management area. In South Africa, fire is important for many natural ecosystems such as fynbos, grasslands and savannah. Veld fires are part of the natural ecological processes in most parts of the country. In many areas, large veld fires occur without necessarily posing a threat to life, property or the environment. In such cases, they are not real or potential disasters.

Indigenous plant species are well adapted to fire and depend on the natural occurrence of fire for their survival. Lightning (also associated with severe storms) is a natural source of ignition in these areas. Prior to human occupation, the areas were ignited by lightning strikes that reached the ground

Geological hazards

A geological hazard is caused by geological conditions that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Geological hazards include internal earth processes, such as earthquakes and related geophysical processes such as mass movements, landslides, rockslides, surface collapses, and debris or mud flows.

Sinkholes

To identify sinkholes, the assumption was made that those areas where dolomite is, can be at risk for sinkholes.

Technological Hazards

Technological hazards are defined as danger originating from technological or industrial accidents, dangerous procedures or certain human activities, which may cause the loss of life or injury, property damage, social and economic degradation.

Hazardous material transportation

During the workshops and as identified in previous risk assessments, roads were identified on which hazardous material are transported.

Hazmat Facilities

HAZMAT facilities were identified from data acquired during the previous disaster management project. The facilities includes the Sasol Plant, chemical industries and fuel and gas depots were map. These were mainly in Metsimaholo and Moqhaka.

Pipelines/Servitudes

Transnet Pipelines is a division of Transnet SOC Ltd (South Africa's state-owned freight and logistics company), responsible for transporting petroleum products through a national network of pipelines. Many of these pipelines pass near or through residential communities, posing potential risks if not properly monitored and maintained. It is clear from discussions with the Fezile Dabi Disaster Management Advisory Forum that this pipeline network can be risk. The proximity of fuel pipelines to communities poses significant safety, environmental, and public health risks. This makes collaboration between Disaster Management Centres (DMCs) and entities like Transnet—which operates much of South Africa's fuel and gas pipeline infrastructure—essential. This is mainly because of the settlement near and sometimes on top of these networks. Transnet together with FDDM Disaster Management Centre mitigate this risk by intensive educational and awareness campaigns. The collaboration between FDDM Disaster Management Centre and Transnet is essential for safeguarding communities living

near pipelines. It ensures that potential disasters are prevented, prepared for, and effectively managed when they occur.

Rand Water Foundation

The Rand Water Foundation (RWF) is the corporate social investment (CSI) arm of Rand Water. Its work often focuses on; Community upliftment, Water and sanitation access, Environmental protection and Youth employment and skills training. The relationship between the Rand Water Foundation and FDDM Disaster Management Centre regarding water servitudes is important for ensuring water infrastructure safety, community protection, and resilience against water-related disasters. FDDM DMC is responsible for coordinating preparedness, response, and recovery in the event of disasters—including water infrastructure failures. The Rand Water Foundation and FDDM Disaster Management Centre both have crucial but complementary roles in managing risks related to water servitudes. A partnership between them can enhance community safety, infrastructure protection, and resilience to water-related disasters—especially in urban and semi-urban areas.

Transport accidents

Transport accidents in this context refer to an unexpected incident with potential for harm occurring through technological transport accidents. This form of disaster involves mechanised modes of transport. It comprises four disaster subsets: accidents involving air, boat, rail transport and motor vehicles on roads and tracks.

Vehicle Accidents

Factors contributing to the high fatality rate can often be attributed to higher travel exposure and poor injury recovery due to fast speeds and limited medical services in rural areas.

Fire structural (formal and informal)

Fire structural (formal) is when fire involves the structural components of various residential buildings ranging from single-family detached homes and townhouses to apartments and tower blocks, or various commercial buildings ranging from offices to shopping malls. A structural fire in an informal settlement involves the temporary dwellings. A critical issue within informal settlements relates to risk of fire: the higher the density of the settlements and poorer the quality of building materials the greater the risk. People living in informal settlements are vulnerable to the physical impacts of climate because of the current status of an already fragile economic structure that is sensitive to changes in climate as well as the low incomes that constrain their ability to adapt and their capacity to cope. Usually informal settlements are characterized by a dense proliferation of shelters built from diverse materials and they are located close to degraded local ecosystems. The nature of this set up makes the provision of basic services such as water, electricity and sanitation difficult roll out in a timely manner.

Dam Failure

Three dams were investigated: Vaal Dam, Koppies Dam and Bloemhoek Dam. Although the area which will be inundated if there is a dam wall failure cannot be identified through this

project, it is important to mention the possibility and identify possible affected areas and communities if such an event occur.

Service Delivery Failure or Disruption

Sewerage and Drainage

Water backlogs have a direct impact on sanitation, health and well-being. Poor road infrastructure limits access to areas so there is a lack of organised waste management systems. Many landowners rely on their own informal or communal dumps and this leads to increased numbers of illegal dumping and serious environmental hazards. Another challenge is the high level of the water table which is another factor which increases contamination from latrines.

Sewerage problems have been highlighted as a major hazard throughout the municipalities. The failure and lack of sewerage infrastructure has contributed to the outbreak of various water-borne diseases in the past. Sewage spills are contaminating the quality of safety of water.

Solid Waste Disposal and Refuse Removal Services

The municipalities faced with the challenge of the shortage of technical skills on developing their sanitation master plans. The municipalities are wrought with illegal dumping. Many households still have no refuse removal services and must rely on their own dump for this purpose. In many areas, waste collection equipment is inadequate and old vehicles that are being used are expensive to maintain. The poor road infrastructure in low-cost housing areas and informal settlements limit access to these areas, thereby rendering these areas largely without any refuse removal services.

Electricity Supply Disruption

The high demand for electricity is still a matter of great concern as the province is not adhering to the energy saving techniques that are continuously being taught by the Department of Minerals and Energy and Eskom. One of the major concerns is that some municipalities in the province are still struggling to settle their electricity bills from Eskom. The high increase of cable theft and other electrical equipment such as transformers is still a challenge that affects both Eskom and Local Municipalities.

Water Supply (rural/informal settlements)

The current water and sanitation infrastructure has exceeded its designed lifespan, making it difficult to manage, as well as operate and maintain assets. Ways of improving this were identified and includes upgrading the asset database, which currently contains poor and insufficient information, posing a challenge for operation and maintenance.

Air Pollution

Air pollution occurs when the air contains gases, dust, fumes or odour in harmful amounts. That is, amounts which could be harmful to the health or comfort of humans and animals or which could cause damage to plants and materials. The substances that cause air pollution are called pollutants. Both natural and anthropogenic sources of air pollution exist ranging from veld fires to industrial processes, agriculture, vegetation burning, mining activities, coal-fired

power stations, petrochemical plants, steelworks, discarded coal dumps and vehicle use. The high pressure system results in subsidence, causing clear skies and pronounced temperature inversions that keeps the air pollutants trapped in lower atmosphere contributing to increasingly poor air quality. A lack of control over saw dust from saw mills, pressure from paper and pulp industries, easily erodible mine tailings, fossil fuel emission are some of the contributing air pollutants.

Water pollution

Water pollution occurs when harmful substances — chemicals, sewage, industrial waste, plastics, or pathogens — contaminate water bodies such as rivers, dams, lakes, or groundwater. It becomes a disaster risk when it; disrupts drinking water supply, affects sanitation and hygiene, threatens aquatic life and agriculture, causes disease outbreaks (e.g., cholera, typhoid), and impacts economic activities like tourism and fishing. Water pollution is not only an environmental issue — it's also a disaster risk, especially when it threatens public health, ecosystems, or critical water infrastructure. FDDM Disaster Management Centre plays an essential role in preparing for, responding to, and mitigating the impact of water pollution incidents. FDDM Disaster Management Centre is responsible for coordinating prevention, preparedness, response, and recovery in case of water pollution-related disasters. Various sources can cause water pollution. These include domestic sources, mines and agricultural sources. Water pollution is a silent disaster with the potential for serious long-term harm. FDDM Disaster Management Centre must be proactive in anticipating, managing, and mitigating water pollution emergencies. Effective coordination, community involvement, and early response are critical to protecting lives, livelihoods, and ecosystems.

Mines

Natural or man-made geochemical alterations are also sources of wastewater pollution. Fines from ore washings disposed of in water suspension may be transferred to the natural water bodies to pollute them in due course. Mining operation also produces soluble toxic materials depending on the geological formation. Acid drainage from coal mines and arsenic residue from gold mines are some of the burning problems of environmental concern.

Domestic sources

Extensive use of unlined pit latrines and sewage spills are contaminating poses a potential health and environmental threat to the surface and ground water resources of the area. Waste dumping is another significant contributor to water pollution. Many households still have no refuse removal services and must rely on their own dump for this purpose. Most residents have resorted to dumping their waste into the rivers and along the roadside. When rainfall or runoff comes into contact with waste, polluted water leaches into the ground, contaminating both surface and groundwater sources. Water treatment is also important in ensuring the supply of potable water. Poor infrastructure, operation and maintenance of such facilities have further health risk implications. The important pollutants present are biodegradable organic matter, coliforms and pathogens. Settlements 2 Km from the rivers were selected using GIS techniques and the assumption was made that because of the vicinity of settlements near the river, the rivers can be polluted.

Agricultural sources

Pollutants discharged into water courses due to agricultural activities include:

- Soil and silt removed by erosion;
- Agricultural run-off;
- Synthetic fertilizers, herbicides and insecticides and
- Plant residue

Receiving water bodies get fertilised with nutrients, thus resulting in Eutrophication. Some common insecticides in use are chlorinated hydrocarbons such as DDT (dichloro diphenyl trichloroethane), aldrin, heptachlor, PCBs (polychlorinated biphenyl) etc. Most of the chlorinated hydrocarbons are persistent to degradation and hence remain in the environment for a very long time. Indiscriminate use of insecticides could make them an integral part of the biological, geological and chemical cycles of the earth. Measurable quantities of DDT residues may be found in air, soil and water several thousand kilometres away from the point where it originally entered the ecosystem. Subsistence farming is common practice, where livestock such as goats and cattle, roam the streets. This is typically referred to as urban farming. This type of farming has implications for health through direct exposure to faecal contamination and indirect contamination of water sources. The practice is unmonitored and is a cause for concern.

Land degradation

Environmental degradation is defined as the process induced by human behaviour and activities (sometimes combined with natural hazards), that damage the natural resource base or adversely alter natural processes or ecosystems. There are six main degradation processes that have been identified by Hoffman et al. (1999);

- Loss of cover: Largely as a result of grazing/overgrazing and trampling patterns caused by domestic livestock.
- Change in species composition: Vegetation cover is lost due to frequent removal, also often caused by the selective grazing of domestic animals.
- Bush encroachment: An increase in the cover of indigenous trees and shrubs.
- Alien plant invasion.
- Deforestation: The removal of trees and shrubs by people for energy or construction purposes.
- Other: There are many other types of environmental degradation, although those causing severe alteration to landscapes include the clearing of land for planting agricultural crops or open cast mining

A combination of factors of unsustainable agricultural practices, livestock production (over-cultivation, overgrazing, and deforestation), urbanization, and extreme weather events such as droughts and coastal surges accelerate land degradation globally and affect the biophysical environment. Land degradation includes a loss or change in vegetative cover, biodiversity and soil nutrients that threatens ecological processes, food security and livelihoods. Desertification is an associated process of land degradation. The 2002 “Social and Economic Conditions in Southern Africa Report” paints an alarming picture of how environmental degradation will

hinder much needed economic growth in the region, if not urgently addressed. The report highlights that the exploitation of the natural environment in pursuit of achieving economic growth and poverty alleviation, does not come without consequence- adversely effecting land, water and soil quality and availability, pollution, desertification and forest cover levels. In addition, overexploitation not only results in environmental degradation, but also worsens poverty conditions - counteracting the very goal economic growth aims to achieve.

Climate change

Climate change is a cross-boundary scientific reality that threatens the global community's shared carbon space. According to the IPCC and Statistics South Africa's results South Africa with an estimated population of 49.32 million will on average be 3.4°C degrees warmer in 2100. This implies that climate change is posing a serious risk to ecosystems, food security, economic development, disaster management and the realisation of sustainable development. It is against this backdrop that provincial and local governments are responsible for incorporating mandates that deliver on both climate change adaptation and mitigation measures into their respective policy frameworks, and to develop appropriate strategies for which they are legislatively responsible.

Chapter 5: Disaster Risk Reduction

(KPA 3)

This chapter ensures that organ of the state develops and implement integrated disaster risk management plans and risk reduction programmes in accordance with approved frameworks.

In terms of Section 26(g) of the Municipal Systems Act, 200, Act 32 of 2000, a Municipality's IDP must contain a disaster management plan. Development projects in the Municipality, as contained in the Municipality's IDP, is thus interlinked with disaster management planning and activities. Risk reduction projects identified as part of disaster risk management planning, such as those identified in this plan and the contingency plans and risk assessment should be included in the District and Local Municipal IDP's.

There are eight key planning points or requirements that must be applied by all municipal organs of state and municipalities when planning for disaster risk reduction initiatives. These must form part of the annual reporting of the municipalities and municipal organs of state to the FDDM Disaster Management Centre;

- a. Use the disaster risk assessment findings to focus planning efforts
- b. Establish an informed multidisciplinary team with the capacity to address identified disaster risks and identify a primary entity to facilitate the initiative
- c. Actively involve the communities or groups at risk
- d. Address identified vulnerabilities in the municipal area wherever possible
- e. Plan for changing risk conditions and uncertainty, including effects of climate variability
- f. Apply the precautionary principle to avoid inadvertently increasing disaster risk
- g. Avoid unintended consequences that undermine risk avoidance behaviour and ownership of disaster risk
- h. Establish clear goals and targets for disaster risk reduction initiatives, and link monitoring and evaluation criteria to initial disaster risk assessment findings.

Several hazard-specific risk reduction project proposals are included in the FDDM Disaster Risk Assessment

Table 10: Risk reduction project proposals

No	Hazard	Risk reduction project proposals
1	Flooding	1. Physical planning: poor physical planning causes the flooding but where adequate drainage channels are constructed and ongoing maintenance the problem of flooding reduces. 2. Engineering & Construction: engineering design and safety standards should be incorporated to assure the structural integrity of buildings.

		3. Economic Measures: address flood-related financial needs & investing in forecast-based financing of risk reduction and preparedness measures as climate changes might increase in the future. 4. Management & Institutional: in order to achieve ideal flood forecasting and warning systems, cooperation involving stakeholders is necessary. For example, SA Weather Services can provide specific advisory services to local communities establishing flood warning systems. 5. Societal Measures: traditional and indigenous practices of coping with floods are as important and vital as the modern approaches. Local knowledge approaches should be investigated as it is also the most valuable asset for flood management planning.
2	Drought	1. Physical planning: limit evaporation from swimming pools and other man-made water bodies through implementing appropriate physical planning measures and by-laws. Study and understand the impact of climate change on development. Promote awareness and cultivation of drought-resistant crops. Build proper storage and preservation facilities by agricultural produce. 2. Engineering & Construction: Monitor observation and production boreholes. Implement water pressure management systems to reduce water network losses. Finding and repairing underground water leaks (ongoing). 3. Economic Measures: address drought-related financial needs through operating budgets & forecast-based financing of risk reduction & preparedness measures. Introducing the stepped tariffs system of billing. Facilitate affordable and accessible insurance for emerging businesses and small-scale farming communities. 4. Management & Institutional Measures: appoint a drought task team with a focus on establishing a multidisciplinary team of stakeholders and securing partnerships. Establish clear drought planning purposes and objectives. 5. Societal Measures: capacitate rural & urban communities to identify areas where water losses and leakages can and do occur and provide an efficient reporting process. Develop awareness training and workshops in high-risk areas. Develop & inform communities of response actions to early warning systems.
4	Road Incident	1. Physical planning: looking into the possibility of introducing less safe travel choices. For example, rail has

		shown to be a more safe form of travelling than motorized modes of travelling. 2. Engineering & Construction measures: development of local road safety schemes that road safety engineers and urban designers can use in a wide range of measures to improve the safety of the road environment for all road users and to encourage increased use of streets as places that meet the needs of pedestrians, cyclists and public transport users. 3. Economic: Speed enforcement detection devices can be effective in reducing road traffic accidents (RTA's) and associated injuries. Appointing and training police for policing on roads can be a beneficial effect on road traffic facilities and crashes. 4. Management & Institutional measures: Introduce proper land use planning, residential, commercial and industrial policies to be enforced. Develop a Road Traffic Accidents Response Strategies. 5. Societal measures: enforce seat-belt wearing use as research has shown that seatbelts reduce the risk of death in a crash by approximately 60%. Safety education programmes for pedestrians. Driver training/ education programmes. Awareness, communication and collaboration are key to establishing and sustaining national road safety efforts.
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FDDM Disaster Management Centre must ensure that response and recovery plans and disaster risk reduction plans, programmes and projects are incorporated into IDP's, spatial development frameworks, environmental management plans and other strategic developmental plans and initiatives in the FDDM and in the local municipalities in the district

Strategic Approach to Disaster Risk Reduction

Strategic Disaster Risk Reduction- Disaster risk reduction, through proper planning and management, is the new key driving principle in disaster management.

Disaster risk reduction is the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. Disaster risk reduction is therefore part of disaster management but does not focus primarily on (although it does link with) disaster response and recovery. Disaster Risk Reduction should not be implemented in an isolated manner. It takes cognisance of international agreements and

guidelines. Disaster risk reduction is closely linked with sustainable development. Development projects should be informed by disaster risk reduction planning and activities. Disaster risk reduction is influenced by a number of factors (such as climate change, economic and regional growth and development, capacity to implement planning, etc.) and the municipality has to think carefully, and creatively about new ways to effectively reduce its disaster risks.

FDDM follows a priority strategic approach to disaster risk reduction. This strategy aims to achieve the following objectives:

- To establish and incorporate the foundational guiding arrangements for disaster risk reduction in FDDM
- To increase awareness and knowledge of disaster risk reduction methods and opportunities.
- To inform the legal and institutional basis for efficient disaster risk reduction planning and implementation.
- To contribute towards the inclusion of disaster risk reduction into development policy, programmes and projects.
- To establish a strategic platform for public-private-sector co-operation in disaster risk reduction.
- To contribute to community resilience against the threats and effects of disasters.

The success of this strategy will lie in its effective implementation and monitoring throughout the municipality. This can however only be achieved through cooperation and partnership between all stakeholders in disaster risk reduction. The following factors are important to ensure the effectiveness of implementing the strategic goals and initiatives:

- Political buy-in and support.
- Strategic leadership by management.
- Uniform standards are supported by national policy and legislation.
- Stakeholders and responsible agencies need to accept responsibility and be held accountable for neglecting responsibilities in terms of disaster risk reduction.
- Capacity and awareness at the local level.
- Appropriate systems and technologies.
- Private-sector support.
- Optimising the use of resources: Using fewer resources to achieve more.
- The involvement and co-operation of non-governmental role players and historical information, to be inter alia gathered through indigenous knowledge, is of paramount importance.
- The Disaster Management Centre must establish mechanisms to ensure integration and joint standards of practice in the execution of disaster management policy.

The following general principles guide the above goals;

- Enhance and support advocacy on disaster risk reduction.

- Work within current reality - optimising usage of existing resources and capacity, whilst awaiting additional funding and capacity, is very important.
- Plan proactively and not re-actively for disaster risk reduction.
- Adopt a more holistic approach to disaster risk reduction and building resilience. The 'silos should be broken' and all risk factors should be recognised and addressed holistically and in an integrated manner.
- Utilise the historic indigenous knowledge of the people when disaster risks are assessed.
- Utilise private sector advertisement funding to further disaster risk reduction advocacy and information sharing.
- Communities need to understand the benefits from contributing to disaster risk reduction and support disaster risk reduction initiatives: Disaster risk reduction can save their lives and property.
- Effective law enforcement is critical for disaster risk reduction.
- Communities should be active participants in disaster risk assessments and disaster risk reduction planning and programmes.
- Work, within the correct and sensitive protocols, with traditional leaders and Community-Based Organisations.
- Maintain a balance when assigning resources between proactive and reactive measures.
- Understand that national/regional programmes such as poverty reduction are mid to long-term goals, but disaster resilience should be built/enhanced within current reality as well. Poor and vulnerable people, communities and groups should be assisted to become more resilient within their current realities.
- Cross-cutting considerations such as gender (for example, the value of utilising women in disaster risk reduction), youth (sustainable disaster risk reduction starts with the children), people with disabilities, people with less access to facilities and risk transfer mechanisms such as insurance, must be taken cognisance of in disaster risk reduction planning and initiatives.
- Because disaster risks cannot be totally eliminated, the remaining economic risks need to be shared, spread or financed so that individual people, companies and communities are not forced into poverty or bankruptcy if a disastrous event occurs. Mechanisms for sharing or transferring risk are an important component of disaster risk reduction. At the national or district level, this can be achieved through the establishment of reserve funds, contingent credit arrangements, or the purchase of offshore insurance or disaster bonds. These usually require supporting arrangements at the international level through the private sector or multilateral banks. At a local level, the insurance industry can become a partner in disaster risk reduction and communities can be encouraged (through incentives agreed upon with insurance companies) to ensure themselves against loss.

In terms of Section 26(g) of the Municipal Systems Act, Act 32 of 2000, a Municipality's IDP must contain a disaster management plan. Development projects in the Municipality, as contained in the Municipality's IDP, is thus interlinked with disaster management planning and activities. Risk reduction projects identified as part of disaster management planning, such as

those identified in this plan and the contingency plans to be developed and risk assessments should be included in the FDDM and local Municipalities' IDPs. FDDM has defined strategic objectives in order to reach the overarching goal of developing more resilient communities in the FDDM Area. One of the objectives is to improve the capacity of Local Municipalities to provide a timely and appropriate response to disasters complex emergencies and other crises. The strategic objectives include the following;

- Assisting Local Municipalities with the development of fire services plans for their areas
- Assisting each Local Municipality with the implementation of its fire services plan by rendering support with;
 - Establishment of satellite fire stations in identified areas
 - recruitment of fire fighters, reservists and/or volunteers
 - Restoration of fire hydrants district-wide
 - Acquisition of fire/rescue vehicles, equipment and tools
 - Training of fire officers, fire fighters, reservists and volunteers.
- Lobbying for funding to assist local municipalities with implementation of their fire services plans
- Preparing business plans where necessary to secure funding
- Make the general public aware of the dangers of fires.

Protection of critical infrastructure

Critical infrastructure includes assets and networks, physical or virtual, which is essential for the functioning of a society and economy. This infrastructure is found in the following sectors/areas;

- Energy
- Communications
- Transportation
- Health Systems
- Public Safety and Security
- Public Administration
- Financial Sector
- Educational Systems
- Water and Sewerage
- Agriculture and Food
- Chemicals and Hazardous Materials

Critical infrastructure in the Municipality should be pro-actively protected and a critical infrastructure protection plan needs to be developed by the Municipality

Chapter 6: Preparedness Planning

This chapter ensures the effective and appropriate preparedness planning by implementing a uniform approach to the dissemination of early warnings and averting or reducing the potential impact in respecting of personal injury, health, loss of life, property, infrastructure, environments and government services through appropriate contingency plans.

Education, Training, Public Awareness and Research

Communication and stakeholder participation in disaster management in FDDM will be executed through a consultative process, education and public awareness, initiated by FDDM disaster management function. These processes will include the development of disaster management information leaflets, training programmes, media and local-level meetings with disaster management role players, including non-governmental institutions (to be preferably invited/co-opted on the local disaster management committee) and the local traditional and community leaders, schools, clinics and communities.

Although the main responsibility to plan for, ensure budgeting and executing education, training and research (and the publication and communication of the results thereof) are with FDDM disaster management function and Municipal departments, organs of state and municipal entities will also address these elements pro-actively. This will be coordinated through to FDDM Disaster Management function and the results communicated to the Free State Provincial Disaster Management Centre, National Disaster Management Centre and the FDDM Disaster Management Advisory Forum.

Training on disaster management in FDDM will be in accordance with the National Disaster Management Framework and National Guidelines in this regard. Training can be of an accredited or non-accredited nature. Practical, 'hands-on' training of FDDM and local municipal disaster management officials need to be executed to ensure that at least the following capabilities have been efficiently established in FDDM disaster management function:

- Public Awareness: Public Awareness is ongoing
- Education: to have brochures for disaster management for primary schools
- Training: training of staff on emergency evacuation
- Integrating all of the above into an effective FDDM Disaster Management operation.

Communication and stakeholder participation in disaster management in FDDM is executed through a consultative process, education and public awareness, initiated by FDDM disaster management function. These processes include the development of disaster management information leaflets, training programmes, media and local-level meetings with disaster management role players, including non-governmental institutions (to be preferably invited/co-opted on the local disaster management committee) and the local traditional and community leaders, schools, clinics and communities.

Disaster management actions and initiatives, such as a result of important meetings and new projects, will be communicated to the communities through the media or otherwise. FDDM Disaster Management, along with Provincial and Municipal organs of state and municipalities will also formulate and implement appropriate disaster management public awareness programmes that are aligned with the national disaster management public awareness strategy and will play an active part in engaging schools to ensure a practical approach to education and awareness programmes.

School-level disaster management awareness programmes in FDDM will be conducted, assessed and adapted on an annual basis. Community resilience-building is crucial, and a first capacity-building priority is the consultative development of a uniform approach to community-based risk assessment for municipalities and non-governmental and community-based organisations throughout FDDM this will contribute considerably to forge links between disaster risk reduction and development planning in disaster-prone areas and communities.

Information Management and Communication: (ENABLER 1)

FDDM will adhere to the Integrated Information Management and communication model as contained in the National Disaster Management Framework. Effective communication is paramount to effective disaster management planning and implementation. Each stakeholder's communication, dispatching and other procedural arrangements are governed by its functional role and its related standard operating procedures. Details of specific disaster incident communication protocols are contained in the disaster contingency plans, where such details are required.

Communication during a disaster or major incident needs to be fast and require the provisioning of accurate information. Designated resources that would be favourably positioned to convey messages and collect information would be communications officers who would act as a communication and information coordinating hub and municipal representatives who would be familiar with and trusted by local communities. The involvement of communities is becoming more prominent to ensure resilience and sustainability. At the heart of participative strategies is the requirement for a sustainable municipal representative that communities will trust and allow should meetings be held for capacity building or information dissemination.

The nature of communication and information management before an incident is largely gathering and making information available regarding the incident. During the incident, it is critical to maintaining situational awareness and understanding. In order to fulfil this requirement speed of delivery, accessibility and accuracy are very important. SMSs, direct phone calls and even two-way radios are preferred mechanisms. After an incident, the coordination of recovery actions would need to take place. For this purpose, emails and meetings would be sufficient.

Information Management Systems in FDDM

The Aurecon IIMP Disaster Management information systems was installed through the district and need to be updated. The aim is to standardise the communication between FDDM and its local municipalities.

Early Warning Systems

FDDM depends on the warnings from South African Weather Services (SAWS). Disaster Management Centre must ensure the technical identification and monitoring of prevailing hazards and must prepare and issue hazard warnings of significance to the district. This will entail the development and implement communication mechanisms and strategies to ensure that such warnings are disseminated immediately to reach at-risk communities, areas and developments as speedily as possible.

Early warning can be received from a number of sources or interactions including:

- Local, provincial or national advisory forums;
- National or provincial organs of state;
- Risk or hazard identified during the normal functioning of departments or local municipalities
- Increased frequency of a hazard.

This further emphasises the importance of communication and taking appropriate action if an early warning is received. Effective early warning can lead to adequate prevention and preparedness measures being implemented.

Early Warning through Normal Functioning

In cases where a hazard is encountered and has the potential to develop into a disaster, it is important that appropriate actions are taken. This can include:

- Initiation of preventative or mitigation measures;
- Awareness to create a broader understanding within the public sector and within government sectors; and
- Using reporting structures/channels so that details of identified hazards that have the potential to lead to disasters are appropriately communicated to relevant stakeholders.

This is a continuous process and will be enhanced by a greater understanding of disaster management throughout the district. However, in order to give effect to the above, it would be necessary to incorporate disaster risk reduction into all activities, projects, and development plans in the district. This means that when there is a need for communication with the Advisory Forum when an early warning or disaster hazards are identified/discovered so that the proper attention can be given to the warning/hazard. It is only when Early Warning/hazard becomes mainstreamed as part of disaster risk reduction that the true benefit will be apparent. There is a need for Early Warning of disaster hazards to be communicated to all sectors (various departments within the district). It is only when these are ingrained into the fabric of the employee's functions that proper Early Warning notices are able to be communicated to decision-makers.

Early Warning as a Result of Participation in Provincial Disaster Management Advisory Forum
Disaster Management Advisory Forum for FDDM is active and meet at least once every quarter. The members of the forum consist of representatives from the provincial Disaster Management Centre, the 4 local municipalities in the district as well. As a result, they are

provided with information on risks that affect other municipalities and stakeholders. Risks that negatively impact the district must be addressed proactively by the Inter-governmental Committee.

South African Weather Services (SAWS)

SAWS has an extremely important Early Warning function due to the high percentage of disasters that are weather-related

Impact Based Early Warning

The current traditional Severe Weather Warning System (SWWS) in South Africa issues warnings based on weather-related thresholds. Typically, such warnings could be of “heavy rain with more than 50 mm in 24 hours”. This warning has no real meaning in a local area where only 30 mm, or another area where more than 100 mm of rainfall is required to cause flash flooding that could close bridges or flood properties. An Impact-based (ImpB) Early Warning System (EWS) is not based on weather thresholds, but rather on increasing severity levels of impact, considering the localised socio-economic vulnerability to distinguish between less severe and more severe events. Currently, SAWS is still issuing the traditional threshold warnings as the ImpB EWS is still being piloted/tested while the dissemination tools are being put in place so that the ImpB Warnings can be issued seamlessly. To fully implement ImpB Warnings there will be a need for Local Municipalities to provide information on the impacts that could be expected for their various mandates.

Fire Danger Index

In order for SAWS to comply with the legislative requirements of, for example, the Veld and Forest Fire Act (refer to Chapter 2), it monitors the current and predicted state of the Fire Danger Index (FDI) across South Africa on a daily basis and issues predictions based on the expected future state of FDI over the next few days. As per the requirements of the Veld and Forest Fire Act, the public are furnished with a basic indication (in a binary yes/no sense) whether there is expected to be an “extremely dangerous” level of FDI. For more specialised users, such as NDMC, PDMC, Agriculture and Forestry (forest/plantation managers), SAWS issues more detailed information. The SAWS make use of the Lowveld Fire Index when generating Fire Danger Index (FDI)-related watches and warnings for South Africa. As such, the FDI formula makes use of four (4) basic meteorological parameters, namely: (a) surface (at 2m) air temperature (b) relative humidity (%) (c) Surface wind speed (at 10m) as well as (d) the “antecedent rainfall” occurring over a 21-day period, prior to the current time. When the calculated FDI meets or exceeds 75 (the lower threshold for the “extremely dangerous” category an FDI warning will be generated and distributed to various media (printed, social media, TV, radio, electronic).” This information is of utmost importance for FDDM as it is a semi-arid area with a high risk of fires. It is also through a system of Early Warning that disaster risks can be reduced, and preparedness and mitigation measures implemented.

Early Warning Planning

As FDDM is in the process of reviewing a Level 3 DRMP the Early Warning Planning will be in line with the disaster risk assessment, and this will further enable the District Municipality

to develop more focused early warning mechanisms. This will also impact the dissemination of warnings and appropriate reactions within the district as well as the neighbouring districts. Also important as part of the expansion and improvement of early warning mechanisms is the inclusion of understanding and interpretation of early warning in awareness programmes so the end-user receiving the warning is able to interpret the message correctly.

Contingency Planning

In terms of sections 52 and 53 of the Disaster Management Act, Act 57 of 2002, (the Act) each municipality and municipal organ of state must draft disaster management plans for their area.

“52. Preparation of disaster management plans by municipal organs of a state other than municipalities. — (1) *each municipal organ of a state other than a municipality must—*

- (a) conduct a disaster risk assessment for its functional area;*
- (b) Identify and map risks, areas, ecosystems, communities and households that are exposed or vulnerable to physical and human-induced threats*
- (c) Prepare a disaster management plan setting out—*
 - (i) the way in which the concept and principles of disaster management are to be applied in its functional area, including expected climate change impacts and risks for that municipal entity or administrative unit;*
 - (ii) its role and responsibilities in terms of the national, provincial or municipal disaster management framework;*
 - (iii) its role and responsibilities regarding emergency response and post-disaster recovery and rehabilitation;*
 - (iv) its capacity to fulfil its role and responsibilities;*
 - (v) particulars of its disaster management strategies;*
 - (vi) contingency strategies and emergency procedures in the event of a disaster, including measures to finance these strategies; and*
 - (vii) specific measures taken to address the needs of women, children, the elderly and persons with disabilities during the disaster management process;*
- d) co-ordinate and align the implementation of its plan with those of other organs of state and institutional role-players*
- e) provide measures and indicate how it will invest in disaster risk reduction and climate change adaptation, including ecosystem and community-based adaptation approaches*
- f) develop early warning mechanisms and procedures for risks identified in its functional area*
- g) regularly review and update its plan.”*

To clarify this further it is important to understand the definition of a “municipal organ of state” as defined in the Disaster Management Act no 57 of 2002: “municipal organ of state” means—

- a municipality;
- a department or other administrative unit with- in the administration of a municipality, including an internal business unit, referred to in section 76 (a) (ii) of the Local Government: Municipal Systems Act, 2000; or
- a municipal entity;”

The Disaster Management Centre is therefore responsible for the application of the Act, has to assist and give guidance, but municipal departments, local municipalities and other municipal entities as indicated above are primarily responsible and can be held liable for their Disaster Management Plans. In terms of section 54 of the Act, a Municipality must deal with a local disaster through existing legislation and contingency arrangements, even if a local state of disaster is not declared. In terms of the National Disaster Management Framework, contingency planning is defined as follows; “The forward planning process for an event that may or may not occur, in which scenarios and objectives are agreed, managerial and technical actions defined, and potential response systems put in place to prevent, or respond effectively to an emergency situation.” Contingency plans for all major disaster risks will be developed.

Planning Calendar

There is a seasonal nature to a lot of hazards and events. Examples of these are grass or veld fires that predominantly happen in winter, and events that happen at specific times of the year such as events increased tourist during the Festive Season and Easter Weekend. FDDM Disaster Management Centre will keep a “Planning Calendar” for such events that can be reviewed and reoccurring planning is required on an annual basis.

Funding arrangements

Funding arrangements for disaster management are specified in the National Disaster Management Framework. Section 7.6.2 of the NDMF states that “*Cost expenditure on routine disaster management activities must be funded through the budgets of the relevant organs of state. Preparedness must be funded through the budgets of national, provincial and local organs of state as part of their routine disaster management activities*”. Considering the above it is evident that the municipality must fund and implement disaster management from their own budgets.

Funding of post-disaster recovery and rehabilitation

In the case of post-disaster recovery and rehabilitation, section 56 of the Act states:

“56. Guiding principles (1) This Chapter is subject to sections 16 and 25 of the Public Finance Management Act, 1999, which provide for the use of funds in emergency situations.

(2) When a disaster occurs, the following principles apply:

(a) National, provincial and local organs of state may financially contribute to response efforts and post-disaster recovery and rehabilitation.

(b) The cost of repairing or replacing public sector infrastructure should be borne by the organ of state responsible for the maintenance of such infrastructure.”

Chapter 7: Response

Response ensures effective and appropriate disaster response by implementing immediate integrated and appropriate response measures when significant events or disasters occur or are threatening to occur.

Immediate and effective response

To clarify this, it is important to take note of the first section in the Disaster Management Act, 57 of 2002. The purpose of the Act states the following:

“To provide for—

- an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and **effective response** to disasters and post-disaster recovery and rehabilitation;
- the establishment and functioning of national, provincial and municipal disaster management centres;
- disaster management volunteers; and
- Matters incidental thereto.”
- What constitutes an integrated, coordinated, rapid and effective response? This can only be achieved through planning, implementation and exercise. A Technical Advisory Committee will be appointed by the FDDM District Advisory Forum. A response policy will be drafted. This document must address amongst other factors the following:
 - Effective communication
 - Who is in command?
 - Co-ordination of response

Section 54 of the Disaster Management Act states the following:

“54. Responsibilities in event of a local disaster.—

(1) Irrespective of whether a local state of disaster has been declared in terms of section 55—

(a) the council of a metropolitan municipality is primarily responsible for the co-ordination and management of local disasters that occur in its area; and

(b) the council of a district municipality, acting after consultation with the relevant local municipality, is primarily responsible for the coordination and management of local disasters that occur in its area.

(2) A district municipality and the relevant local municipality may, despite subsection (1) (b), agree that the council of the local municipality assumes primary responsibility for the co-ordination and management of a local disaster that has occurred or may occur in the area of the local municipality.

(3) The municipality having primary responsibility for the co-ordination and management of a local disaster must deal with a local disaster—

(a) in terms of existing legislation and contingency arrangements, if a local state of disaster has not been declared in terms of section 55 (1); or

(b) in terms of existing legislation and contingency arrangements as augmented by by-laws or directions made or issued in terms of section 55(2), if a local state of disaster has been declared” Each of the departments involved has a specific response and/or recovery roles and functions, which includes the following generic requirements.

The Departmental Heads: must ensure that Disaster Risk Management Plans are compiled and maintained within their respective departments, with specific reference to the following:

- Compilation of pro-active departmental disaster risk management programmes to support disaster risk reduction;
- Compilation of reactive departmental disaster management plans to ensure service continuation during emergency/disaster situations;
- Submit departmental disaster management plans to the Head of Disaster Management and ensure regular review of such plans; and
- Provide a representative at the Disaster Operations Centre if this has been activated.

Section 55 of the Disaster Management Act stipulates the following:

“55. Declaration of the local state of disaster. —

(1) In the event of a local disaster the council of a municipality having primary responsibility for the co-ordination and management of the disaster may, by notice in the Provincial Gazette, declare a local state of disaster if—

(a) existing legislation and contingency arrangements do not adequately provide for that municipality to deal effectively with the disaster; or

(b) other special circumstances warrant the declaration of a local state of disaster

(2) If a local state of disaster has been declared in terms of subsection (1), the municipal council concerned may, subject to subsection (3), make by-laws or issue directions, or authorise the issue of directions, concerning—

(a) the release of any available resources of the municipality, including stores, equipment, vehicles and facilities;

(b) the release of personnel of the municipality for the rendering of emergency services;

(c) the implementation of all or any of the provisions of a municipal disaster management plan that are applicable in the circumstances;

(d) the evacuation to temporary shelters of all or part of the population from the disaster-stricken or threatened area if such action is necessary for the preservation of life;

(e) the regulation of traffic to, from or within the disaster-stricken or threatened area;

(f) the regulation of the movement of persons and goods to, from or within the disaster-stricken or threatened area;

(g) the control and occupancy of premises in the disaster-stricken or threatened area;

(h) the provision, control or use of temporary emergency accommodation;

(i) the suspension or limiting of the sale, dispensing or transportation of alcoholic beverages in the disaster-stricken or threatened area;

(j) the maintenance or installation of temporary lines of communication to, from or within the disaster area;

(k) the dissemination of information required for dealing with the disaster;

(l) emergency procurement procedures;

- (m) the facilitation of response and post-disaster recovery and rehabilitation; or
 - (n) other steps that may be necessary to prevent an escalation of the disaster, or to alleviate, contain and minimise the effects of the disaster.
- (3) The powers referred to in subsection (2) may be exercised only to the extent that this is necessary for the purpose of—
- (a) assisting and protecting the public;
 - (b) providing relief to the public;
 - (c) protecting property;
 - (d) preventing or combating disruption; or
 - (e) dealing with the destructive and other effects of the disaster.
- (4) By-laws made in terms of subsection (2) may include by-laws prescribing penalties for any contravention of the by-laws.
- (5) A municipal state of disaster that has been declared in terms of subsection (1)—
- (a) lapses three months after it have so been declared;
 - (b) may be terminated by the council by notice in the Provincial Gazette before it lapses in terms of paragraph (a); and
 - (c) may be extended by the council by notice in the Provincial Gazette for one month at a time before it lapses in terms of paragraph (a) or the existing extension is due to expire.”

FDDM Disaster Management Centre will draft these bylaws and have them approved with the provision that they should only be valid if the State of Disaster has been declared.

Declaration of a state of disaster

There are a number of sections in Act 57 of 2002 as amended Act 16 of 2015 that contains stipulations that affect the declarations of a Disaster. These sections include:

- Section 2. Instances where the Disaster Management Act does not apply;
- Section 23. Classification and recording of Disasters. When is a Disaster a:
 - Local Disaster
 - Provincial Disaster
 - National Disaster
- Section 27. Declaration of a National state of Disaster
- Section 35. Disaster occurring or threatening to occur in provinces
- Section 41. Declaration of Provincial state of Disaster
- Section 49. Disasters occurring or threatening to occur in municipal areas
- Section 55. Declaration of a local state of Disaster

It is important to note that none of these sections can be applied in isolation and cognisance should be taken of all these sections during the declaration of a Disaster. The following section highlights these stipulations that are more applicable to declaring a Local state of Disaster.

Section 2. Instances Where the Disaster Management Act Does Not Apply

“2. Application of Act. (1) This Act does not apply to an occurrence falling within the definition of “disaster” in sections 1—

- (a) if, and from the date on which, a state of emergency is declared to deal with that occurrence in terms of the State of Emergency Act, 1997 (Act No. 64 of 1997); or
- (b) to the extent that that occurrence can be dealt with effectively in terms of other national legislation—
 - (i) aimed at reducing the risk, and addressing the consequences, of occurrences of that nature; and
 - (ii) identified by the Minister by notice in the Gazette.
- (2) The Minister may, in consultation with Cabinet members responsible for the administration of national legislation referred to in subsection (1) (b), issue guidelines on the application of that subsection.
- (3) Where provincial legislation regulating disaster management in a province is inconsistent with this Act, this Act prevails over the provincial legislation subject to section 146 of the Constitution.”

Section 23. Classification and Recording of Disasters

- “23. Classification and recording of disasters. (1) When a disastrous event occurs or threatens to occur, the National Centre must, for the purpose of the proper application of this Act, determine whether the event should be regarded as a disaster in terms of this Act and if so, the National Centre must immediately—
- (a) assess the magnitude and severity or potential magnitude and severity of the disaster;
 - (b) classify the disaster as a local, provincial or national disaster in accordance with subsections (4), (5) and (6);
 - (b) inform the relevant provincial disaster management centre of the decision on the classification of the disaster made in terms of paragraph (b); and
 - (c) record the prescribed particulars concerning the disaster in the prescribed register.
- (2) When assessing the magnitude and severity or potential magnitude and severity of a disaster, the National Centre—
- (a) must consider any information and recommendations concerning the disaster received from a provincial or municipal disaster management centre in terms of section 35 or 49; and
 - (b) may enlist the assistance of an independent assessor to evaluate the disaster on-site.
- (3) The National Centre may reclassify a disaster classified in terms of subsection (1) (b) as a local, provincial or national disaster at any time after consultation with the relevant provincial or municipal disaster management centres if the magnitude and severity or potential magnitude and severity of the disaster are greater or lesser than the initial assessment.
- (4) A disaster is a local disaster if—
- (a) it affects a single metropolitan, district or local municipality only; and
 - (b) the municipality concerned, or, if it is a district or local municipality, that municipality either alone or with the assistance of local municipalities in the area of the district municipality is able to deal with it effectively.
- (5) A disaster is a provincial disaster if—
- (a) it affects—
 - (i) more than one metropolitan or district municipality in the same province; or

(ii) a single metropolitan or district municipality in the province and that metropolitan municipality, or that district municipality with the assistance of the local municipalities within its area, is unable to deal with it effectively; and

(b) the province concerned is able to deal with it effectively.

(6) A disaster is a national disaster if it affects—

(a) more than one province; or

(b) a single province that is unable to deal with it effectively.

(7) Until a disaster is classified in terms of this section, the disaster must be regarded as a local disaster.

(8) The classification of a disaster in terms of this section designates primary responsibility to a particular sphere of government for the co-ordination and management of the disaster, but an organ of state in another sphere may assist the sphere having primary responsibility to deal with the disaster and its consequences.”

7.2.3 Section 49. Disasters Occurring or Threatening to Occur in Municipal Areas

“49. Disaster occurring or threatening to occur in municipal areas.—

(1) When a disastrous event occurs or is threatening to occur in the area of a municipality, the disaster management centre of the municipality concerned must determine whether the event should be regarded as a disaster in terms of this Act, and, if so, must immediately—

(a) initiate efforts to assess the magnitude and severity or potential magnitude and severity of the disaster;

(b) inform the National Centre and the relevant provincial disaster management centre of the disaster and its initial assessment of the magnitude and severity or potential magnitude and severity of the disaster;

(c) alert disaster management role-players in the municipal area that may be of assistance in the circumstances; and

(d) initiate the implementation of any contingency plans and emergency procedures that may be applicable in the circumstances.

(2) When informing the National Centre and the relevant provincial disaster management centre in terms of subsection (1) (b), the municipal disaster management centre may make such recommendations regarding the classification of the disaster as may be appropriate.”

7.2.4 Section 55. Declaration of a Local State of Disaster

“55. Declaration of the local state of disaster. —

(1) In the event of a local disaster the council of a municipality having primary responsibility for the co-ordination and management of the disaster may, by notice in the Provincial Gazette, declare a local state of disaster if—

(a) existing legislation and contingency arrangements do not adequately provide for that municipality to deal effectively with the disaster; or

(b) other special circumstances warrant the declaration of a local state of disaster.

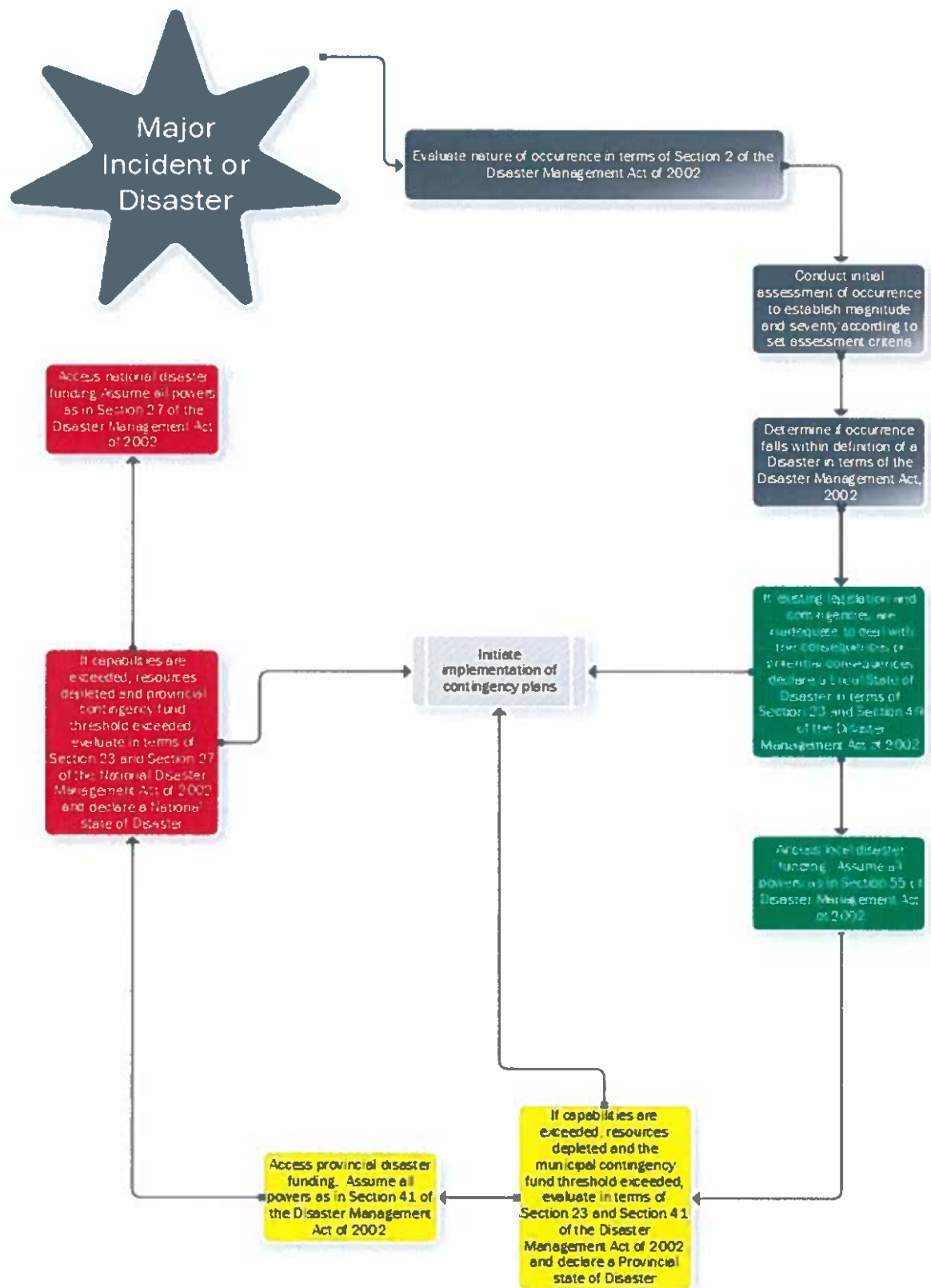
(2) If a local state of disaster has been declared in terms of subsection (1), the municipal council concerned may, subject to subsection (3), make by-laws or issue directions, or authorise the issue of directions, concerning—

(a) the release of any available resources of the municipality, including stores, equipment, vehicles and facilities;

(b) the release of personnel of the municipality for the rendering of emergency services;

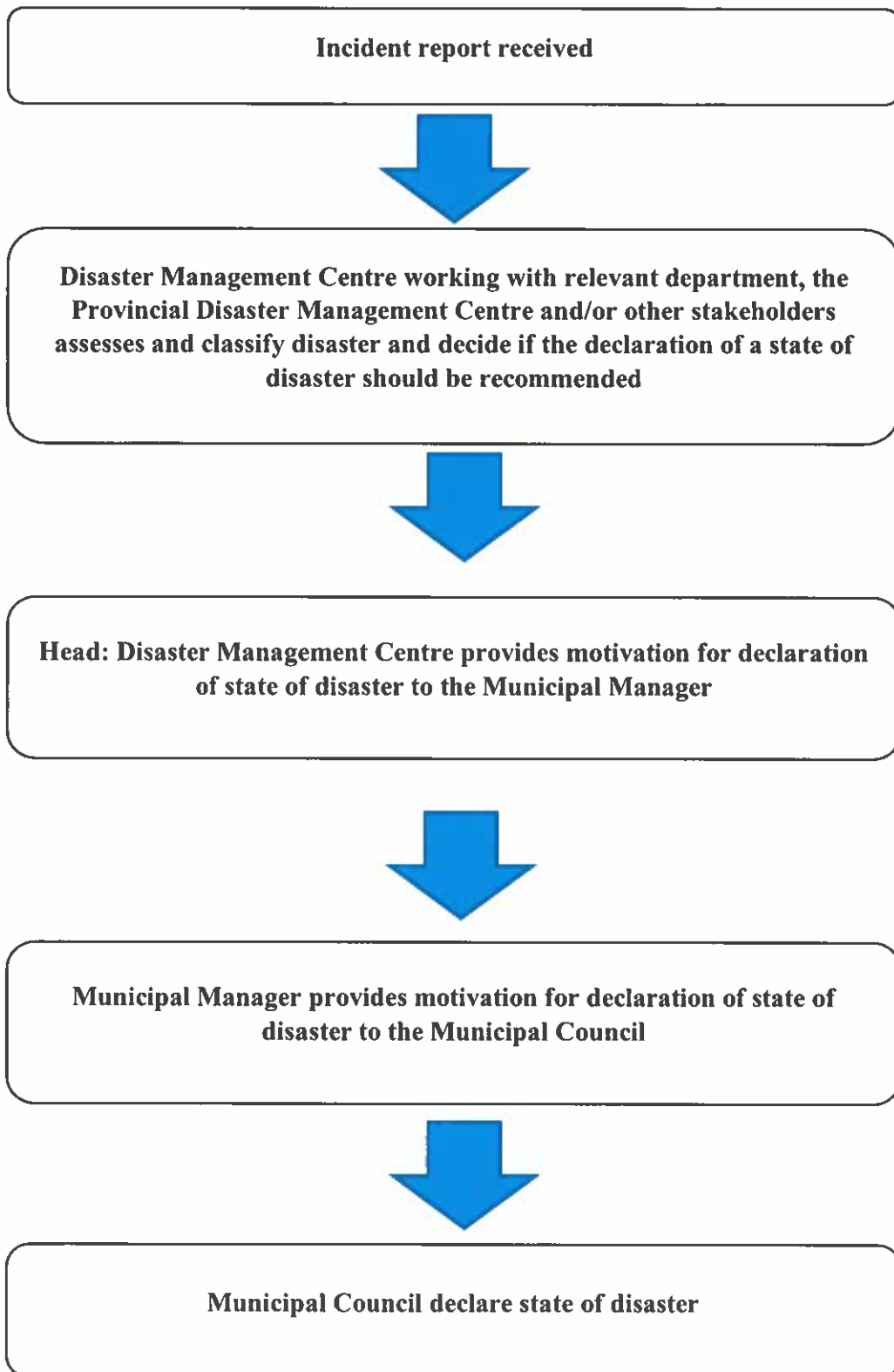
- (c) the implementation of all or any of the provisions of a municipal disaster management plan that are applicable in the circumstances;
 - (d) the evacuation to temporary shelters of all or part of the population from the disaster-stricken or threatened area if such action is necessary for the preservation of life;
 - (e) the regulation of traffic to, from or within the disaster-stricken or threatened area;
 - (f) the regulation of the movement of persons and goods to, from or within the disaster-stricken or threatened area;
 - (g) the control and occupancy of premises in the disaster-stricken or threatened area;
 - (h) the provision, control or use of temporary emergency accommodation;
 - (i) the suspension or limiting of the sale, dispensing or transportation of alcoholic beverages in the disaster-stricken or threatened area;
 - (j) the maintenance or installation of temporary lines of communication to, from or within the disaster area;
 - (k) the dissemination of information required for dealing with the disaster;
 - (l) emergency procurement procedures;
 - (m) the facilitation of response and post-disaster recovery and rehabilitation; or
 - (n) other steps that may be necessary to prevent an escalation of the disaster, or to alleviate, contain and minimise the effects of the disaster.
- (3) The powers referred to in subsection (2) may be exercised only to the extent that this is necessary for the purpose of—
- (a) assisting and protecting the public; (b) providing relief to the public;
 - (c) protecting property;
 - (d) preventing or combating disruption; or
 - (e) dealing with the destructive and other effects of the disaster.
- (4) By-laws made in terms of subsection (2) may include by-laws prescribing penalties for any contravention of the by-laws.
- (5) A municipal state of disaster that has been declared in terms of subsection (1)—
- (a) lapses three months after it have so been declared;
 - (b) may be terminated by the council by notice in the Provincial Gazette before it lapses in terms of paragraph (a); and
 - (c) may be extended by the council by notice in the Provincial Gazette for one month at a time before it lapses in terms of paragraph (a) or the existing extension is due to expire”.

Figure 28: The Process of Declaration of disaster



The internal process following during declaration of a disaster is summarised below

Figure 29: Internal process during declaration of a disaster



Disaster relief

The National Disaster Management Framework defines Relief as follows:

“The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can include the provision of shelter, food, medicine, clothing, water, etc.” FDDM Disaster Management Centre will establish a Technical Task Team to formulate a Disaster Relief Strategy which will inter alia address the following matters:

- Database of resources
- Manpower & resource contingencies
- Effective needs assessments
- Education as part of relief provision and sustainable relief provision, linking to prevention/mitigation
- Relief protocols, including communication
- Emergency kits
- Venues for relief
- Relief reporting
- Funding & procurement

Chapter 8: Recovery

Recovery ensures effective and appropriate disaster recovery by implementing all rehabilitation and reconstruction strategies following a disaster- in an integrated and developmental manner. The aim of this section is to provide an overview of a general logistical system and to provide guidance on conducting planning for logistical support during disaster mitigation activities.

Post-disaster impact assessments

After a disaster, the following disaster impact assessment activities will be undertaken, including an impact analysis relating to;

- Direct and indirect impact on communities;
- Social impact;
- Agricultural impact;
- Infrastructural impact, including critical infrastructure;
- Environmental impact; and
- Economic impact.

Logistics

Whether during disaster response, or while implementing mitigation activities, the basic task of a logistics system is to deliver the appropriate supplies, in good condition, in the quantities required, and at the place and time they are needed. The type of supplies or goods transported in the specific logistical system will be influenced by the operation and activities supported by the logistical system, for example, if the aim is emergency relief, the good might include food or shelter items; while, if a reconstruction or rehabilitation initiative is implemented, the goods transported might include equipment or construction material. Therefore, irrespective of the disaster phase for which the logistical system is required and implemented (prevention, mitigation, response, recovery), some general considerations can be identified.

Role of Logistics in Mitigation Activities

For the purpose of this discussion, Mitigation activities will be considered to include components such as Preparedness, Recovery and Reconstruction. Mitigation activities can generally also be grouped into two levels, namely structural and non-structural. Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts. In terms of logistical systems in support of mitigation activities, and in line with the above-mentioned definition, the aim of mitigation logistics will be to ensure appropriate mitigation related supplies or goods, in good condition, in the quantities required, are available at the place and time they are needed in order to implement preparedness, recovery and reconstruction activities.

Overview of Logistics

The UNDAC indicates that: “Emergency logistics is a “systems exercise” and requires:

- Delivery of the appropriate supplies in good condition, when and where they are needed.
- A wide range of transport is often improvised at the local level.
- Limited, rapid, and specific deliveries from outside the area.
- A system of prioritising various relief inputs.
- Storing, staging, and moving bulk commodities.
- Moving people.
- Coordination and prioritization of the use of limited and shared transport assets; and
- Possible military involvement in logistics support (especially in cases of civil conflict).

The main factors in the operating environment that shape the response is:

- The capacity of the infrastructure.
- Availability and quantity of transport assets in the country.
- Politics of the situation; and
- Civil conflict in the area of operations.

Even though the above relates specifically to ‘Emergency logistics’ the above-mentioned aspects apply equally to logistics during the mitigation phase. Generally speaking, the further down in the logistical flow, the smaller the required vehicles will be. The transportation means will usually start with ships, trains or aircraft, through big trucks with trailers or semi-trailers, to smaller trucks or even smaller 4x4 vehicles.

Required Facilities and Equipment

The following function will form part of the logistical system, while a number of facilities will be required to support these functions. These functions and facilities should be considered when developing a logistical plan.

Table 11: Logistical functions and facilities

Logistical Functions	Logistical Facilities
• Management; • Central support; • Procurement; • Port clearance; • Warehouse/storage; • Transport; • Scheduling; • Communications; • Commodity control; and • Distribution control.	• Offices and administrative equipment; • Warehouses at various levels; • Fuel and spares stores; • Workshops; • Vehicle parks; • Vehicles for management staff; • Fleets of trucks; • Special vehicles such as cranes, tankers and cargo-handling machines; • Communications equipment; and • Accommodations.

Role Players in Logistics

Several role-players are involved in the logistical process and should be considered in the logistical planning process. Some of the role-players involved in emergencies include:

- **Multilateral agencies:** In general terms, these are organizations formed by several governments and include disaster assistance among their objectives, such as the United Nations. Their collaboration is generally focused on technical assistance related to the issues dealt with by their different agencies, sending of consultants and experts on these topics, and support to look for and channel assistance resources for the affected country. Multilateral agencies can often provide valuable expertise and support in terms of logistical processes
- **Neighbouring communities or regions:** It is common to have contributions in kind and spontaneous volunteers from municipalities neighbouring the affected area.
- **The national or local government of the affected region or country:** A major event usually brings about the intervention not only of the national authority on disasters but also of other governmental institutions. This is especially the case with logistics, where a range of different role-players need to coordinate activities to ensure the availability, storage, transportation and delivery of goods or people. A key role-player in this regard will include border control/customs departments, who need to ensure the swift processing and transportation of goods through the relevant ports of entry.
- **Military organizations:** Usually they have a wide supply of equipment and experience that may be used to support logistic operations. These include means of transportation, manpower, bridge and road construction, etc. However, the use of this resource must be carefully appraised whenever the army is an active participant in a conflict, as in these cases it may be unwise to use it for security reasons.
- **Non-governmental organizations (NGO):** These may be national or international and include religious and social organizations. The abilities, experience, and resources are usually very varied. There are international NGOs specializing in emergencies and with appropriate intervention skills and resources.
- **Specialized institutions:** These groups may provide crucial technical assistance to deal with specific issues, such as vulnerability analysis, risk mitigation, needs assessment, or other more practical issues such as water quality, medical supply management, etc.
- **The private and commercial sector, national and international:** This section may become involved at different levels ranging from donations to contracting their specialized services (transportation, storage room renting, equipment manufacturing, etc.).
- **Local population:** The inhabitants of the disaster area are the first to provide aid and who also assist with contributions in kind for the victims. The role of local populations, familiar with the affected area, should not be underestimated

The Logistical Plan

Planning and preparedness are vital to establishing an adequate logistics system. This planning should be based on good knowledge of the geographic, social, political, and physical context in which the operations are to be implemented. After a suitable plan has been compiled, it is

also important to ensure effective implementation through the required operations plan. The plan should respond to the following questions with clear, detailed answers:

- Which tasks are to be performed? How do they relate to other activities, and what is the sequence for their implementation?
- Who is responsible for these tasks? (List specific organizations/departments).
- Who will be in charge of the global coordination of the logistics system?
- Which resources will be necessary? How and where will they be acquired?
- Which alternative actions will be implemented in case the defined system breaks down?
- Special procurement process that can be affected by existing procurement-related legislation.

Chapter 9: Information Management and Communication

Purpose: To guide the development of a comprehensive information management and communication system and establish integrated communication links with all disaster risk management role players.

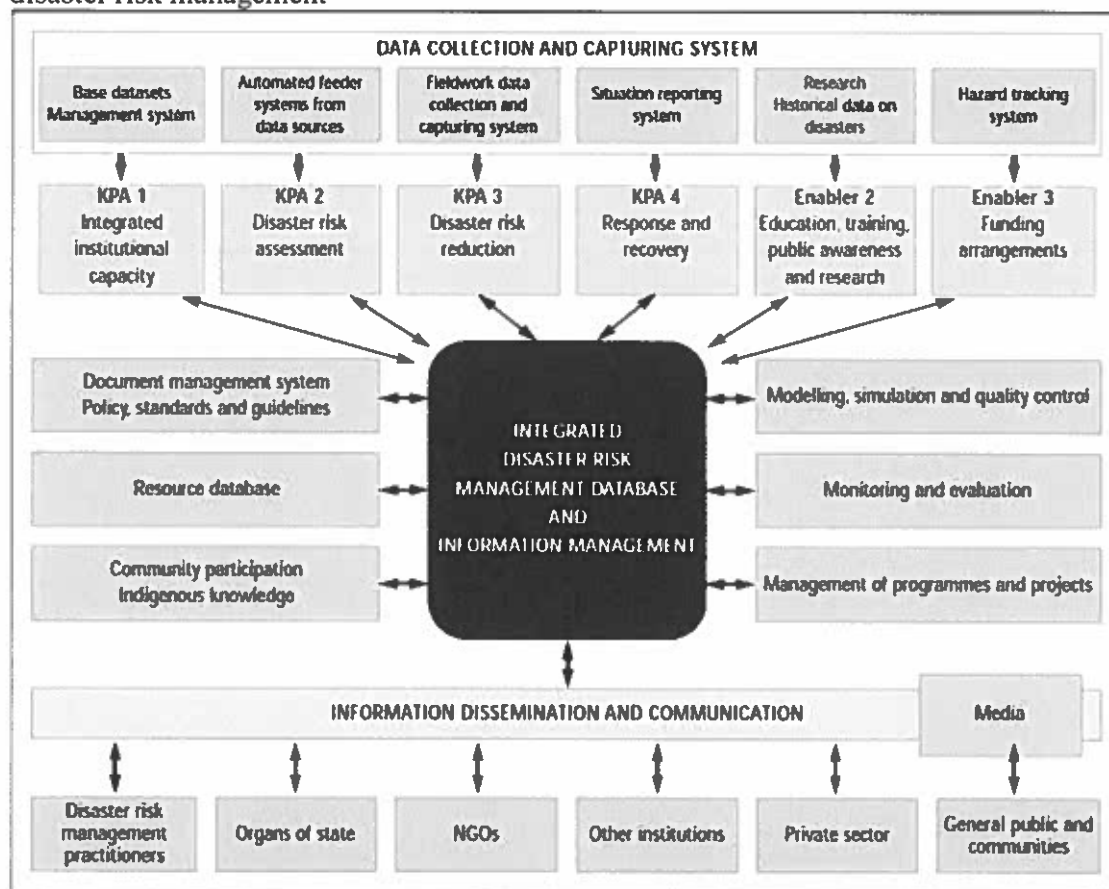
INFORMATION MANAGEMENT AND COMMUNICATION SYSTEM

The information management and communication system required to execute this plan must include the establishment of communication links that must enable the receipt, transmission and dissemination of information between disaster management Centre and those likely to be affected by disaster risks as well as other role players and stakeholders involved in disaster risk management. The design of the system must take into account the lack of technological infrastructure in areas and communities most at risk, as well as telephonic system failures during disasters.

Integrated Information Management and Communication Model

FDDM will adhere to the integrated information management and communication model as contained in the NDMF, summarized below:

Figure 30: Model of an integrated information management and communication system for disaster risk management



Effective communication is paramount to effective disaster management planning and implementation. Each stakeholder's communication, dispatching and other procedural arrangements are governed by its functional role and its related standard operating procedures. Details of specific disaster incident communication protocols are contained in the disaster contingency plans, where such details are required. Communication during a disaster or major incident needs to be fast and require the provisioning of accurate information. Designated resources that would be favourably positioned to convey messages and collect information would be communications officers who would act as a communication and information.

Coordinating hub and municipal representatives who would be familiar with and trusted by local communities. The involvement of communities is becoming more prominent to ensure resilience and sustainability. At the heart of participative strategies is the requirement for a sustainable municipal representative that communities will trust and allow should meetings be held for capacity building or information dissemination.

The nature of communication and information management before an incident is largely gathering and making information available regarding the incident. During the incident, it is critical to maintaining situational awareness and understanding. In order to fulfil this requirement speed of delivery, accessibility and accuracy are very important. SMSs, direct phone calls and even two-way radios are preferred mechanisms. After an incident, the coordination of recovery actions would need to take place. For this purpose, emails and meetings would be sufficient.

Information Management Systems in FDDM

The Aurecon IIMP Disaster Management information systems was installed through the district and need to be updated. The aim is to standardise the communication between FDDM and its local municipalities.

- **Early Warning Systems**

FDDM depends on the warnings from South African Weather Services (SAWS). Disaster Management Centre must ensure the technical identification and monitoring of prevailing hazards and must prepare and issue hazard warnings of significance to the district. This will entail the development and implement communication mechanisms and strategies to ensure that such warnings are disseminated immediately to reach at-risk communities, areas and developments as speedily as possible.

This further emphasises the importance of communication and taking appropriate action if an early warning is received. Effective early warning can lead to adequate prevention and preparedness measures being implemented.

- **Forums and committee participation**

This is a continuous process and will be enhanced by a greater understanding of disaster management throughout the district. However, in order to give effect to the above, it would be necessary to incorporate disaster risk reduction into all activities, projects, and development

plans in the district. This means that when there is a need for communication with the Advisory Forum when an early warning or disaster hazards are identified/discovered so that the proper attention can be given to the warning/hazard. It is only when Early Warning/hazard becomes mainstreamed as part of disaster risk reduction that the true benefit will be apparent. There is a need for Early Warning of disaster hazards to be communicated to all sectors (various departments within the district). It is only when these are ingrained into the fabric of the employee's functions that proper Early Warning notices are able to be communicated to decision-makers.

Chapter 10: Education, Training, Public Awareness & Research- Enabler 2

To promote a culture of risk avoidance among stakeholders by capacitating role players through integrated education, training and public awareness programmes informed by scientific research. Communication and stakeholder participation in disaster risk management in FDDM will be executed through a consultative process, education and public awareness, initiated by FDDM disaster management function. These processes will include the development of disaster risk management information leaflets, training programmes, media and local-level meetings with disaster risk management role players, including nongovernmental institutions (to be preferably invited / co-opted on the local disaster management committee) and the local traditional and community leaders, schools, clinics and communities.

Although the main responsibility to plan for, ensure budgeting and executing education, training and research (and the publication and communication of the results thereof) lies with the FDDM disaster management function, local Municipalities and Municipal departments, organs of state and municipal entities will also address these elements pro-actively. This will be co-ordinated through to the FDDM disaster management function and the results communicated to the Free State Province Provincial DMC, NDMC and the local disaster management committee. Training on disaster risk management in FDDM will be in accordance with the NDMF and National Guidelines in this regard. Training can be of an accredited or non-accredited nature. Practical, 'hands-on' training of FDDM disaster management officials need to be executed to ensure that at least the following capabilities have been efficiently established in the FDDM disaster management function:

- Public Awareness: Public Awareness is ongoing
- Education: to have brochures for disaster management for primary schools
- Training: training of staff on emergency evacuation
- Integrating all of the above into an effective FDDM Disaster Management operation.

Communication and stakeholder participation in disaster risk management in the FDDM is executed through a consultative process, education and public awareness, initiated by FDDM disaster management function. These processes includes the development of disaster risk management information leaflets, training programmes, media and local-level meetings with disaster risk management role players, including nongovernmental institutions (to be preferably invited / co-opted on the local disaster management committee) and the local traditional and community leaders, schools, clinics and communities.

As part of gathering indigenous knowledge (part of detailed hazard identification), at municipal level, local communities and structures will be orientated on the requirements of the Act and the specific element and information required from them in terms of the Act. Through the hazard identification and disaster information management dissemination processes, indigenous knowledge via local communities and local structure representatives will consequently be directly acquired and involved.

Cross-border disaster risk management co-operation and co-planning is crucial and will be facilitated through FDDM disaster management function within the protocols of Government and as made provision for in section 1.4.4 and 1.4.5 of the NDMF. Memoranda of Understanding will be signed with bordering Municipalities, districts and Provinces (*section 33 (4) of the Act and sections 1.2.4.1, 1.2.5.1, 1.4.4 and 1.4.5 of the NDMF*). Disaster risk management actions and initiatives, such as result of important meetings and new projects, will be communicated to the communities' via media or otherwise.

FDDM Disaster Management, along with the district, Provincial and Municipal organs of state and local municipalities will also formulate and implement appropriate disaster risk management public awareness programmes that are aligned with the national disaster risk management public awareness strategy and will play an active part in engaging schools to ensure a practical approach to education and awareness programmes. School disaster risk management awareness programmes in the FDDM will be conducted, assessed and adapted on an annual basis.

Community resilience-building is crucial and a first capacity-building priority is the consultative development of a uniform approach to community-based risk assessment for municipalities and non-governmental and community-based organisations throughout FDDM this will contribute considerably to closer links between disaster risk reduction and development planning in disaster-prone areas and communities.

Chapter 11: Funding Arrangements for Disaster Risk Management- Enabler 3

This chapter explores the establishment of funding mechanisms for disaster risk management for FDDM

RECOMMENDED FUNDING ARRANGEMENTS

The table below provides an overview of the recommended funding mechanisms for each of the five disaster risk management activities. Funding arrangements for disaster risk management are specified in the NDMF as indicated below and these guidelines will be followed in FDDM

Chapter 12: Testing and reviewing of the Plan

This chapter is the Testing and review of the plan which simply set out the testing and review of the plan.

12.1 Evaluation of response and contingency planning

An assessment or evaluation of the response efforts of the various departments and role-players. The results from the assessment will be used to determine the overall impact of the event on the Municipality, identify gaps in the current disaster contingency plans, and also identify suitable improvements required to increase the resilience of the Municipality to disasters or extreme events. This should be achieved by performing an analysis of the response efforts of the various departments and role-players after a disaster event. This can be achieved by firstly recapping the events according to records kept during the occurrence.

Study among others the following:

- How was decision making? What needs to change to make this effective?
- Were the resources adequate or were gaps identified?
- Were the contingencies adequate, or do they need to be revised?
- How was the communication? Was gaps or problems identified?
- What is the standard of personnel, were there gaps that need to be addressed through training?

This emphasises the need for simulations and exercises, especially to evaluate response before the occurrence of major incidents or Disasters.

12.2 Integrated Reporting, Monitoring and Evaluation

Section 48 of the Disaster Management Act requires that FDDM Disaster Management Centre must monitor compliance in terms of Section 52 and Section 53 of the Disaster Management Act. FDDM Disaster Management Centre must also report on these monitoring initiatives. Taking into consideration the requirements of the National Disaster Management Framework, the following approach will be followed in this regard;

- Reviewing the results of disasters and major incidents in areas where these have occurred and developing contingency arrangements in the interim from lessons learned. This is a simplified example and does not aim to replace any formal reporting templates prescribed by the Provincial Disaster Management Centre or National Disaster Management Centre.
- Conducting rehearsal and simulation exercises.
- Constant progress reporting to the Provincial Disaster Management Centre and National Disaster Management Centre, as may be required by these institutions and reports to the Municipal Council as required by Council.

Disaster Incident Reporting will occur in the formats prescribed by the Municipality and/or Provincial Disaster Management Centres externally and in the formats required by the Municipal Council internally. The Head of the Disaster Management Centre should have direct access and report to the Municipal Manager in the case of a major incident or disaster. Integrated reporting, monitoring and evaluation.

12.3 Simulations Exercises and Drills

To respond effectively to the impact of disasters it is necessary to have a preparedness and response plan to facilitate organised and coordinated actions during an event. Plans are not theoretical exercises: they must be tested frequently so that they can be evaluated, adapted, and updated before and after an actual event. Simulation exercises and drills are among the most useful tools for evaluating and testing these plans, and they have been used systematically over the years by organisations that work in disaster preparedness and response. They are also excellent tools for training, evaluating tools and procedures, decision-making exercises, developing teamwork, and internal and external coordination.

12.4 Seminars

With seminars, a topic, or a number of topics are discussed in a group format. This can almost be seen as a brainstorming session where a hazard, risk or the occurrence of a disaster is discussed important discussion points are noted for incorporation into contingency and other plans. What is also important is that a “disaster risk reduction” mind-set is facilitated by participation in a seminar. The advantage of seminars is that it has little or no cost and can be conducted on regular basis. A short seminar can for example be conducted at the end of an Advisory Forum meeting.

12.5 Simulations

A simulation is a table top exercise that recreates a hypothetical disaster scenario where a group of participants must make decisions based on information that they receive during the exercise. Each participant is assigned a role in the exercise that can match his or her actual occupation. The events in the exercise happen in “simulated time” (representing days or weeks), during which the players receive information about situations that might arise during an emergency or disaster.

12.6 Drills

A drill is a practical exercise in managing operations that simulates damage and injuries in a hypothetical emergency situation. Participants face mock situations, using the skills and techniques that would be applied in real situations. Unlike the simulation exercises described in the previous section, drills require the actual mobilization and use of personnel and material resources. Drills allow for the evaluation of procedures, tools, skills, and individual and institutional capacity in relation to disaster preparedness and response. Drills are carried out in “real” time and each of the participants assumes the role that he or she customarily performs in his/her regular work. Others will perform as victims or other roles.

Chapter 13: Contact details and reference documents

This chapter provides contact details and information on the material relevant to the plan.

In terms of the NDMC guidelines, this chapter requires the contact details of role players and stakeholders as well as the reference documents referred to in the contents of the plan. This section is a dynamic section as the contact details and reference documents listed below may change frequently. An example of contact details that may change, is when a senior stakeholder is no longer part of the organisation and another is appointed in that space. An example of reference documents that may change is when key equipment is removed for an extended period and contingency arrangements need to be changed to take this into consideration.

Since a Disaster Management Plan is required by Section 26(g) of Municipal System Act 32 of 2000 (Local Government Systems Act) and Section 53(2) of Act 57 of 2002 as amended (Disaster Management Act) to be included in the Integrated Development Plan (IDP) of a Municipality, as a core component, it would be necessary to for the Municipal Council to approve any amendments to the Disaster Management Plan. The IDP would have been approved by the council and therefore any changes to an approved resolution of the council would have to be rescinded and re-approved.

The reference documents included in a Disaster Management Plan (DMP) are critical for ensuring the plan is legally compliant, contextually relevant, and aligned with national and municipal frameworks. These documents serve as the foundation and guidance for developing, implementing, and reviewing the plan. They are both external and internal documents.

List of reference Documents

- National Disaster Management Act 57 of 2002
- National Disaster Management Framework of 2005
- Contact List
- FDDM Integrated Development Plan (IDP)
- FDDM Service Delivery and Budget Implementation Plan (SDBIP)
- FDDM Spatial Development Framework
- FDDM Risk Profile (which includes hazard and vulnerability assessments)

Table 12: FDDM Contact List

Institution	Personnel	Contacts
Fezile Dabi District Municipality	Mr. Mathibe	082 779 0533
	Mrs. Lemeko-Mogoera	082 924 8443
	Mr. Khambule	082 776 0519
Mafube Local Municipality	Mr. Tsotetsi	082 936 6211
	Mr. Tshabalala	074 725 8525

Ngwathe Local Municipality	Mr. Chochoe	083 240 0087 067 1934258
Metsimaholo Local Municipality	Ms. Maubane	082 976 3729 073 943 8831
	Ms. Mavundla	079 570 9846
Moqhaka Local Municipality	Mr. Rakgase	081 342 5812 072 474 1729 072 643 9814
Provincial Disaster Management Centre	Ms. Nkosi	066 487 4878
	Ms. Mokoena	079 163 8043
Ngwathe Local Municipality		
Mr. Chochoe	Disaster Management	083 240 0087 067 1934258
Control Room	Fire & Rescue Services	056 811 1111 056 811 5834 082 909 3464
Moqhaka Local Municipality		
Mr. Rakgase	Disaster Management	081 342 5812 072 474 1729 072 643 9814
Ms. Sothoane	Disaster Management	073 834 1792
Mr. Nkumbi	Fire & Rescue Services	073 078 4142
Control Room	Fire & Rescue Services	056 216 9111 066 327 6804
Metsimaholo Local Municipality		
Ms. Maubane	Disaster Management	082 976 3729 073 943 8831
Ms. Mavundla	Disaster Management	079 570 9846
Mr. Mkhwanazi	Fire & Rescue Services	073 430 2766
Control Room	Fire & Rescue Services	016 973 0946 080 037 5370
Ms. Mareletse	Traffic	083 406 0614
Mafube Local Municipality		
Mr. Khambule	Disaster Management	082 776 0519
Mr. Tsotetsi	Disaster Management	082 936 6211
Mr. Tshabalala	Disaster Management	074 725 8525
Control Room	Fire & Rescue Services	058 813 1500
SAPS		
Col. Kock	Search & Rescue	083 463 2520
W/O	Search & Rescue	079 889 7767
District JOC	District	071 682 5910

Recommendations

- It is recommended that the contact list will be updated on a regular basis.

- The Disaster Management plan must be reviewed annually and any amendments thereto must be submitted to the DDMC and PDMC.
- A final document will be circulated to FDDM Disaster Management Centre, Provincial Disaster Management Centre, and relevant stakeholders.

Monitoring and updating of plan

Section 53 of Disaster Management Act (Act No. 57 of 2002) stipulates that FDDM disaster management centre must:

- Monitor progress with the preparation and regular updating of disaster management plans and strategies by the district and municipal organs of state involved in disaster management in the district.
- Monitor formal and informal prevention, mitigation and response initiatives by the district and municipal organs of state, the private sector, nongovernmental organizations and communities, including the integration of these initiatives with development plans.
- Monitor the compliance in the province with key performance indicators in respect of the various aspects of disaster management. Measure the performance and evaluate such progress and initiatives from time to time.

Conclusion

The Fezile Dabi District Municipality Disaster Management Plan aims to enhance disaster resilience by adopting proactive measures, strengthening coordination among stakeholders, and ensuring effective response and recovery strategies. Stakeholder collaboration and community involvement remain critical in mitigating the impact of disasters in the region.

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